UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

FORM 10-Q

(Mark One)

☒ **QUARTERLY REPORT UNDER SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the quarterly period ended December 31, 2018

☐ **TRANSITION REPORT UNDER SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

Commission file number 001-38042

ARROWHEAD PHARMACEUTICALS, INC.

(Exact name of registrant as specified in its charter)

Delaware	**46-0408024**
(State of incorporation)	**(I.R.S. Employer Identification No.)**

225 S. Lake Avenue, Suite 1050
Pasadena, California 91101
(626) 304-3400
(Address and telephone number of principal executive offices)

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer”, “smaller reporting company” and “emerging growth company” in Rule 12b-2 of the Exchange Act.

Large accelerated	☐	Accelerated filer	☒
Non-accelerated filer	☐ (Do not check if a smaller reporting company)	Smaller reporting company	☐
Emerging growth company	☐		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

The number of shares of the registrant’s common stock outstanding as of February 6, 2019 was 94,207,393.

PART I. FINANCIAL INFORMATION

ITEM 1. FINANCIAL STATEMENTS

Arrowhead Pharmaceuticals, Inc.
Consolidated Balance Sheets

	(unaudited) December 31, 2018	September 30, 2018
ASSETS		
CURRENT ASSETS		
Cash and cash equivalents	$ 189,772,981	$ 30,133,213
Accounts receivable	3,168,578	327,375
Prepaid expenses	1,550,437	1,267,717
Other current assets	478,310	640,117
Short term investments	53,980,307	46,400,176
TOTAL CURRENT ASSETS	248,950,613	78,768,598
Property and equipment, net	13,920,667	13,935,425
Intangible assets, net	18,338,903	18,764,010
Long term investments	59,595,287	-
Other assets	141,918	141,918
TOTAL ASSETS	**$ 340,947,388**	**$ 111,609,951**
LIABILITIES AND STOCKHOLDERS' EQUITY		
CURRENT LIABILITIES		
Accounts payable	$ 3,936,590	$ 2,806,098
Accrued expenses	3,907,515	5,043,087
Accrued payroll and benefits	1,629,871	3,937,605
Deferred rent	212,159	307,334
Deferred revenue	124,925,638	600
Note Payable	-	223,820
Other current liabilities	-	46,407
TOTAL CURRENT LIABILITIES	134,611,773	12,364,951
LONG-TERM LIABILITIES		
Deferred rent, net of current portion	1,664,182	1,702,801
Deferred revenue, net of current portion	33,171,402	-
Note Payable, net of current portion	-	2,101,198
Other non-current liabilities	-	200,000
TOTAL LONG-TERM LIABILITIES	34,835,584	4,003,999
Commitments and contingencies (Note 7)		
STOCKHOLDERS' EQUITY		
Arrowhead Pharmaceuticals, Inc. stockholders' equity:		
Common stock, $0.001 par value; 145,000,000 shares authorized; 92,591,457 and 88,505,302 shares issued and outstanding as of December 31, 2018 and September 30, 2018, respectively	184,961	180,875
Additional paid-in capital	647,142,565	582,902,694
Accumulated other comprehensive income (loss)	(43,744)	(21,564)
Accumulated deficit	(475,228,563)	(487,265,816)
Total Arrowhead Pharmaceuticals, Inc. stockholders' equity	172,055,219	95,796,189
Noncontrolling interest	(555,188)	(555,188)
TOTAL STOCKHOLDERS' EQUITY	171,500,031	95,241,001
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	**$ 340,947,388**	**$ 111,609,951**

The accompanying notes are an integral part of these unaudited consolidated financial statements.

Arrowhead Pharmaceuticals, Inc.
Consolidated Statements of Operations and Comprehensive Income (Loss)
(unaudited)

	Three Months Ended December 31,	
	2018	**2017**
REVENUE	**$ 34,657,896**	**$ 3,509,821**
OPERATING EXPENSES		
Research and development	17,572,043	12,919,618
General and administrative expenses	6,139,709	4,403,551
TOTAL OPERATING EXPENSES	**23,711,752**	**17,323,169**
OPERATING INCOME (LOSS)	10,946,144	(13,813,348)
OTHER INCOME (EXPENSE)		
Interest income (expense), net	1,091,109	163,731
Change in value of derivatives	-	450,739
TOTAL OTHER INCOME (EXPENSE)	**1,091,109**	**614,470**
INCOME (LOSS) BEFORE INCOME TAXES	**12,037,253**	**(13,198,878)**
Provision for income taxes	-	-
NET INCOME (LOSS)	**12,037,253**	**(13,198,878)**
NET INCOME (LOSS) PER SHARE - BASIC	$ 0.13	$ (0.18)
NET INCOME (LOSS) PER SHARE - DILUTED	$ 0.13	$ (0.18)
Weighted average shares outstanding - basic	91,091,823	74,831,415
Weighted average shares outstanding - diluted	95,590,183	74,831,415
OTHER COMPREHENSIVE INCOME (LOSS), NET OF TAX:		
Foreign Currency Translation Adjustments	(22,180)	(9,528)
COMPREHENSIVE INCOME (LOSS)	**$ 12,015,073**	**$ (13,208,406)**

The accompanying notes are an integral part of these unaudited consolidated financial statements.

Arrowhead Pharmaceuticals, Inc.
Consolidated Statement of Stockholders' Equity
(unaudited)

	Common Stock	Amount ($)	Additional Paid-In Capital	Accumulated Other Comprehensive Income (loss)	Accumulated Deficit	Non-controlling Interest	Totals
Balance at September 30, 2018	**88,505,302**	**$ 180,875**	**$ 582,902,694**	**$ (21,564)**	**$ (487,265,816)**	**$ (555,188)**	**$ 95,241,001**
Stock-based compensation	-	-	2,717,534	-	-	-	2,717,534
Exercise of stock options	166,327	166	1,004,528	-	-	-	1,004,694
Common stock- Restricted Stock Units vesting	658,959	659	(659)	-	-	-	-
Common stock issued for cash	3,260,869	3,261	60,518,468	-	-	-	60,521,729
Foreign currency translation adjustments	-	-	-	(22,180)	-	-	(22,180)
Net income for the three months ended December 31, 2018	-	-	-	-	12,037,253	-	12,037,253
Balance at December 31, 2018	**92,591,457**	**$ 184,961**	**$ 647,142,565**	**$ (43,744)**	**$ (475,228,563)**	**$ (555,188)**	**$ 171,500,031**

The accompanying notes are an integral part of these unaudited consolidated financial statements.

Arrowhead Pharmaceuticals, Inc.
Consolidated Statements of Cash Flows
(unaudited)

	Three Months Ended December 31,	
	2018	**2017**
CASH FLOWS FROM OPERATING ACTIVITIES:		
Net income (loss)	$ 12,037,253	$ (13,198,878)
Change in value of derivatives	-	(450,739)
Stock-based compensation	2,717,534	2,092,541
Depreciation and amortization	1,177,352	1,141,173
Amortization/(accretion) of note premiums	(156,637)	107,783
Changes in operating assets and liabilities:		
Accounts receivable	(2,841,204)	(82,134)
Prepaid expenses and Other Current Assets	(120,912)	(29,223)
Deferred revenue	158,096,440	(3,394,740)
Accounts payable	1,130,491	1,630,533
Accrued expenses	(3,489,712)	(2,550,703)
Other	(265,842)	43,907
NET CASH PROVIDED BY (USED IN) OPERATING ACTIVITIES	168,284,763	(14,690,480)
CASH FLOWS FROM INVESTING ACTIVITIES:		
Purchases of property and equipment	(737,487)	(135,414)
Purchases of marketable securities	(69,271,001)	(5,018,040)
Proceeds from sale of marketable securities	2,252,219	6,510,420
NET CASH PROVIDED BY (USED IN) INVESTING ACTIVITIES	(67,756,269)	1,356,966
CASH FLOWS FROM FINANCING ACTIVITIES:		
Principal payments on notes payable	(2,415,149)	(197,790)
Proceeds from the exercises of warrants and stock options	1,004,694	224,082
Proceeds from the issuance of common stock	60,521,729	-
NET CASH PROVIDED BY (USED IN) FINANCING ACTIVITIES	59,111,274	26,292
NET INCREASE (DECREASE) IN CASH	159,639,768	(13,307,222)
CASH AT BEGINNING OF PERIOD	30,133,213	24,838,567
CASH AT END OF PERIOD	$ 189,772,981	$ 11,531,345
Supplementary disclosures:		
Interest Paid	$ (27,437)	$ (44,722)

The accompanying notes are an integral part of these consolidated financial statements.

Unless otherwise noted, (1) the term "Arrowhead" refers to Arrowhead Pharmaceuticals, Inc., a Delaware corporation and its Subsidiaries, (2) the terms "Company," "we," "us," and "our," refer to the ongoing business operations of Arrowhead and its Subsidiaries, whether conducted through Arrowhead or a subsidiary of Arrowhead, (3) the term "Subsidiaries" refers collectively to Arrowhead Madison Inc. ("Arrowhead Madison"), Arrowhead Australia Pty Ltd ("Arrowhead Australia") and Ablaris Therapeutics, Inc. ("Ablaris"), (4) the term "Common Stock" refers to Arrowhead's Common Stock, (5) the term "Preferred Stock" refers to Arrowhead's Preferred Stock and (6) the term "Stockholder(s)" refers to the holders of Arrowhead Common Stock.

NOTE 1. *ORGANIZATION AND SIGNIFICANT ACCOUNTING POLICIES*

Nature of Business and Recent Developments

Arrowhead Pharmaceuticals, Inc. develops medicines that treat intractable diseases by silencing the genes that cause them. Using a broad portfolio of RNA chemistries and efficient modes of delivery, Arrowhead therapies trigger the RNA interference mechanism to induce rapid, deep and durable knockdown of target genes. RNA interference, or RNAi, is a mechanism present in living cells that inhibits the expression of a specific gene, thereby affecting the production of a specific protein. Arrowhead's RNAi-based therapeutics leverage this natural pathway of gene silencing. The Company's pipeline includes ARO-AAT for liver disease associated with alpha-1 antitrypsin deficiency (AATD), ARO-APOC3 for hypertriglyceridemia, ARO-ANG3 for dyslipidemia, ARO-ENaC for cystic fibrosis, and ARO-HIF2 for renal cell carcinoma. ARO-LPA (AMG 890) for cardiovascular disease was out-licensed to Amgen Inc. in 2016. ARO-AMG1 for an undisclosed genetically validated cardiovascular target is under a license and collaboration agreement with Amgen Inc. ARO-HBV for chronic hepatitis B virus was out-licensed to Janssen Pharmaceuticals, Inc. in October 2018.

Arrowhead operates a lab facility in Madison, Wisconsin, where the Company's research and development activities, including the development of RNAi therapeutics, are based. The Company's principal executive offices are located in Pasadena, California.

During fiscal 2019, the Company has continued to develop its pipeline and partnered candidates. In November 2018, the Company presented late-breaking clinical data on ARO-AAT and ARO-HBV at the AASLD Liver Meeting 2018. In December 2018 and January 2019, Clinical Trial Applications (CTAs) were filed for ARO-ANG3 and ARO-APOC3, respectively, and dosing has commenced on ARO-ANG3. The Company has also achieved substantial progress on its other preclinical pipeline candidates including ARO-ENaC and ARO-HIF2 with CTA or equivalent filings planned in 2019. The Company delivered the Arrowhead Deliverable, as defined in its collaboration agreement, to Amgen for ARO-AMG1 in August 2018, and Amgen is currently progressing its phase 1 clinical study of ARO-LPA.

The Company also made significant progress on the business development and partnership front. In October 2018, the Company entered into a License Agreement ("Janssen License Agreement") and a Research Collaboration and Option Agreement ("Janssen Collaboration Agreement") with Janssen Pharmaceuticals, Inc. ("Janssen") part of the Janssen Pharmaceutical Companies of Johnson & Johnson. The Company also entered into a Stock Purchase Agreement ("JJDC Stock Purchase Agreement") with Johnson & Johnson Innovation-JJDC, Inc. ("JJDC"), a New Jersey corporation. Under the Janssen License Agreement, Janssen has received a worldwide, exclusive license to the Company's ARO-HBV program, the Company's third-generation subcutaneously administered RNAi therapeutic candidate being developed as a potentially curative therapy for patients with chronic hepatitis B virus infection. Beyond the Company's ongoing Phase 1 / 2 study of ARO-HBV, Janssen will be wholly responsible for clinical development and commercialization. Under the Janssen Collaboration Agreement, Janssen will be able to select three new targets against which Arrowhead will develop clinical candidates. These candidates are subject to certain restrictions and will not include candidates in the Company's current pipeline. The Company will perform discovery, optimization and preclinical development, entirely funded by Janssen, sufficient to allow the filing of a U.S. Investigational New Drug application or equivalent, at which time Janssen will have the option to take an exclusive license. If the option is exercised, Janssen will be wholly responsible for clinical development and commercialization. Under the JJDC Stock Purchase Agreement, in October 2018 the Company sold 3,260,869 shares of common stock to JJDC at a price of $23.00 per share. Under the terms of the agreements taken together, the Company has received $175 million as an upfront payment, $75 million in the form of an equity investment by JJDC in Arrowhead common stock, and may receive up to $1.6 billion in development and sales milestones payments for the Janssen License Agreement, and up to $1.9 billion in development and sales milestone payments for the three additional targets covered under the Janssen Collaboration Agreement. The Company is further eligible to receive tiered royalties up to mid teens under the Janssen License Agreement and up to low teens under the Janssen Collaboration Agreement on product sales.

The Company's collaboration agreements with Amgen for AMG 890 (ARO-LPA) and ARO-AMG1 continue to progress. The Company has received $35 million in upfront payments and $21.5 million in the form of an equity investment by Amgen in the

Company's Common Stock and could receive up to $617 million in option payments and development, regulatory and sales milestone payments. The Company is further eligible to receive single-digit royalties for sales of products under the ARO-AMG1 agreement and up to low double-digit royalties for sales of products under the AMG 890 (ARO-LPA) Agreement. On August 1, 2018, the Company announced that it had earned a $10 million milestone payment from Amgen following the administration of the first dose of AMG 890 (ARO-LPA) in a phase 1 clinical study. This milestone payment was recognized as revenue during the year ended September 30, 2018.

Liquidity

The Consolidated Financial Statements have been prepared in conformity with the accounting principles generally accepted in the United States of America, which contemplate the continuation of the Company as a going concern. Historically, the Company's primary source of financing has been through the sale of its securities. Research and development activities have required significant capital investment since the Company's inception. The Company expects its operations to continue to require cash investment to pursue its research and development goals, including clinical trials and related drug manufacturing.

At December 31, 2018, the Company had $189.8 million in cash and cash equivalents, $54.0 million in short-term investments, and $59.6 million in long-term investments to fund operations. During the three months ended December 31, 2018, the Company's cash and investments balance increased by $226.8 million, which was primarily the result of the $75 million equity investment and $175 million upfront payment from JJDC and Janssen, respectively, as discussed further in Note 2 below. These cash inflows were partially offset by cash outflows related to operating activities. Additionally, in October 2018, the Company paid off the remaining $2.3 million balance on its note payable for its research facility lease in Madison, Wisconsin.

Summary of Significant Accounting Policies

Principles of Consolidation—The Consolidated Financial Statements include the accounts of Arrowhead and its Subsidiaries. Arrowhead's primary operating subsidiary is Arrowhead Madison, which is located in Madison, Wisconsin, where the Company's research and development facility is located. All significant intercompany accounts and transactions are eliminated in consolidation.

Basis of Presentation and Use of Estimates—The preparation of financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. In the opinion of management, all adjustments, consisting of normal recurring accruals, considered necessary for a fair presentation have been included. Actual results could materially differ from those estimates. Actual results could materially differ from those estimates. Additionally, certain reclassifications have been made to prior period financial statements to conform to the current period presentation. These condensed consolidated financial statements should be read in conjunction with the Company's consolidated financial statements and the notes thereto contained in our Annual Report on Form 10-K for the year ended September 30, 2018.

Cash and Cash Equivalents—The Company considers all liquid debt instruments purchased with a maturity of three months or less to be cash equivalents. The Company had no restricted cash at December 31, 2018 and September 30, 2018.

Concentration of Credit Risk—The Company maintains several bank accounts primarily at two financial institutions for its operations. These accounts are insured by the Federal Deposit Insurance Corporation (FDIC) for up to $250,000 per institution. Management believes the Company is not exposed to significant credit risk due to the financial position of the depository institutions in which these deposits are held.

Investments—The Company may invest excess cash balances in short-term and long-term marketable debt securities. Investments may consist of certificates of deposit, money market accounts, government-sponsored enterprise securities, corporate bonds and/or commercial paper. The Company accounts for its investment in marketable securities in accordance with FASB ASC 320, Investments – Debt and Equity Securities. This statement requires debt securities to be classified into three categories:

Held-to-maturity—Debt securities that the entity has the positive intent and ability to hold to maturity are reported at amortized cost.

Trading Securities—Debt securities that are bought and held primarily for the purpose of selling in the near term are reported at fair value, with unrealized gains and losses included in earnings.

Available-for-Sale—Debt securities not classified as either securities held-to-maturity or trading securities are reported at fair value with unrealized gains or losses excluded from earnings and reported as a separate component of shareholders' equity.

The Company classifies its investments in marketable debt securities based on the facts and circumstances present at the time of purchase of the securities. During the three months ended December 31, 2018 and 2017, respectively, all the Company's investments were classified as held-to-maturity.

Held-to-maturity investments are measured and recorded at amortized cost on the Company's Consolidated Balance Sheet. Discounts and premiums to par value of the debt securities are amortized to interest income/expense over the term of the security. No gains or losses on investment securities are realized until they are sold or a decline in fair value is determined to be other-than-temporary.

Property and Equipment—Property and equipment are recorded at cost, which may equal fair market value in the case of property and equipment acquired in conjunction with a business acquisition. Depreciation of property and equipment is recorded using the straight-line method over the respective useful lives of the assets ranging from three to seven years. Leasehold improvements are amortized over the lesser of the expected useful life or the remaining lease term. Long-lived assets, including property and equipment are reviewed for impairment whenever events or circumstances indicate that the carrying amount of these assets may not be recoverable.

Intangible Assets Subject to Amortization—Intangible assets subject to amortization include certain patents and license agreements. Intangible assets subject to amortization are reviewed for impairment whenever events or circumstances indicate that the carrying amount of these assets may not be recoverable.

Contingent Consideration - The consideration for the Company's acquisitions may include future payments that are contingent upon the occurrence of a particular event. For example, milestone payments might be based on the achievement of various regulatory approvals or future sales milestones, and royalty payments might be based on drug product sales levels. The Company records a contingent consideration obligation for such contingent payments at fair value on the acquisition date. The Company estimates the fair value of contingent consideration obligations through valuation models designed to estimate the probability of such contingent payments based on various assumptions and incorporating estimated success rates. Estimated payments are discounted using present value techniques to arrive at an estimated fair value at the balance sheet date. Changes in the fair value of the contingent consideration obligations are recognized within the Company's Consolidated Statements of Operations and Comprehensive Loss. Changes in the fair value of the contingent consideration obligations can result from changes to one or multiple inputs, including adjustments to the discount rates, changes in the amount or timing of expected expenditures associated with product development, changes in the amount or timing of cash flows from products upon commercialization, changes in the assumed achievement or timing of any development milestones, changes in the probability of certain clinical events and changes in the assumed probability associated with regulatory approval. These fair value measurements are based on significant inputs not observable in the market. Substantial judgment is employed in determining the appropriateness of these assumptions as of the acquisition date and for each subsequent period. Accordingly, changes in assumptions could have a material impact on the amount of contingent consideration expense the Company records in any given period. The Company determined the fair value of its contingent consideration obligation to be $0 at December 31, 2018 and September 30, 2018.

Revenue Recognition— On October 1, 2018, the Company adopted FASB Topic 606 – Revenue for Contracts from Customers which amended revenue recognition principles and provides a single, comprehensive set of criteria for revenue recognition within and across all industries. The Company's adoption of the new revenue standard did not have a material impact on its Consolidated Financial Statements. The Company has not yet achieved commercial sales of its drug candidates to date, however, the new standard is applicable to the Company's ongoing licensing and collaboration agreements, including those with Amgen and Janssen, and the analysis of the impact of this guidance on those agreements is discussed further in Note 2 below.

The new revenue standard provides a five-step framework for recognizing revenue as control of promised goods or services is transferred to a customer at an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. To determine revenue recognition for arrangements that the Company determines are within the scope of the new revenue standard, the Company performs the following five steps: (i) identify the contract; (ii) identify the performance obligations; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when (or as) the Company satisfies a performance obligation. At contract inception, the Company assesses whether the goods or services promised within each contract are distinct and, therefore, represent a separate performance obligation, or whether they are not distinct and are combined with other goods and services until a distinct bundle is identified. The Company then determines the transaction price, which typically includes upfront payments and any variable consideration that the Company determines is probable

to not cause a significant reversal in the amount of cumulative revenue recognized when the uncertainty associated with the variable consideration is resolved. The Company then allocates the transaction price to each performance obligation and recognizes the associated revenue when (or as) each performance obligation is satisfied.

The Company recognizes the transaction price allocated to upfront license payments as revenue upon delivery of the license to the customer and resulting ability of the customer to use and benefit from the license, if the license is determined to be distinct from the other performance obligations identified in the contract. These other performance obligations are typically to perform research and development services for the customer, often times relating to the candidate that the customer is licensing. If the license is not considered to be distinct from other performance obligations, the Company assesses the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied at a point in time or over time. If the performance obligation is satisfied over time, the Company then determines the appropriate method of measuring progress for purposes of recognizing revenue from license payments. The Company evaluates the measure of progress each reporting period and, if necessary, adjusts the related revenue recognition.

Typically, the Company's collaboration agreements entitle it to additional payments upon the achievement of milestones or royalties on sales. The milestones are generally categorized into three types: development milestones, generally based on the initiation of toxicity studies or clinical trials; regulatory milestones, generally based on the submission, filing or approval of regulatory applications such as a Clinical Trial Application (CTA) or NDA in the United States; and sales-based milestones, generally based on meeting specific thresholds of sales in certain geographic areas. The Company evaluates whether it is probable that the consideration associated with each milestone or royalty will not be subject to a significant reversal in the cumulative amount of revenue recognized. Amounts that meet this threshold are included in the transaction price using the most likely amount method, whereas amounts that do not meet this threshold are excluded from the transaction price until they meet this threshold. At the end of each subsequent reporting period, the Company re-evaluates the probability of a significant reversal of the cumulative revenue recognized for our milestones and royalties, and, if necessary, adjusts its estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which would affect revenues and net income in our Consolidated Statement of Operations and Comprehensive Income (Loss). Typically, milestone payments and royalties are achieved after the Company's performance obligations associated with the collaboration agreements have been completed and after the customer has assumed responsibility for the respective clinical or pre-clinical program. Thus, the milestone or royalty payments are recognized as revenue in the period the milestone or royalty was achieved. If a milestone payment is achieved during the performance period, the milestone payment would be recognized as revenue to the extent performance had been completed at that point, and the remaining balance would be recorded as deferred revenue.

The new revenue standard requires the Company to assess whether a significant financing component exists in determining the transaction price. The Company performs this assessment at the onset of its licensing or collaboration agreements. Typically, a significant financing component does not exist because the customer is paying for a license or services in advance with an upfront payment. Additionally, future royalty payments are not substantially within the control of the Company or the customer.

The new revenue standard requires the Company to allocate the arrangement consideration on a relative standalone selling price basis for each performance obligation after determining the transaction price of the contract and identifying the performance obligations to which that amount should be allocated. The relative standalone selling price is defined in the new revenue standard as the price at which an entity would sell a promised good or service separately to a customer. If other observable transactions in which the Company has sold the same performance obligation separately are not available, the Company estimates the standalone selling price of each performance obligation. Key assumptions to determine the standalone selling price may include forecasted revenues, development timelines, reimbursement rates for personnel costs, discount rates and probabilities of technical and regulatory success.

Whenever the Company determines that goods or services promised in a contract should be accounted for as a combined performance obligation over time, the Company determines the period over which the performance obligations will be performed and revenue will be recognized. Revenue is recognized using the proportional performance method. Direct labor hours are typically used as the measure of performance. Significant management judgment is required in determining the level of effort required under an arrangement and the period over which the Company is expected to complete its performance obligations. If the Company determines that the performance obligation is satisfied over time, any upfront payment received is initially recorded as deferred revenue on the Company's Consolidated Balance Sheets.

Certain judgments affect the application of the Company's revenue recognition policy. For example, the Company records short-term and long-term deferred revenue based on its best estimate of when such revenue will be recognized. Short-term deferred revenue consists of amounts that are expected to be recognized as revenue in the next 12 months, and long-term deferred revenue consists of amounts that the Company does not expect will be recognized in the next 12 months. This estimate is based on the Company's current operating plan and, if the Company's operating plan should change in the future, the Company may recognize a different amount of deferred revenue over the next 12-month period.

Allowance for Doubtful Accounts—The Company accrues an allowance for doubtful accounts based on estimates of uncollectible revenues by analyzing historical collections, accounts receivable aging and other factors. Accounts receivable are written off when all collection attempts have failed.

Research and Development—Costs and expenses that can be clearly identified as research and development are charged to expense as incurred in accordance with FASB ASC 730-10. Included in research and development costs are operating costs, facilities, supplies, external services, clinical trial and manufacturing costs, overhead directly related to the Company's research and development operations, and costs to acquire technology licenses.

Net Income (Loss) per Share—Basic net income (loss) per share is computed using the weighted-average number of common shares outstanding during the period. Diluted net income (loss) per share are computed using the weighted-average number of common shares and dilutive potential common shares outstanding during the period. Dilutive potential common shares primarily consist of stock options and restricted stock units issued to employees. During the three months ended December 31, 2018 and 2017, the calculation of the effect of dilutive stock options and restricted stock units was 4,498,360 shares and 0 shares, respectively. During the three months ended December 31, 2018 the calculation of the effect of dilutive stock options and restricted stock units excluded 680,000 stock options due to their anti-dilutive effect. During the three months ended December 31, 2017, the calculation of the effect of dilutive stock options and restricted stock units excluded all stock options and restricted stock units granted and outstanding during the period due to their anti-dilutive effect.

Stock-Based Compensation—The Company accounts for share-based compensation arrangements in accordance with FASB ASC 718, which requires the measurement and recognition of compensation expense for all share-based payment awards to be based on estimated fair values. The Company uses the Black-Scholes option valuation model to estimate the fair value of its stock options at the date of grant. The Black-Scholes option valuation model requires the input of subjective assumptions to calculate the value of stock options. For restricted stock units, the value of the award is based on the Company's stock price at the grant date. For performance-based restricted stock unit awards, the value of the award is based on the Company's stock price at the grant date, with consideration given to the probability of the performance condition being achieved. The Company uses historical data and other information to estimate the expected price volatility for stock option awards and the expected forfeiture rate for all awards. Expense is recognized over the vesting period for all awards and commences at the grant date for time-based awards and upon the Company's determination that the achievement of such performance conditions is probable for performance-based awards. This determination requires significant judgment by management.

Income Taxes—The Company accounts for income taxes under the liability method, which requires the recognition of deferred income tax assets and liabilities for the expected future tax consequences of events that have been included in the financial statements or tax returns. Under this method, deferred income taxes are recognized for the tax consequences in future years of differences between the tax bases of assets and liabilities and their financial reporting amounts at each period end based on enacted tax laws and statutory tax rates applicable to the periods in which the differences are expected to affect taxable income. Valuation allowances are established, when necessary, to reduce deferred income tax assets to the amount expected to be realized. The provision for income taxes, if any, represents the tax payable for the period and the change in deferred income tax assets and liabilities during the period.

Recent Accounting Pronouncements

In May 2014, the FASB issued ASU No. 2014-09 Revenue from Contracts with Customers (Topic 606), which will supersede nearly all existing revenue recognition guidance under GAAP. ASU No. 2014-09 provides that an entity recognize revenue when it transfers promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. This update also requires additional disclosure about the nature, amount, timing and uncertainty of revenue and cash flows arising from customer contracts, including significant judgments and changes in judgments, and assets recognized from costs incurred to obtain or fulfill a contract. ASU No. 2014-09 allows for either full retrospective or modified retrospective adoption and will become effective for the Company in the first quarter of fiscal 2019. In April 2016, the FASB issued an amendment to ASU No. 2014-09 with update ASU 2016-10 which provided more specific guidance around the identification of performance obligations and licensing arrangements. On October 1, 2018, the Company adopted this standard using the modified retrospective method. The Company's implementation approach included reviewing the status of each of its ongoing collaboration agreements and designing appropriate internal controls to enable the preparation of financial information. The Company has completed its assessment of the impact of the new revenue recognition guidance and determined that there will be no material impact. The Company's existing performance obligations under its ongoing licensing and collaboration agreements as of October 1, 2018 were substantially completed prior to September 30, 2018. Any future option, milestone or royalty payments received will be accounted for under the sales-based royalty exception provided for under this new revenue recognition guidance. Additionally, there will be no impact to cash from or used in operating, financing or investing activities on the Company's Consolidated Statement of Cash Flows as a result of the adoption of the new standard.

In March 2016, the FASB issued ASU No. 2016-02, Leases. Under ASU 2016-02, lessees will be required to recognize a right-of-use asset and a lease liability for virtually all of their leases (other than leases that meet the definition of a short-term lease). For income statement purposes, a dual model was retained, requiring leases to be classified as either operating or finance. Operating leases will result in straight-line expense (similar to current operating leases) while finance leases will result in a front-loaded expense pattern (similar to current capital leases). ASU 2016-02 becomes effective for the Company in the first quarter of fiscal 2020. The Company expects the adoption of this update to have a material effect on the classification and disclosure of its leased facilities.

In May 2017, the FASB issued ASU No. 2017-09, which is an update to Topic 718, Compensation - Stock Compensation. The update provides guidance on determining which changes to the terms and conditions of share-based payment awards, including stock options, require an entity to apply modification accounting under Topic 718. ASU 2017-09 becomes effective for the Company in the first quarter of fiscal 2019. The adoption of this update has not had a material impact on the Company's results of operations and Consolidated Financial Statements.

In November 2018, the FASB issued ASU No. 2018-18 Collaborative Arrangements (Topic 808). This update provides clarification on the interaction between Revenue Recognition (Topic 606) and Collaborative Arrangements (Topic 808) including the alignment of unit of account guidance between the two topics / ASU 2018-18 becomes effective for the Company in the first quarter of fiscal 2021 with early adoption permitted. The Company does not expect the adoption of this update to have a material effect on its Consolidated Financial Statements.

NOTE 2. *COLLABORATION AND LICENSE AGREEMENTS*

Amgen Inc.

On September 28, 2016, the Company entered into two Collaboration and License agreements, and a Common Stock Purchase Agreement with Amgen Inc., a Delaware corporation (“Amgen”). Under one of the license agreements (the “Second Collaboration and License Agreement” or “AMG 890 (ARO-LPA) Agreement”), Amgen has received a worldwide, exclusive license to Arrowhead’s novel, RNAi ARO-LPA program. These RNAi molecules are designed to reduce elevated lipoprotein(a), which is a genetically validated, independent risk factor for atherosclerotic cardiovascular disease. Under the other license agreement (the “First Collaboration and License Agreement” or “ARO-AMG1 Agreement”), Amgen received an option to a worldwide, exclusive license for ARO-AMG1, an RNAi therapy for an undisclosed genetically validated cardiovascular target. In both agreements, Amgen is wholly responsible for clinical development and commercialization. Under the Common Stock Purchase Agreement, the Company has sold 3,002,793 shares of Common Stock to Amgen at a price of $7.16 per share. Subject to Amgen’s exercise of the Option, as defined in the ARO-AMG1 Agreement, Amgen has agreed to purchase, and the Company has agreed to sell, an additional $5 million worth of shares of Common Stock based on a 30 trading day formula surrounding the date of the Option exercise. Under the terms of the agreements taken together, the Company has received $35 million in upfront payments, $21.5 million in the form of an equity investment by Amgen in the Company’s Common Stock and could receive up to $617 million in Option payments, and development, regulatory and sales milestone payments. The Company is further eligible to receive single-digit royalties for sales of products under the ARO-AMG1 Agreement and up to low double-digit royalties for sales of products under the AMG 890 (ARO-LPA) Agreement.

The Company has evaluated these agreements in accordance with the new revenue recognition standard that became effective for the Company on October 1, 2018. The adoption of the new revenue standard did not have a material impact on the balances reported when evaluated under the superseded revenue standard. During the year ended September 30, 2018, the Company substantially completed its performance obligations under the AMG 890 (ARO-LPA) Agreement and the ARO-AMG1 Agreement. Future milestones and royalties achieved will be recognized in their entirety when earned. During the three months ended December 31, 2018 and 2017, the Company recognized $0 million and $3.5 million of Revenue associated with its agreements with Amgen. As of December 31, 2018 there were $0 million of contract assets, and $0.1 million of contract liabilities recorded as current deferred revenue on the Company’s Consolidated Balance Sheets.

Janssen Pharmaceuticals, Inc.

On October 3, 2018, the Company entered into a License Agreement (“Janssen License Agreement”) and a Research Collaboration and Option Agreement (“Janssen Collaboration Agreement”) with Janssen Pharmaceuticals, Inc. (“Janssen”) part of the Janssen Pharmaceutical Companies of Johnson & Johnson. The Company also entered into a Stock Purchase Agreement (“JJDC Stock Purchase Agreement”) with Johnson & Johnson Innovation-JJDC, Inc. (“JJDC”), a New Jersey corporation. Under the Janssen License Agreement, Janssen has received a worldwide, exclusive license to the Company’s ARO-HBV program, the Company’s third-generation subcutaneously administered RNAi therapeutic candidate being developed as a potentially curative therapy for patients with chronic hepatitis B virus infection. Beyond the Company’s ongoing Phase 1 / 2 study of ARO-HBV, Janssen will be wholly responsible for clinical development and commercialization. Under the Janssen Collaboration Agreement, Janssen will be able to select three new targets against which Arrowhead will develop clinical candidates. These candidates are subject to certain restrictions and will not include candidates in the Company’s current pipeline. The Company will perform discovery, optimization and preclinical

development, entirely funded by Janssen, sufficient to allow the filing of a U.S. Investigational New Drug application or equivalent, at which time Janssen will have the option to take an exclusive license. If the option is exercised, Janssen will be wholly responsible for clinical development and commercialization of each optioned candidate. Under the JJDC Stock Purchase Agreement, in October 2018 the Company sold 3,260,869 shares of common stock to JJDC at a price of $23.00 per share. Under the terms of the agreements taken together, the Company has received $175 million as an upfront payment, $75 million in the form of an equity investment by JJDC in Arrowhead common stock, and may receive up to $1.6 billion in development and sales milestones payments for the Janssen License Agreement, and up to $1.9 billion in development and sales milestone payments for the three additional targets covered under the Janssen Collaboration Agreement. The Company is further eligible to receive tiered royalties up to mid teens under the Janssen License Agreement and up to low teens under the Janssen Collaboration Agreement on product sales.

The Company has evaluated these agreements in accordance with the new revenue recognition standard that became effective for the Company on October 1, 2018. The adoption of the new revenue standard did not have a material impact on the balances reported when evaluated under the superseded revenue standard. At the inception of these agreements, the Company has identified one distinct performance obligation. Regarding the Janssen License Agreement, the Company determined that the key deliverables included the license and certain R&D services including the Company's responsibility to complete the ongoing Phase 1 / 2 study of ARO-HBV and the Company's responsibility to ensure certain manufacturing of ARO-HBV drug product is completed and delivered to Janssen (the "Janssen R&D Services"). Due to the specialized and unique nature of these Janssen R&D services, and their direct relationship with the license, the Company determined that these deliverables represent one distinct bundle and thus, one performance obligation. The Company also determined that Janssen's option to require the Company to develop up to three new targets is not a material right, and thus, not a performance obligation at the onset of the agreement. The consideration for this option will be accounted for if and when it is exercised.

The Company determined the transaction price totaled approximately $197.8 million which includes the upfront payment, the premium paid by JJDC for its equity investment in the Company, and estimated payments for ARO-HBV drug materials on hand and additional material to be manufactured. The Company has allocated the total $197.8 million initial transaction price to its one distinct performance obligation for the ARO-HBV license and the associated Janssen R&D Services. This revenue will be recognized using a proportional performance method (based on actual direct labor hours versus estimated total direct labor hours) beginning in October 2018 and ending as the Company's efforts in overseeing the ongoing phase 1 / 2 clinical trial are completed. During the three months ended December 31, 2018, the Company recognized approximately $34.7 million of Revenue associated with its agreements with Janssen and JJDC. As of December 31, 2018 there were $3.2 million of contract assets recorded as accounts receivable, and $158.1 million of contract liabilities recorded as current deferred revenue and long-term deferred revenue on the Company's Consolidated Balance Sheets. The $3.2 million of accounts receivable is driven by costs incurred that will be reimbursed by Janssen for the ARO-HBV drug materials, and the $158.1 million of current and long-term deferred revenue is driven by the upfront payment and premium paid by JJDC for its equity investment in the Company, net of the $34.7 million of revenue recognized in the period.

NOTE 3. ***PROPERTY AND EQUIPMENT***

The following table summarizes the Company's major classes of property and equipment:

	December 31, 2018	September 30, 2018
Computers, office equipment and furniture	$ 600,334	$ 600,334
Research equipment	11,356,568	10,751,627
Software	225,092	152,676
Leasehold improvements	12,269,261	12,236,150
Total gross fixed assets	24,451,255	23,740,787
Less: Accumulated depreciation and amortization	(10,530,588)	(9,805,362)
Property and equipment, net	$ 13,920,667	$ 13,935,425

Depreciation and amortization expense for Property and Equipment the for the three months ended December 31, 2018 and 2017 and was $752,245 and $716,066, respectively.

NOTE 4. ***INVESTMENTS***

The Company invests a portion of its excess cash balances in short-term debt securities and may, from time to time, also invest in long-term debt securities. Investments at December 31, 2018 consisted of corporate bonds with maturities remaining of less than 36 months. The Company may also invest excess cash balances in certificates of deposits, money market accounts, government-sponsored enterprise securities, corporate bonds and/or commercial paper. The Company accounts for its investments in accordance with FASB ASC 320, Investments – Debt and Equity Securities. At December 31, 2018, all investments were classified as held-to-maturity securities.

The following tables summarize the Company's short-term and long-term investments as of December 31, 2018, and September 30, 2018.

	As of December 31, 2018			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Commercial notes (due within one year)	$ 53,980,307	$ 201,216	$ (799,900)	$ 53,381,623
Commercial notes (due within two years)	$ 59,595,287	$ 27,609	$ (201,793)	$ 59,421,103
Total	$ 113,575,594	$ 228,825	$ (1,001,693)	$ 112,802,726

	As of September 30, 2018			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Commercial notes (due within one year)	$ 46,400,176	$ —	$ (429,050)	$ 45,971,126
Commercial notes (due within two years)	$ —	$ —	$ —	$ —
Total	$ 46,400,176	$ —	$ (429,050)	$ 45,971,126

NOTE 5. ***INTANGIBLE ASSETS***

Intangible assets subject to amortization include patents and a license agreement capitalized as part of the Novartis RNAi asset acquisition in March 2015. The license agreement associated with the Novartis RNAi asset acquisition is being amortized over the estimated life remaining at the time of acquisition, which was 21 years, and the accumulated amortization of the asset is approximately $568,887. The patents associated with the Novartis RNAi asset acquisition are being amortized over the estimated life remaining at the time of acquisition, which was 14 years, and the accumulated amortization of the assets is approximately $5,949,425. Amortization expense for the three months ended December 31, 2018 and 2017 was $425,107 and $425,107, respectively. Amortization expense is expected to be $1,275,322 for the remainder of fiscal 2019, $1,700,429 in 2020, $1,700,429 in 2021, $1,700,429 in 2022, $1,700,429 in 2023, and $10,261,865 thereafter.

The following table provides details on the Company's intangible asset balances:

	Intangible assets subject to amortization
Balance at September 30, 2018	$ 18,764,010
Impairment	—
Amortization	(425,107)
Balance at December 31, 2018	$ 18,338,903

NOTE 6. ***STOCKHOLDERS' EQUITY***

At December 31, 2018, the Company had a total of 150,000,000 shares of capital stock authorized for issuance, consisting of 145,000,000 shares of Common Stock, par value $0.001 per share, and 5,000,000 shares of Preferred Stock, par value $0.001 per share.

At December 31, 2018, 92,591,457 shares of Common Stock were outstanding. At December 31, 2018, 7,954,283 shares of Common Stock were reserved for issuance upon exercise of options and vesting of restricted stock units granted or available for grant under Arrowhead's 2004 Equity Incentive Plan and 2013 Incentive Plan, as well as for inducement grants made to new employees.

In October 2018 the Company sold 3,260,869 shares of Common Stock to JJDC at a price of $23.00 per share as part of the JJDC Stock Purchase Agreement discussed further in Note 2 above. The Company received proceeds of $75.0 million. The portion of these proceeds that were deemed to be a premium were recorded as deferred revenue as discussed further in Note 2 above.

NOTE 7. *COMMITMENTS AND CONTINGENCIES*

Leases

The Company leases approximately 8,500 square feet of office space for its corporate headquarters in Pasadena, California. The lease will expire in September 2019. Monthly rental payments are approximately $28,100 per month, increasing approximately 3% annually.

The Company also leases approximately 60,000 square feet of office and laboratory space for its research facility in Madison, Wisconsin. The lease will expire in September 2026. As part of this lease, the Company was provided a primary tenant improvement allowance of $2.1 million which is accounted for as Deferred Rent and a secondary tenant improvement allowance of $2.7 million which was accounted for as a note payable on the Company's Consolidated Balance Sheet. In October 2018, the Company paid off the remaining $2.3 million balance on the note payable. Monthly rental payments are approximately $133,400 per month, increasing approximately 2.5% annually.

Facility rent expense for the three months ended December 31, 2018 and 2017 was $335,000 and $326,000, respectively.

As of December 31, 2018, future minimum lease payments due in fiscal years under operating leases are as follows:

2019	$	1,043,245
2020		1,044,431
2021		1,070,496
2022		1,097,168
2023		1,124,445
2024 and thereafter		3,544,882
Total	$	8,924,667

In January 2019, the Company entered into amendments to its existing lease for its Madison, Wisconsin research facility. The amendments add an additional 13,000 square feet of office and laboratory space to the facility. The increased capacity of this new facility will accommodate increased research and development personnel and manufacturing capabilities for the Company's expanding pipeline of current and future drug candidates. See Note 11 for additional discussion of these amendments.

Litigation –

The Company and certain of its officers and directors were named as defendants in a putative consolidated class action in the United States District Court for the Central District of California regarding certain public statements in connection with the Company's hepatitis B drug research. The consolidated class action, initially filed as *Wang v. Arrowhead Research Corp., et al.*, No. 2:14-cv-07890 (C.D. Cal., filed Oct. 10, 2014), and *Eskinazi v. Arrowhead Research Corp., et al.*, No. 2:14-cv-07911 (C.D. Cal., filed Oct. 13, 2014), asserted claims under Sections 10(b) and 20(a) of the Securities Exchange Act of 1934 and sought damages in an unspecified amount. Additionally, three putative stockholder derivative actions captioned *Weisman v. Anzalone et al.*, No. 2:14-cv-08982 (C.D. Cal., filed Nov. 20, 2014), *Bernstein (Backus) v. Anzalone, et al.*, No. 2:14-cv-09247 (C.D. Cal., filed Dec. 2, 2014); and *Johnson v. Anzalone, et al.*, No. 2:15-cv-00446 (C.D. Cal., filed Jan. 22, 2015), were filed in the United States District Court for the Central District of California, alleging breach of fiduciary duty by the Company's Board of Directors in connection with the alleged facts underlying the securities claims. An additional consolidated derivative action asserting similar claims was filed in Los Angeles County Superior Court, initially filed as *Bacchus v. Anzalone, et al.*, (L.A. Super., filed Mar. 5, 2015); and *Jackson v. Anzalone, et al.* (L.A. Super., filed Mar. 16, 2015). Each of these suits seeks damages in unspecified amounts and some seek various forms of injunctive relief. On October 7, 2016, the federal district court dismissed the consolidated class action with prejudice. Following the dismissal of the consolidated class action, the parties for the Weisman and Johnson actions jointly stipulated to dismiss the actions, with the parties bearing their own fees and costs. The parties to the Bernstein and consolidated derivative action agreed to stay the matters pending the resolution of the Ninth Circuit appeal of the dismissal of the consolidated class action. On February 15, 2018, the Ninth Circuit issued a memorandum affirming the district court's dismissal of all claims. Plaintiffs in the consolidated derivative action voluntarily dismissed their case. The parties to the Bernstein action filed a stipulation to continue the stay of the action pending resolution of the Ninth Circuit appeal in Meller v. Arrowhead Pharmaceuticals, Inc., Case No. 2:16-cv-08505 (C.D. Cal.). The Company believes it has meritorious defenses and intends to vigorously defend itself in each of these matters. The Company makes provisions for liabilities when it is both probable that a liability has been incurred and the amount can be reasonably estimated. No

such liability has been recorded related to these matters. The Company does not expect these matters to have a material effect on its Consolidated Financial Statements.

The Company and certain executive officers were named as defendants in a putative consolidated class action in the United States District Court for the Central District of California regarding certain public statements in connection with the Company's drug research programs. The consolidated class action, initially filed as *Meller v. Arrowhead Pharmaceuticals, Inc., et al.*, No. 2:16-cv-08505 (C.D. Cal, filed Nov. 15, 2016), *Siegel v. Arrowhead Pharmaceuticals, Inc., et al*., No. 2:16-cv-8954 (C.D. Cal., filed Dec. 2, 2016), and *Unz v. Arrowhead Pharmaceuticals, Inc., et al*., No.2:17-cv-00310 (C.D. Cal., filed Jan. 13, 2017) asserts claims under Sections 10(b) and 20(a) of the Securities Exchange Act of 1934 regarding certain public statements in connection with the Company's drug research programs and seek damages in an unspecified amount. Additionally, a putative stockholder derivative action captioned *Johnson v. Anzalone, et al*., (Los Angeles County Superior Court, filed January 19, 2017) asserting substantially similar claims is pending in Los Angeles County Superior Court and is stayed pending the related consolidated class action. Two additional putative stockholder derivative actions, captioned *Lucas v. Anzalone, et al*., No. 2:17-cv-03207 (C.D. Cal., filed April 28, 2017), and *Singh v. Anzalone, et al*., No. 2:17-cv-03160 (C.D. Cal., filed April 27, 2017), alleging breach of fiduciary duty by the Company's Board of Directors in connection with the alleged facts underlying the securities claims, are pending in the United States District Court for the Central District of California. The Lucas and Singh actions have been consolidated. On December 21, 2017, the federal district court dismissed the consolidated class action with prejudice. On December 27, 2017 the plaintiffs appealed the dismissal to the United States Court of Appeals for the Ninth Circuit. The Lucas and Singh actions are stayed pending resolution of the Ninth Circuit appeal. The Company believes it has meritorious defenses and intends to vigorously defend itself in these matters. The Company makes provisions for liabilities when it is both probable that a liability has been incurred and the amount can be reasonably estimated. No such liability has been recorded related to these matters. The Company cannot predict the ultimate outcome of this matter and cannot accurately estimate any potential liability the Company may incur or the impact of the results of this matter on the Company.

With regard to legal fees, such as attorney fees related to these matters or any other legal matters, the Company recognizes such costs as incurred.

Purchase Commitments

In the normal course of business, we enter into various purchase commitments for the manufacture of drug components, for toxicology studies, and for clinical studies. As of December 31, 2018, these future commitments were estimated at approximately $34.0 million, of which approximately $25.0 million is expected to be incurred in fiscal 2019, and $9.0 is expected to be incurred beyond fiscal 2019.

Technology License Commitments

The Company has licensed from third parties the rights to use certain technologies for its research and development activities, as well as in any products the Company may develop using these licensed technologies. These agreements and other similar agreements often require milestone and royalty payments. Milestone payments, for example, may be required as the research and development process progresses through various stages of development, such as when clinical candidates enter or progress through clinical trials, upon NDA and upon certain sales level milestones. These milestone payments could amount to the mid to upper double-digit millions of dollars. During the three months ended December 31, 2018 and 2017, the Company did not reach milestones requiring payment. In certain agreements, the Company may be required to make mid to high single-digit percentage royalty payments based on a percentage of the sales of the relevant products.

NOTE 8. ***STOCK-BASED COMPENSATION***

Arrowhead has two plans that provide for equity-based compensation. Under the 2004 Equity Incentive Plan and 2013 Incentive Plan, as of December 31, 2018, 1,750,568 and 5,475,495 shares, respectively, of Arrowhead's Common Stock are reserved for the grant of stock options, stock appreciation rights, restricted stock awards and performance unit/share awards to employees, consultants and others. No further grants may be made under the 2004 Equity Incentive Plan. As of December 31, 2018, there were options granted and outstanding to purchase 1,750,568 and 2,926,286 shares of Common Stock under the 2004 Equity Incentive Plan and the 2013 Incentive Plan, respectively, and there were 2,313,000 restricted stock units granted and outstanding under the 2013 Incentive Plan. Also, as of December 31, 2018, there were 728,218 shares reserved for options issued as inducement grants to new employees outside of equity compensation plans. During the three months ended December 31, 2018, 0 options and 3,459 restricted stock units were granted under the 2013 Incentive Plan, and 47,000 options and 0 restricted stock units were granted as inducement awards to new employees outside of equity incentive plans.

The following table summarizes information about stock options:

	Number of Options Outstanding	Weighted-Average Exercise Price Per Share	Weighted-Average Remaining Contractual Term	Aggregate Intrinsic Value
Balance At September 30, 2018	5,524,399	$ 6.14		
Granted	47,000	13.73		
Cancelled	—	—		
Exercised	(166,327)	6.04		
Balance At December 31, 2018	5,405,072	$ 6.21	5.8 years	$ 35,651,163
Exercisable At December 31, 2018	3,686,534	$ 6.50	4.9 years	$ 24,853,606

Stock-based compensation expense related to stock options for the three months ended December 31, 2018 and 2017 was $790,345 and $900,659, respectively. For non-qualified stock options, the expense creates a timing difference, resulting in a deferred tax asset, which is fully reserved by a valuation allowance.

The grant date fair value of the options granted by the Company for the three months ended December 31, 2018 and 2017 was $556,889 and $348,899, respectively.

The intrinsic value of the options exercised during the three months ended December 31, 2018 and 2017 was $1,315,700 and $0, respectively.

As of December 31, 2018, the pre-tax compensation expense for all outstanding unvested stock options in the amount of approximately $4,883,533 will be recognized in the Company's results of operations over a weighted average period of 2.8 years.

The fair value of each stock option award is estimated on the date of grant using the Black-Scholes option pricing model. The Black-Scholes option valuation model was developed for use in estimating the fair value of traded options, which do not have vesting restrictions and are fully transferable. The determination of the fair value of each stock option is affected by the Company's stock price on the date of grant, as well as assumptions regarding a number of highly complex and subjective variables. Because the Company's employee stock options have characteristics significantly different from those of traded options, and because changes in the subjective input assumptions can materially affect the fair value estimate, in management's opinion, the existing models do not necessarily provide a reliable single measure of the fair value of its employee stock options.

The assumptions used to value stock options are as follows:

	Three Months Ended December 31,	
	2018	2017
Dividend yield	—	—
Risk-free interest rate	2.75 – 3.11%	2.05 – 2.22%
Volatility	115%	110%
Expected life (in years)	6.25	6.25
Weighted average grant date fair value per share of options granted	$11.85	$3.03

The dividend yield is zero as the Company currently does not pay a dividend.

The risk-free interest rate is based on that of the U.S. Treasury bond.

Volatility is estimated based on volatility average of the Company's Common Stock price.

Restricted Stock Units

Restricted stock units (RSUs), including time-based and performance-based awards, were granted under the Company's 2013 Incentive Plan and as inducement grants granted outside of the Plan. During the three months ended December 31, 2018, the Company issued 3,459 RSUs under the 2013 Incentive Plan. At vesting, each outstanding RSU will be exchanged for one share of the Company's Common Stock. RSU recipients may elect to net share settle upon vesting, in which case the Company pays the employee's income taxes due upon vesting and withholds a number of shares of Common Stock of equal value. RSU awards generally vest subject to the satisfaction of service requirements or the satisfaction of both service requirements and achievement of certain performance targets.

The following table summarizes the activity of the Company's RSUs:

	Number of RSUs	Weighted-Average Grant Date Fair Value
Unvested at September 30, 2018	2,968,500	$ 2.99
Granted	3,459	13.73
Vested	(658,959)	4.29
Forfeited	—	—
Unvested at December 31, 2018	2,313,000	$ 2.64

During the three months ended December 31, 2018 and 2017, the Company recorded $1,927,099 and $1,191,882 of expense related to RSUs, respectively. Such expense is included in stock-based compensation expense in the Company's Consolidated Statement of Operations and Comprehensive Loss. For RSUs, the expense creates a timing difference, resulting in a deferred tax asset, which is fully reserved by a valuation allowance.

For RSUs, the grant date fair value of the award is based on the Company's closing stock price at the grant date, with consideration given to the probability of achieving performance conditions for performance-based awards.

As of December 31, 2018, the pre-tax compensation expense for all unvested RSUs in the amount of approximately $1,679,283 will be recognized in the Company's results of operations over a weighted average period of 2.9 years.

NOTE 9. ***FAIR VALUE MEASUREMENTS***

The Company measures its financial assets and liabilities at fair value. Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability (i.e., exit price) in an orderly transaction between market participants at the measurement date. Additionally, the Company is required to provide disclosure and categorize assets and liabilities measured at fair value into one of three different levels depending on the assumptions (i.e., inputs) used in the valuation. Level 1 provides the most reliable measure of fair value while Level 3 generally requires significant management judgment. Financial assets and liabilities are classified in their entirety based on the lowest level of input significant to the fair value measurement. The fair value hierarchy is defined as follows:

Level 1—Valuations are based on unadjusted quoted prices in active markets for identical assets or liabilities.

Level 2—Valuations are based on quoted prices for similar assets or liabilities in active markets, or quoted prices in markets that are not active for which significant inputs are observable, either directly or indirectly.

Level 3—Valuations are based on prices or valuation techniques that require inputs that are both unobservable and significant to the overall fair value measurement. Inputs reflect management's best estimate of what market participants would use in valuing the asset or liability at the measurement date.

The following table summarizes fair value measurements at December 31, 2018 and September 30, 2018 for assets and liabilities measured at fair value on a recurring basis:

December 31, 2018:

	Level 1	Level 2	Level 3	Total
Cash and cash equivalents	$ 189,772,981	$ —	$ —	$ 189,772,981
Short-term investments	$ 53,381,623	$ —	$ —	$ 53,381,623
Long-term investments	$ 59,421,103	$ —	$ —	$ 59,421,103
Contingent Consideration	$ —	$ —	$ —	$ —

September 30, 2018:

	Level 1	Level 2	Level 3	Total
Cash and cash equivalents	$ 30,133,213	$ —	$ —	$ 30,133,213
Short-term investments	$ 45,971,126	$ —	$ —	$ 45,971,126
Long-term investments	$ —	$ —	$ —	$ —
Contingent Consideration	$ —	$ —	$ —	$ —

As of September 30, 2015, the Company had a liability for contingent consideration related to its acquisition of the Roche RNAi business completed in 2011. The fair value measurement of the contingent consideration obligations is determined using Level 3 inputs. The fair value of contingent consideration obligations is based on a discounted cash flow model using a probability-weighted income approach. The measurement is based upon unobservable inputs supported by little or no market activity based on the Company's assumptions and experience. Estimating timing to complete the development and obtain approval of products is difficult, and there are inherent uncertainties in developing a product candidate, such as obtaining U.S. Food and Drug Administration (FDA) and other regulatory approvals. In determining the probability of regulatory approval and commercial success, the Company utilizes data regarding similar milestone events from several sources, including industry studies and its own experience. These fair value measurements represent Level 3 measurements as they are based on significant inputs not observable in the market. Significant judgment is employed in determining the appropriateness of these assumptions as of the acquisition date and for each subsequent period. Accordingly, changes in assumptions could have a material impact on the amount of contingent consideration expense the Company records in any given period. In November 2016, the Company announced the discontinuation of its clinical trial efforts for ARC-520, ARC-AAT and ARC-521. Given this development, the Company assessed the fair value of its contingent consideration obligation to be $0 at December 31, 2018 and September 30, 2018.

NOTE 10. - *INCOME TAXES*

There was no provision for income taxes for the three months ended December 31, 2018 and 2017. During the three months ended December 31, 2018, the Company generated net income of $12.0 million. However, this net income was more than offset by the Company's existing net operating loss carryforwards. As of December 31, 2018, the Company's remaining deferred income taxes assets, consisting primarily of net operating loss carryforwards, remain fully offset by a valuation allowance.

NOTE 11. *SUBSEQUENT EVENTS*

In January 2019, the Company amended its existing lease for its Madison, Wisconsin research facility, which added an additional 13,000 square feet of laboratory space to the facility, and extended the term of the lease through September 2029. This additional space will accommodate increased research and development personnel and manufacturing capabilities for the Company's expanding pipeline of current and future drug candidates. The initial term of the amended lease commenced on January 1, 2019 with expected occupancy of the additional space in mid to late 2019, after certain leasehold improvements have been completed.

ITEM 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

This Quarterly Report on Form 10-Q contains certain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934, and we intend that such forward-looking statements be subject to the safe harbors created thereby. For this purpose, any statements contained in this Quarterly Report on Form 10-Q except for historical information may be deemed to be forward-looking statements. Without limiting the generality of the foregoing, words such as "may," "will," "expect," "believe," "anticipate," "intend," "could," "estimate," or "continue" or the negative or other variations thereof or comparable terminology are intended to identify forward-looking statements. In addition, any statements that refer to projections of our future financial performance, trends in our businesses, or other characterizations of future events or circumstances are forward-looking statements.

The forward-looking statements included herein are based on current expectations of our management based on available information and involve a number of risks and uncertainties, all of which are difficult or impossible to predict accurately and many of which are beyond our control. As such, our actual results may differ significantly from those expressed in any forward-looking statements. Readers should carefully review the factors identified in our most recent Annual Report on Form 10-K under the caption "Risk Factors" as well as the additional risks described in other documents we file from time to time with the Securities and Exchange Commission ("SEC"), including subsequent quarterly reports on Form 10-Q. In light of the significant risks and uncertainties inherent in the forward-looking information included herein, the inclusion of such information should not be regarded as a representation by us or any other person that such results will be achieved, and readers are cautioned not to place undue reliance on such forward-looking information. Except as may be required by law, we disclaim any intent to revise the forward-looking statements contained herein to reflect events or circumstances after the date hereof or to reflect the occurrence of unanticipated events.

Overview

Arrowhead Pharmaceuticals, Inc. develops medicines that treat intractable diseases by silencing the genes that cause them. Using a broad portfolio of RNA chemistries and efficient modes of delivery, Arrowhead therapies trigger the RNA interference mechanism to induce rapid, deep and durable knockdown of target genes. RNA interference, or RNAi, is a mechanism present in living cells that inhibits the expression of a specific gene, thereby affecting the production of a specific protein. Arrowhead's RNAi-based therapeutics leverage this natural pathway of gene silencing. The company's pipeline includes ARO-AAT for liver disease associated with alpha-1 antitrypsin deficiency (AATD), ARO-APOC3 for hypertriglyceridemia, ARO-ANG3 for dyslipidemia, ARO-ENaC for cystic fibrosis, and ARO-HIF2 for renal cell carcinoma. ARO-LPA (AMG 890) for cardiovascular disease was out-licensed to Amgen Inc. in 2016. ARO-AMG1 for an undisclosed genetically validated cardiovascular target is under a license and collaboration agreement with Amgen Inc. ARO-HBV for chronic hepatitis B virus was out-licensed to Janssen Pharmaceuticals, Inc. in October 2018.

Arrowhead operates a lab facility in Madison, Wisconsin, where the Company's research and development activities, including the development of RNAi therapeutics, are based. The Company's principal executive offices are located in Pasadena, California.

Arrowhead has focused its resources on therapeutics that exclusively utilize the company's Targeted RNAi Molecule (TRiM™) platform technology. Therapeutics built on the TRiM™ platform have demonstrated high levels of pharmacologic activity in multiple animal models spanning several therapeutic areas. TRiM™ enabled therapeutics offer several potential advantages over prior generation and competing technologies, including: simplified manufacturing and reduced costs; multiple routes of administration including subcutaneous injection and inhaled administration; the ability to target multiple tissue types including liver, lung, and tumors; and the potential for improved safety and reduced risk of intracellular buildup, because there are less metabolites from smaller, simpler molecules.

During fiscal 2019, the Company has continued to develop its pipeline and partnered candidates. In November 2018, the Company presented late-breaking clinical data on ARO-AAT and ARO-HBV at the AASLD Liver Meeting 2018. In December 2018 and January 2019, Clinical Trial Applications (CTAs) were filed for ARO-ANG3 and ARO-APOC3, respectively, and dosing has commenced on ARO-ANG3. The Company has also achieved substantial progress on its other preclinical pipeline candidates including ARO-ENaC and ARO-HIF2 with CTA or equivalent filings planned in 2019. The Company delivered the Arrowhead Deliverable, as defined in its collaboration agreement, to Amgen for ARO-AMG1 in August 2018, and Amgen is currently progressing its phase 1 clinical study of ARO-LPA.

The Company also made significant progress on the business development and partnership front. In October 2018, the Company entered into a License Agreement ("Janssen License Agreement") and a Research Collaboration and Option Agreement ("Janssen Collaboration Agreement") with Janssen Pharmaceuticals, Inc. ("Janssen") part of the Janssen Pharmaceutical Companies of Johnson & Johnson. The Company also entered into a Stock Purchase Agreement ("JJDC Stock Purchase Agreement") with

Johnson & Johnson Innovation-JJDC, Inc. ("JJDC"), a New Jersey corporation. Under the Janssen License Agreement, Janssen has received a worldwide, exclusive license to the Company's ARO-HBV program, the Company's third-generation subcutaneously administered RNAi therapeutic candidate being developed as a potentially curative therapy for patients with chronic hepatitis B virus infection. Beyond the Company's ongoing Phase 1 / 2 study of ARO-HBV, Janssen will be wholly responsible for clinical development and commercialization. Under the Janssen Collaboration Agreement, Janssen will be able to select three new targets against which Arrowhead will develop clinical candidates. These candidates are subject to certain restrictions and will not include candidates in the Company's current pipeline. The Company will perform discovery, optimization and preclinical development, entirely funded by Janssen, sufficient to allow the filing of a U.S. Investigational New Drug application or equivalent, at which time Janssen will have the option to take an exclusive license. If the option is exercised, Janssen will be wholly responsible for clinical development and commercialization. Under the JJDC Stock Purchase Agreement, in October 2018 the Company sold 3,260,869 shares of common stock to JJDC at a price of $23.00 per share. Under the terms of the agreements taken together, the Company has received $175 million as an upfront payment, $75 million in the form of an equity investment by JJDC in Arrowhead common stock and may receive up to $1.6 billion in development and sales milestones payments for the Janssen License Agreement, and up to $1.9 billion in development and sales milestone payments for the three additional targets covered under the Janssen Collaboration Agreement. The Company is further eligible to receive tiered royalties up to mid teens under the Janssen License Agreement and up to low teens under the Janssen Collaboration Agreement on product sales.

The Company's collaboration agreements with Amgen for AMG 890 (ARO-LPA) and ARO-AMG1 with Amgen continue to progress. The Company has received $35 million in upfront payments and $21.5 million in the form of an equity investment by Amgen in the Company's Common Stock and could receive up to $617 million in option payments and development, regulatory and sales milestone payments. The Company is further eligible to receive single-digit royalties for sales of products under the ARO-AMG1 agreement and up to low double-digit royalties for sales of products under the AMG 890 (ARO-LPA) Agreement. On August 1, 2018, the Company announced that it had earned a $10 million milestone payment from Amgen following the administration of the first dose of AMG 890 (ARO-LPA) in a phase 1 clinical study. This milestone payment was recognized as revenue during the year ended September 30, 2018.

The Company continues to develop other clinical candidates for future clinical trials. Clinical candidates are tested internally and through GLP toxicology studies at outside laboratories. Drug materials for such studies and clinical trials are contracted to third-party manufacturers when cGMP production is required. The Company engages third-party contract research organizations (CROs) to manage clinical trials and works collaboratively with such organizations on all aspects of clinical trial management, including plan design, patient recruiting, and follow up. These outside costs, relating to the preparation for and administration of clinical trials, are referred to as "program costs". If the clinical candidates progress through human testing, program costs will increase.

Net income was $12.0 million for the three months ended December 31, 2018 as compared to a net loss of $13.2 million for the three months ended December 31, 2017. Net income per share – diluted was $0.13 for the three months ended December 31, 2018 as compared to net loss per share - diluted of $0.18 for the three months ended December 31, 2017. An increase in revenue from the license and collaboration agreements with Janssen was the driver of the increase in net income and net income per share, as discussed further below.

Additionally, the Company strengthened its liquidity and financial position through the Janssen License Agreement, Janssen Collaboration Agreement and JJDC Stock Purchase Agreement, executed in October 2018. Under the terms of the agreements taken together, the Company has received $175 million as an upfront payment, $75 million in the form of an equity investment by JJDC in Arrowhead common stock. These cash proceeds secure the funding needed to continue to advance our pipeline candidates. The Company had $189.8 million of cash and cash equivalents, $54.0 million in short-term investments, $59.6 million of long term investments and $340.9 million of total assets as of December 31, 2018, as compared to $30.1 million, $46.4 million, $0 million and $111.6 million as of September 30, 2018, respectively. Based upon the Company's current cash and investment resources and operating plan, the Company expects to have sufficient liquidity to fund operations for at least the next twelve months.

Critical Accounting Policies and Estimates

Management makes certain judgments and uses certain estimates and assumptions when applying GAAP in the preparation of our Consolidated Financial Statements. We evaluate our estimates and judgments on an ongoing basis and base our estimates on historical experience and on assumptions that we believe to be reasonable under the circumstances. Our experience and assumptions form the basis for our judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may vary from what we anticipate and different assumptions or estimates about the future could change our reported results. We believe the following accounting policies are the most critical to us, in that they require our most difficult, subjective or complex judgments in the preparation of our consolidated financial statements. For further information, see *Note 1, Organization and Significant Accounting Policies*, to our Consolidated Financial Statements, which outlines our application of significant accounting policies.

Revenue Recognition

Revenue Recognition— On October 1, 2018, the Company adopted FASB Topic 606 – Revenue for Contracts from Customers which amended revenue recognition principles and provides a single, comprehensive set of criteria for revenue recognition within and across all industries. The Company's adoption of the new revenue standard did not have a material impact on its Consolidated Financial Statements. The Company has not yet achieved commercial sales of its drug candidates to date, however, the new standard is applicable to the Company's ongoing licensing and collaboration agreements, including those with Amgen and Janssen, and the analysis of the impact of this guidance on those agreements is discussed further below.

The new revenue standard provides a five-step framework for recognizing revenue as control of promised goods or services is transferred to a customer at an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. To determine revenue recognition for arrangements that the Company determines are within the scope of the new revenue standard, the Company performs the following five steps: (i) identify the contract; (ii) identify the performance obligations; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when (or as) the Company satisfies a performance obligation. At contract inception, the Company assesses whether the goods or services promised within each contract are distinct and, therefore, represent a separate performance obligation, or whether they are not distinct and are combined with other goods and services until a distinct bundle is identified. The Company then determines the transaction price, which typically includes upfront payments and any variable consideration that the Company determines is probable to not cause a significant reversal in the amount of cumulative revenue recognized when the uncertainty associated with the variable consideration is resolved. The Company then allocates the transaction price to each performance obligation and recognizes the associated revenue when (or as) each performance obligation is satisfied.

The Company recognizes the transaction price allocated to upfront license payments as revenue upon delivery of the license to the customer and resulting ability of the customer to use and benefit from the license, if the license is determined to be distinct from the other performance obligations identified in the contract. These other performance obligations are typically to perform research and development services for the customer, often times relating to the candidate that the customer is licensing. If the license is not considered to be distinct from other performance obligations, the Company assesses the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied at a point in time or over time. If the performance obligation is satisfied over time, the Company then determines the appropriate method of measuring progress for purposes of recognizing revenue from license payments. The Company evaluates the measure of progress each reporting period and, if necessary, adjusts the related revenue recognition.

Typically, the Company's collaboration agreements entitle it to additional payments upon the achievement of milestones or royalties on sales. The milestones are generally categorized into three types: development milestones, generally based on the initiation of toxicity studies or clinical trials; regulatory milestones, generally based on the submission, filing or approval of regulatory applications such as a Clinical Trial Application (CTA) or NDA in the United States; and sales-based milestones, generally based on meeting specific thresholds of sales in certain geographic areas. The Company evaluates whether it is probable that the consideration associated with each milestone or royalty will not be subject to a significant reversal in the cumulative amount of revenue recognized. Amounts that meet this threshold are included in the transaction price using the most likely amount method, whereas amounts that do not meet this threshold are excluded from the transaction price until they meet this threshold. At the end of each subsequent reporting period, the Company re-evaluates the probability of a significant reversal of the cumulative revenue recognized for our milestones and royalties, and, if necessary, adjusts its estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which would affect revenues and net income in our Consolidated Statement of Operations and Comprehensive Income (Loss). Typically, milestone payments and royalties are achieved after the Company's performance obligations associated with the collaboration agreements have been completed and after the customer has assumed responsibility for the respective clinical or pre-clinical program. Thus, the milestone or royalty payments are recognized as revenue in the period the milestone or royalty was achieved. If a milestone payment is achieved during the performance period, the milestone payment would be recognized as revenue to the extent performance had been completed at that point, and the remaining balance would be recorded as deferred revenue.

The new revenue standard requires the Company to assess whether a significant financing component exists in determining the transaction price. The Company performs this assessment at the onset of its licensing or collaboration agreements. Typically, a significant financing component does not exist because the customer is paying for a license or services in advance with an upfront payment. Additionally, future royalty payments are not substantially within the control of the Company or the customer.

The new revenue standard requires the Company to allocate the arrangement consideration on a relative standalone selling price basis for each performance obligation after determining the transaction price of the contract and identifying the performance obligations to which that amount should be allocated. The relative standalone selling price is defined in the new revenue standard as the price at which an entity would sell a promised good or service separately to a customer. If other observable transactions in which the Company has sold the same performance obligation separately are not available, the Company estimates the standalone selling

price of each performance obligation. Key assumptions to determine the standalone selling price may include forecasted revenues, development timelines, reimbursement rates for personnel costs, discount rates and probabilities of technical and regulatory success.

Whenever the Company determines that goods or services promised in a contract should be accounted for as a combined performance obligation over time, the Company determines the period over which the performance obligations will be performed and revenue will be recognized. Revenue is recognized using the proportional performance method. Direct labor hours are typically used as the measure of performance. Significant management judgment is required in determining the level of effort required under an arrangement and the period over which the Company is expected to complete its performance obligations. If the Company determines that the performance obligation is satisfied over time, any upfront payment received is initially recorded as deferred revenue on the Company's Consolidated Balance Sheets.

Certain judgments affect the application of the Company's revenue recognition policy. For example, the Company records short-term and long-term deferred revenue based on its best estimate of when such revenue will be recognized. Short-term deferred revenue consists of amounts that are expected to be recognized as revenue in the next 12 months, and long-term deferred revenue consists of amounts that the Company does not expect will be recognized in the next 12 months. This estimate is based on the Company's current operating plan and, if the Company's operating plan should change in the future, the Company may recognize a different amount of deferred revenue over the next 12-month period.

Impairment of Long-lived Assets

We review long-lived assets for impairment whenever events or changes in business circumstances indicate that the carrying amount of assets may not be fully recoverable or that our assumptions about the useful lives of these assets are no longer appropriate. If impairment is indicated, recoverability is measured by a comparison of the carrying amount of an asset to the estimated undiscounted future cash flows expected to be generated by the asset. If the carrying amount of an asset exceeds its estimated future cash flows, an impairment charge is recognized in the amount by which the carrying amount of the asset exceeds the fair value of the asset.

Impairment of Intangible assets

Intangible assets consist of a license agreement and patents acquired in conjunction with a business or asset acquisition. Intangible assets are monitored for potential impairment whenever events or circumstances indicate that the carrying amount may not be recoverable and are also reviewed annually to determine whether any impairment is necessary. Based on ASU 2012-02, the annual review of intangible assets is performed via a two-step process. First, a qualitative assessment is performed to determine if it is more likely than not that the intangible asset is impaired. If required, a quantitative assessment is performed and, if necessary, impairment is recorded.

Stock-Based Compensation

We account for stock-based compensation arrangements in accordance with FASB ASC 718, which requires the measurement and recognition of compensation expense for all share-based payment awards to be based on estimated fair values. The Company uses the Black-Scholes option valuation model to estimate the fair value of its stock options at the date of grant. The Black-Scholes option valuation model requires the input of subjective assumptions to calculate the value of stock options. For restricted stock units, the value of the award is based on the Company's stock price at the grant date. For performance-based restricted stock unit awards, the value of the award is based on the Company's stock price at the grant date with consideration given to the probability of the performance condition being achieved. The Company uses historical data and other information to estimate the expected price volatility for stock option awards and the expected forfeiture rate for all awards. Expense is recognized over the vesting period for all awards and commences at the grant date for time-based awards and upon the Company's determination that the achievement of such performance conditions is probable for performance-based awards. This determination requires significant judgement by management.

Contingent Consideration

The consideration for our acquisitions often includes future payments that are contingent upon the occurrence of a particular event. For example, milestone payments might be based on progress of clinical development, the achievement of various regulatory approvals or future sales milestones, and royalty payments might be based on drug product sales levels. The Company records a contingent consideration obligation for such contingent payments at fair value on the acquisition date. The Company estimates the fair value of contingent consideration obligations through valuation models designed to estimate the probability of the occurrence of such contingent payments based on various assumptions and incorporating estimated success rates. Estimated payments are discounted using present value techniques to arrive at estimated fair value at the balance sheet date. Changes in the fair value of our contingent consideration obligations are recognized within our Consolidated Statements of Operations. Changes in the fair value of the contingent consideration obligations can result from changes to one or multiple inputs, including adjustments to the discount rates, changes in the

amount or timing of expected expenditures associated with product development, changes in the amount or timing of cash flows from products upon commercialization, changes in the assumed achievement or timing of any development milestones, changes in the probability of certain clinical events and changes in the assumed probability associated with regulatory approval. These fair value measurements are based on significant inputs not observable in the market. Substantial judgment is employed in determining the appropriateness of these assumptions as of the acquisition date and for each subsequent period. Accordingly, changes in assumptions could have a material impact on the amount of contingent consideration expense the Company records in any given period.

Results of Operations

The following data summarizes our results of operations for the following periods indicated:

	Three Months Ended December 31, 2018	Three Months Ended December 31, 2017
Revenue	$ 34,657,896	$ 3,509,821
Operating Income (Loss)	10,946,144	(13,813,348)
Net Income (Loss)	12,037,253	(13,198,878)
Net Income (Loss) per Share (Diluted)	$ 0.13	$ (0.18)

The increase in our Revenue during the three months ended December 31, 2018 was driven by the revenue recognized from our agreements with Janssen and JJDC which were executed in October 2018. This increase in Revenue was also the key driver of the increase in our Operating Income, Net Income and Net Income per Share.

Revenue

Total revenue was $34,657,896 for the three months ended December 31, 2018 and $3,509,821 for the three months ended December 31, 2017. Revenue in the current period is primarily related to the recognition of a portion of the $197.8 million initial transaction price associated with our agreements with Janssen and JJDC as we achieved progress toward completing our performance obligations within those agreements. Revenue in the previous period was primarily related to the upfront payments received from Amgen in 2016 that we recognized as Revenue as performance was completed for the AMG 890 (ARO-LPA) and ARO-AMG1 Agreements.

Amgen Inc.

On September 28, 2016, the Company entered into two Collaboration and License agreements, and a Common Stock Purchase Agreement with Amgen Inc., a Delaware corporation (“Amgen”). Under one of the license agreements (the “Second Collaboration and License Agreement” or “AMG 890 (ARO-LPA) Agreement”), Amgen has received a worldwide, exclusive license to Arrowhead’s novel, RNAi ARO-LPA program. These RNAi molecules are designed to reduce elevated lipoprotein(a), which is a genetically validated, independent risk factor for atherosclerotic cardiovascular disease. Under the other license agreement (the “First Collaboration and License Agreement” or “ARO-AMG1 Agreement”), Amgen received an option to a worldwide, exclusive license for ARO-AMG1, an RNAi therapy for an undisclosed genetically validated cardiovascular target. In both agreements, Amgen is wholly responsible for clinical development and commercialization. Under the Common Stock Purchase Agreement, the Company has sold 3,002,793 shares of Common Stock to Amgen at a price of $7.16 per share. Subject to Amgen’s exercise of the Option, as defined in the ARO-AMG1 Agreement, Amgen has agreed to purchase, and the Company has agreed to sell, an additional $5 million worth of shares of Common Stock based on a 30 trading day formula surrounding the date of the Option exercise. Under the terms of the agreements taken together, the Company has received $35 million in upfront payments, $21.5 million in the form of an equity investment by Amgen in the Company’s Common Stock and could receive up to $617 million in option payments, and development, regulatory and sales milestone payments. The Company is further eligible to receive single-digit royalties for sales of products under the ARO-AMG1 Agreement and up to low double-digit royalties for sales of products under the AMG 890 (ARO-LPA) Agreement.

The Company has evaluated these agreements in accordance with the new revenue recognition requirements that became effective for the Company on October 1, 2018. The adoption of the new revenue standard did not have a material impact on the balances reported when evaluated under the superseded revenue standard. During the year ended September 30, 2018, the Company substantially completed its performance obligations under the AMG 890 (ARO-LPA) Agreement and the ARO-AMG1 Agreement. Future milestones and royalties achieved will be recognized in their entirety when earned. During the three months ended December 31, 2018 and 2017, the Company recognized $0 million and $3.5 million of Revenue associated with its agreements with Amgen. As of December 31, 2018 there was $0 million of contract assets, and $0.1 million of contract liabilities recorded as current deferred revenue on the Company’s Consolidated Balance Sheets.

Janssen Pharmaceuticals, Inc.

On October 3, 2018, the Company entered into a License Agreement ("Janssen License Agreement") and a Research Collaboration and Option Agreement ("Janssen Collaboration Agreement") with Janssen Pharmaceuticals, Inc. ("Janssen") part of the Janssen Pharmaceutical Companies of Johnson & Johnson. The Company also entered into a Stock Purchase Agreement ("JJDC Stock Purchase Agreement") with Johnson & Johnson Innovation-JJDC, Inc. ("JJDC"), a New Jersey corporation. Under the Janssen License Agreement, Janssen has received a worldwide, exclusive license to the Company's ARO-HBV program, the Company's third-generation subcutaneously administered RNAi therapeutic candidate being developed as a potentially curative therapy for patients with chronic hepatitis B virus infection. Beyond the Company's ongoing Phase 1 / 2 study of ARO-HBV, Janssen will be wholly responsible for clinical development and commercialization. Under the Janssen Collaboration Agreement, Janssen will be able to select three new targets against which Arrowhead will develop clinical candidates. These candidates are subject to certain restrictions and will not include candidates in the Company's current pipeline. The Company will perform discovery, optimization and preclinical development, entirely funded by Janssen, sufficient to allow the filing of a U.S. Investigational New Drug application or equivalent, at which time Janssen will have the option to take an exclusive license. If the option is exercised, Janssen will be wholly responsible for clinical development and commercialization of each optioned candidate. Under the JJDC Stock Purchase Agreement, in October 2018 the Company sold 3,260,869 shares of common stock to JJDC at a price of $23.00 per share. Under the terms of the agreements taken together, the Company has received $175 million as an upfront payment, $75 million in the form of an equity investment by JJDC in Arrowhead common stock, and may receive up to $1.6 billion in development and sales milestones payments for the Janssen License Agreement, and up to $1.9 billion in development and sales milestone payments for the three additional targets covered under the Janssen Collaboration Agreement. The Company is further eligible to receive tiered royalties up to mid teens under the Janssen License Agreement and up to low teens under the Janssen Collaboration Agreement on product sales.

The Company has evaluated these agreements in accordance with the new revenue recognition requirements that became effective for the Company on October 1, 2018. The adoption of the new revenue standard did not have a material impact on the balances reported when evaluated under the superseded revenue standard. At the inception of these agreements, the Company has identified one distinct performance obligation. Regarding the Janssen License Agreement, the Company determined that the key deliverables included the license and certain R&D services including the Company's responsibility to complete the ongoing Phase 1 / 2 study of ARO-HBV and the Company's responsibility to ensure certain manufacturing of ARO-HBV drug product is completed and delivered to Janssen (the "Janssen R&D Services"). Due to the specialized and unique nature of these Janssen R&D services, and their direct relationship with the license, the Company determined that these deliverables represent one distinct bundle and thus, one performance obligation. The Company also determined that Janssen's option to require the Company to develop up to three new targets is not a material right, and thus, not a performance obligation at the onset of the agreement. The consideration for this option will be accounted for if and when it is exercised.

The Company determined the transaction price totaled approximately $197.8 million which includes the upfront payment, the premium paid by JJDC for its equity investment in the Company, and estimated payments for ARO-HBV drug materials on hand and additional material to be manufactured. The Company has allocated the total $197.8 million initial transaction price to its one distinct performance obligation for the ARO-HBV license and the associated Janssen R&D Services. This revenue will be recognized using a proportional performance method (based on actual labor hours versus estimated total labor hours) beginning in October 2018 and ending as the Company's efforts in overseeing the ongoing phase 1 / 2 clinical trial are completed. During the three months ended December 31, 2018, the Company recognized approximately $34.7 million of Revenue associated with its agreements with Janssen and JJDC. As of December 31, 2018 there were $3.2 million of contract assets recorded as accounts receivable, and $158.1 million of contract liabilities recorded as current deferred revenue and long-term deferred revenue on the Company's Consolidated Balance Sheets. The $3.2 million of accounts receivable is driven by costs incurred that will be reimbursed by Janssen for the ARO-HBV drug materials, and the $158.1 million of current and long-term deferred revenue is driven by the upfront payment and premium paid by JJDC for its equity investment in the Company, net of the $34.7 million of revenue recognized in the period.

Operating Expenses

The analysis below details the operating expenses and discusses the expenditures of the Company within the major expense categories. Certain reclassifications have been made to prior-period operating expense categories to conform to the current period presentation. For purposes of comparison, the amounts for the three months ended December 31, 2018 and 2017 are shown in the tables below.

Research and Development Expenses

R&D expenses are related to the Company's research and development efforts, and related program costs which are comprised primarily of outsourced costs related to the manufacturing of clinical supplies, toxicity/efficacy studies and clinical trial expenses. Internal costs primarily relate to operations at our research facility in Madison, Wisconsin, including facility costs and laboratory-related expenses. Salaries and stock compensation expense consist of salary, bonuses, payroll taxes and related benefits and stock compensation for our R&D personnel. Depreciation and amortization expense relates to depreciation on lab equipment and leasehold improvements at our Madison research facility. The following table provides details of research and development expense for the periods indicated:

(in thousands)

	Three Months Ended December 31, 2018	% of Expense Category	Three Months Ended December 31, 2017	% of Expense Category	Increase (Decrease) $	Increase (Decrease) %
Salaries	$ 3,277	19%	$ 2,811	22%	$ 466	17%
Stock compensation	641	3%	544	4%	97	18%
In Vivo studies	483	3%	680	5%	(197)	-29%
Drug manufacturing	5,804	33%	3,453	27%	2,351	68%
Toxicity/efficacy studies	2,411	14%	1,884	15%	527	28%
Clinical trials	2,242	13%	815	6%	1,427	175%
License, royalty & milestones	-	0%	19	0%	(19)	N/A
Facilities related	583	3%	594	5%	(11)	-2%
Depreciation/amortization	1,172	7%	1,133	9%	39	3%
Other R&D	959	5%	987	7%	(28)	-3%
Total	$ 17,572	100%	$ 12,920	100%	$ 4,652	36%

Salaries expense increased by $466,000 from $2,811,000 during the three months ended December 31, 2017 to $3,277,000 during the current period. The increase in the expense is primarily due to an increase in R&D headcount that has occurred as the Company has expanded its pipeline of candidates.

Stock compensation expense, a non-cash expense, increased by $97,000 from $544,000 during the three months ended December 31, 2017 to $641,000 during the current period. Stock compensation expense is based upon the valuation of stock options and restricted stock units granted to employees, directors, and certain consultants. Many variables affect the amount expensed, including the Company's stock price on the date of the grant, as well as other assumptions. The increase in the expense is primarily due to the increased headcount discussed above and a mix of higher grant date fair values of awards amortizing during the periods due to the Company's stock price at the time of the grants.

In vivo studies expense decreased by $197,000 from $680,000 during the three months ended December 31, 2017 to $483,000 during the current period. In vivo studies expense can vary depending on the stage of preclinical candidates, the nature and amount of testing required and the cost variation of different in vivo testing models. The decrease in in vivo studies expense is a result of the timing of discovery studies being completed in the prior period.

Drug manufacturing expense increased by $2,351,000 from $3,453,000 during the three months ended December 31, 2017 to $5,804,000 during the current period. The increase in the expense primarily relates to the timing of manufacturing campaigns for ARO-HBV, ARO-ANG3 and ARO-APOC3 clinical trials and toxicology studies. We anticipate this expense to increase as the volume of candidates in our pipeline increases and as each candidate progresses through clinical trial phases.

Toxicity/efficacy studies expense increased by $527,000 from $1,884,000 during the three months ended December 31, 2017 to $2,411,000 during the current period. This category includes IND-enabling toxicology studies as well as post-IND toxicology studies, such as long-term toxicology studies, and other efficacy studies. The increase in the expense primarily relates to toxicology studies for ARO-AAT, ARO-HBV, ARO-ANG3 and ARO-APOC3 as each candidate progresses through and into clinical trials. We anticipate this expense to increase as we prepare to enter clinical trials with our other drug candidates.

Clinical trials expense increased by $1,427,000 from $815,000 during the three months ended December 31, 2017 to $2,242,000 during the current period. The increase in the expense is primarily due to the ongoing ARO-AAT and ARO-HBV clinical trials. We anticipate this expense to increase as ARO-AAT progresses through clinical trials and as we enter clinical trials with our other drug candidates.

License, royalty and milestones expense was minor in both periods. This category includes milestone payments which can vary from period to period depending on the nature of our various license agreements, and the timing of reaching various development milestones requiring payment. No significant milestones were achieved in either period.

Facilities expense was consistent at $594,000 during the three months ended December 31, 2017 and $583,000 during the current period. This category includes rental costs for our research and development facility in Madison, Wisconsin.

Depreciation and amortization expense, a non-cash expense, was consistent at $1,133,000 during the three months ended December 31, 2017 and $1,172,000 during the current period. The majority of depreciation and amortization expense relates to depreciation on lab equipment at our Madison research facility. In addition, the Company records depreciation on leasehold improvements at its Madison research facility.

Other research expense was consistent at $987,000 during the three months ended December 31, 2017 to $959,000 during the current period. This category includes the following costs to support discovery efforts and the advancement of current drug candidates: in-house laboratory supplies, outsourced labs services, and other miscellaneous research and development expenses.

General & Administrative Expenses

The following table provides details of our general and administrative expenses for the periods indicated:

(in thousands)

	Three Months Ended December 31, 2018	% of Expense Category	Three Months Ended December 31, 2017	% of Expense Category	Increase (Decrease) $	Increase (Decrease) %
Salaries	$ 2,089	34%	$ 1,176	27%	$ 913	78%
Stock compensation	2,077	34%	1,548	35%	529	34%
Professional/outside services	1,220	20%	1,146	26%	74	6%
Facilities related	298	5%	178	4%	120	67%
Depreciation/amortization	5	0%	8	0%	(3)	-38%
Other G&A	451	7%	348	8%	103	30%
Total	$ 6,140	100%	$ 4,404	100%	$ 1,736	39%

Salaries expense increased by $913,000 from $1,176,000 during the three months ended December 31, 2017 to $2,089,000 during the current period. The increase in the expense is primarily driven by annual merit increases, performance bonuses and increased headcount.

Stock compensation expense, a non-cash expense, increased by $529,000 from $1,548,000 during the three months ended December 31, 2017 to $2,077,000 during the current period. Stock compensation expense is based upon the valuation of stock options and restricted stock units granted to employees, directors, and certain consultants. Many variables affect the amount expensed, including the Company’s stock price on the date of the grant, as well as other assumptions. The increase in the expense is primarily due to the achievement of certain performance-based awards during the current period.

Professional/outside services include legal, accounting, consulting, patent expenses, business insurance expenses and other outside services retained by the Company. Professional/outside services expense increased by $74,000 from $1,146,000 during the three months ended December 31, 2017 to $1,220,000 during the current period. The increase in the expense is primarily related to the timing of certain patent expenses.

Facilities-related expense increased $120,000 from $178,000 during the three months ended December 31, 2017 to $298,000 during the current period. This category primarily includes rental costs for our corporate headquarters in Pasadena, California. However, the increase in the expense is primarily related to miscellaneous office expenses driven by our increased headcount.

Depreciation and amortization expense, a noncash expense, was minor in each of the periods. The majority of general and administrative depreciation and amortization expense relates to depreciation on leasehold improvements at our Pasadena headquarters.

Other G&A expense increased by $103,000 from $348,000 during the three months ended December 31, 2017 to $451,000 during the current period. This category consists primarily of travel, communication and technology, office expenses, and franchise and property tax expenses. The increase in the expense was due to various travel and communication and technology expenses.

Other Income / Expense

Other income / expense was income of $614,470 during the three months ended December 31, 2017 as compared to income of $1,091,109 during the current period. The largest component of other income / expense in the current period was interest income of $1.1 million earned on the Company's short-term investments. The largest component of other income / expense in the previous period was $0.5 million in other income due to the change in the value of derivative liabilities related to certain warrants with a price adjustment feature, which required derivative accounting. These warrants expired during the year ended September 30, 2018.

Liquidity and Cash Resources

Arrowhead has historically financed its operations through the sale of its equity securities. Research and development activities have required significant capital investment since the Company's inception and are expected to continue to require significant cash expenditure in the future.

At December 31, 2018, the Company had cash on hand of approximately $189.8 million as compared to $30.1 million at September 30, 2018. Excess cash invested in short-term fixed income securities was $54.0 million at December 31, 2018, compared to $46.4 million at September 30, 2018. Excess cash invested in long-term fixed income securities was $59.6 million at December 31, 2018, compared to $0 million at September 30, 2018. The Company believes its current financial resources are sufficient to fund its operations through at least the next twelve months.

A summary of cash flows for the three months ended December 31, 2018 and 2017 is as follows:

	Three Months Ended December 31, 2018	Three Months Ended December 31, 2017
Cash Flow from Continuing Operations:		
Operating Activities	$ 168,284,763	$ (14,690,480)
Investing Activities	(67,756,269)	1,356,966
Financing Activities	59,111,274	26,292
Net Increase (Decrease) in Cash	159,639,768	(13,307,222)
Cash at Beginning of Period	30,133,213	24,838,567
Cash at End of Period	$ 189,772,981	$ 11,531,345

During the three months ended December 31, 2018, the Company generated $168.3 million in cash from operating activities, which was primarily related to the $175.0 million upfront payment received from Janssen and the premium JJDC paid on the Company's common stock during the period. These inflows were partially offset by $21.2 million of cash used for the ongoing expenses of the Company's research and development programs and general and administrative expenses. Cash used in investing activities was $67.8 million, which was primarily related to purchases of fixed-income investments of $69.3 million. Cash provided by financing activities of $59.1 million was driven by the equity investment the Company received from JJDC during the period.

During the three months ended December 31, 2017, the Company used $14.7 million in cash from operating activities for the on-going expenses of its research and development programs and general and administrative expenses. Cash provided by investing activities was $1.4 million, which was primarily related to maturities of fixed-income investments of $6.5 million offset by purchases of fixed-income securities of $5.0 million. Cash provided by financing activities of $26,292 was driven by the $0.2 million of cash generated from warrant exercises offset by $0.2 million of payments against a note payable.

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements or relationships.

ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

There has been no material change in our exposure to market risk from that described in Item 7A of our Annual Report on Form 10-K for the year ended September 30, 2018, filed with the Securities and Exchange Commission on December 11, 2018.

ITEM 4. CONTROLS AND PROCEDURES

Our Chief Executive Officer and our Chief Financial Officer, after evaluating our "disclosure controls and procedures" (as defined in Rules 13a-15(e) and 15d-15(e)) of the Securities Exchange Act of 1934, as amended (the "Exchange Act") as of the end of the period covered by this Quarterly Report on Form 10-Q (the "Evaluation Date"), have concluded that, as of the Evaluation Date, our disclosure controls and procedures are effective to ensure that information we are required to disclose in reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in SEC rules and forms, and to ensure that information required to be disclosed by us in such reports is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer where appropriate, to allow timely decisions regarding required disclosure.

No change in the Company's internal controls over financial reporting (as defined in Rule 13a-15(f) and 15d-15(f) of the Exchange Act) occurred during the Company's most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

PART II—OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

From time to time, we may be involved in routine legal proceedings, as well as demands, claims and threatened litigation, which arise in the normal course of our business. Litigation can be expensive and disruptive to normal business operations. Moreover, the results of legal proceedings, particularly complex legal proceedings, cannot be predicted with any certainty. We disclosed information about certain of our legal proceedings in Part I, Item 3 of our Annual Report on Form 10-K for the year ended September 30, 2018. For an update to those disclosures, see Note 7 to the Consolidated Financial Statements under the heading “Litigation” in Part I, Item 1.

ITEM 1A. Risk Factors

There have been no material changes to the risk factors included in our Annual Report on Form 10-K for the year ended September 30, 2018. Please carefully consider the information set forth in this Quarterly Report on Form 10-Q and the risk factors discussed in Part I, “Item 1A. Risk Factors” in our Annual Report on Form 10-K for the year ended September 30, 2018, which could materially affect our business, financial condition or future results. The risks described in our Annual Report on Form 10-K, as well as other risks and uncertainties, could materially and adversely affect our business, results of operations and financial condition, which in turn could materially and adversely affect the trading price of shares of our Common Stock. Additional risks not currently known or currently material to us may also harm our business.

ITEM 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS

All information under this Item has been previously reported on our Current Reports on Form 8-K.

ITEM 3. DEFAULTS UPON SENIOR SECURITIES

None.

ITEM 4. MINE SAFETY DISCLOSURES

Not Applicable.

ITEM 5. OTHER INFORMATION

None.

ITEM 6. EXHIBITS

Exhibit Number	Document Description
10.1	License Agreement between Arrowhead Pharmaceuticals, Inc. and Janssen Pharmaceuticals, Inc., dated October 3, 2018*†
10.2	Research Collaboration and Option Agreement between Arrowhead Pharmaceuticals, Inc. and Janssen Pharmaceuticals, Inc., dated October 3, 2018*†
10.3	Stock Purchase Agreement between Arrowhead Pharmaceuticals, Inc. and Johnson & Johnson Innovation-JJDC, Inc., dated October 3, 2018*
10.4	Registration Rights Agreement between Arrowhead Pharmaceuticals, Inc. and Johnson & Johnson Innovation-JJDC, Inc., dated October 3, 2018*
31.1	Certification of Chief Executive Officer pursuant to Rule 13a-14(a) of the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002*
31.2	Certification of Chief Financial Officer pursuant to Rule 13a-14(a) of the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002*
32.1	Certification of Chief Executive Officer pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002**
32.2	Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002**
101	The following materials from Registrant's Quarterly Report on Form 10-Q for the quarter ended December 31, 2018, formatted in XBRL (Extensible Business Reporting Language): (1) Consolidated Balance Sheets, (2) Consolidated Statements of Operations, (3) Consolidated Statement of Stockholders' Equity, (4) Consolidated Statements of Cash Flows, and (5) Notes to Consolidated Financial Statements. **

* Filed herewith

** Furnished herewith

† Confidential treatment has been requested with respect to certain portions of this exhibit. Omitted portions have been filed separately with the Securities and Exchange Commission.

SIGNATURE

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this Quarterly Report on Form 10-Q to be signed on its behalf by the undersigned, thereunto duly authorized.

Dated: February 7, 2019

ARROWHEAD PHARMACEUTICALS, INC.

By: /s/ Kenneth A. Myszkowski
Kenneth A. Myszkowski
Chief Financial Officer

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[**]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT UNDER RULE 24B-2 OF THE SECURITIES EXCHANGE ACT OF 1934

EXECUTION VERSION

LICENSE AGREEMENT

This License Agreement (**"Agreement"**), made as of the date of execution by the last Party to sign below (the "**Execution Date**") and effective as of the Effective Date as defined below, is by and between Arrowhead Pharmaceuticals, Inc., a Delaware corporation with a place of business at 225 South Lake Avenue, Suite 1050, Pasadena, California 91101, USA ("**Arrowhead**"), and Janssen Pharmaceuticals, Inc., a Pennsylvania corporation with a place of business at 1125 Trenton-Harbourton Road, Titusville, New Jersey 08560, USA ("**Janssen**"). Arrowhead and Janssen are at times referred to herein individually as a "**Party**" and collectively as the "**Parties**".

RECITALS

WHEREAS, Arrowhead possesses certain information, materials, and intellectual property rights relating to oligonucleotides and oligonucleotide constructs, including the Licensed Construct in clinical development known as ARO-HBV, which inhibits expression of the hepatitis B virus ("**HBV**");

WHEREAS, Janssen, directly and through certain of its Affiliates, has extensive experience and expertise in the development and commercialization of pharmaceutical and biologic products, and owns or otherwise controls information, materials and intellectual property rights useful to Develop and Commercialize pharmaceutical and biologic products in the Field; and

WHEREAS, Janssen desires to acquire from Arrowhead and Arrowhead desires to grant to Janssen, an exclusive license under Arrowhead Intellectual Property to Develop and Commercialize Licensed Products; and

WHEREAS Arrowhead and Janssen are entering into a Research Collaboration and Option Agreement in relation to the development and licensing of additional constructs and products having activity in other assays concurrently with this Agreement (the "**Research Collaboration and Option Agreement**").

NOW, THEREFORE, in consideration of the mutual promises and covenants set forth below and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

ARTICLE I: DEFINITIONS

Unless the context otherwise requires, the terms in this Agreement with initial letters capitalized shall have the meanings described below or the meaning as designated in the indicated places throughout this Agreement.

1.1 **"Access Territory"** means those countries set forth in Exhibit A.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1.2 **"Accounting Standards"** means GAAP or International Financial Reporting Standards (IFRS), as appropriate, as generally and consistently applied in compliance with Applicable Laws throughout the relevant company's organization at the relevant time.

1.3 **"Acquired General Arrowhead Patent Rights"** has the meaning as set forth in Section 12.5.3.

1.4 **"Acquired Specific Arrowhead Patent Rights"** has the meaning as set forth in Section 12.5.3.

1.5 **"Action"** means any claim, action, cause of action or suit (whether in contract or tort or otherwise), litigation (whether at law or in equity, whether civil or criminal), controversy, assessment, arbitration, investigation, hearing, charge, complaint, demand, notice or proceeding of, to, from, by or before any Governmental Authority.

1.6 **"Active Ingredient"** means clinically-active material that provides a pharmacological activity in a pharmaceutical or biologic product (excluding formulation components, such as coatings, stabilizers, excipients or solvents, adjuvants or controlled release technologies).

1.7 **"Affiliate"** means, with respect to a designated Party or entity, any entity controlling, controlled by, or under common control with such Party or entity. For purposes of this definition only, "control" means: (a) where the entity is a corporate entity, direct or indirect ownership of 50% or more of the stock or shares having the right to vote for the election of directors of such entity; and (b) where the entity is other than a corporate entity, the possession, directly or indirectly, of the power to direct, or cause the direction of, the management or policies of such entity, whether through the ownership of voting securities, by contract or otherwise.

1.8 **"Agreement"** has the meaning set forth in the preamble above.

1.9 **"Alliance Manager"** has the meaning set forth in Section 3.9.

1.10 **"Ancillary Agreements"** means, collectively, the Pharmacovigilance Agreement and any supply agreement and quality agreement entered into between the Parties in accordance with Section 7.1 or Section 7.2.

1.11 **"Anti-Corruption Laws"** means the FCPA and related regulations in the United States, and equivalent anti-bribery laws and regulations under Applicable Laws in other jurisdictions.

1.12 **"Applicable Laws"** means the applicable provisions of any national, supranational, regional, state and local laws, treaties, statutes, rules, regulations, administrative codes, guidance, ordinances, judgments, decrees, directives, injunctions, orders, permits, of or from any court, arbitrator, Regulatory Authority, or Governmental Authority having jurisdiction over or related to the subject item.

1.13 **"ARO-HBV"** means the particular Construct for which Arrowhead initiated the Ongoing Phase 1/2 Study.

1.14 **"ARO-HBV Product"** means any Licensed Product comprising ARO-HBV.

1.15 **"Arrowhead Intellectual Property"** means Arrowhead Patent Rights and Arrowhead Know-How, collectively.

1.16 **"Arrowhead Invention"** has the meaning set forth in Section 10.1.

1.17 **"Arrowhead Know-How"** means Know-How Controlled by, or on behalf of, Arrowhead or its Affiliates at any time that is necessary or reasonably useful to Exploit Licensed Constructs or Licensed Products including CMC Know-How.

1.18 **"Arrowhead Patent Rights"** means Patent Rights Controlled by, or on behalf of, Arrowhead or its Affiliates at any time that are necessary or reasonably useful to Exploit Licensed Constructs or Licensed Products, provided that such Patent Rights Covering inventions that are Arrowhead Platform Technology shall be limited to Patent Rights Covering inventions made as of the Effective Date and thereafter for the longer of the three-year period following the Effective Date or the end of the Option Right Development Term. A list of certain Arrowhead Patents Rights that, as of the Effective Date, Cover the Exploitation of ARO-HBV, is attached hereto as Exhibit B. Arrowhead Patent Rights includes General Arrowhead Patent Rights and Specific Arrowhead Patent Rights as indicated in Exhibit B.

1.19 "**Arrowhead Platform Technology**" means targeted RNAi molecule technology Controlled by Arrowhead utilizing targeting ligand-mediated delivery of RNAi designated by Arrowhead as its TRiM™ platform.

1.20 "**Assay**" means [**].

1.21 **"Audited Party"** has the meaning set forth in Section 9.6.2.

1.22 **"Audited Site"** means any site or facility of a Party or any of its Affiliates, Third Party sublicensees, or Third Party contractors or subcontractors hereunder, as the case may be, on which any clinical study or Manufacturing of Licensed Products for human use is conducted, and which is undergoing an inspection or audit by a Regulatory Authority or a Party as provided hereunder.

1.23 **"Auditing Party"** has the meaning set forth in Section 9.6.2.

1.24 **"Bankruptcy"** means, with respect to a Party, that: (a) the Party has been declared insolvent or bankrupt by a court of competent jurisdiction; or (b) a voluntary or involuntary petition in bankruptcy is filed in any court of competent jurisdiction against the Party and such petition has not dismissed within ninety (90) days after filing; or (c) the Party has made or executed an assignment of substantially all of its assets for the benefit of creditors.

1.25 **"Bankruptcy Code"** means Title 11 of the United States Code, as may be amended or superseded from time to time.

1.26 **"Breaching Party"** has the meaning set forth in Section 15.2.1.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1.27 **"Business Day"** means a weekday on which banking institutions in the City of New York, New York are open for business.

1.28 **"CAPA"** means a written recovery plan or proposal of corrective and preventative actions.

1.29 **"Change of Control"** means, with respect to a specified Party: (a) the acquisition, directly or indirectly, by a Person or group (whether in a single transaction or multiple transactions) of more than 50% of the voting power of such Party or of beneficial ownership of (or the right to acquire such beneficial ownership of) more than 50% of the outstanding equity or convertible securities of such Party (including by tender offer or exchange offer); (b) any merger, consolidation, share exchange, business combination, recapitalization, sale of a majority of assets of (i.e., having a fair market value (as determined by the board of directors of such Party in good faith) in excess of 50% of the fair market value of all the assets of such Party and its subsidiaries immediately prior to such sale), or similar corporate transaction involving such Party (whether or not including one or more wholly owned subsidiaries of such Party), other than: (i) transactions involving solely such Party and/or one or more Affiliates, on the one hand, and one or more of such Party 's Affiliates, on the other hand, and/or (ii) transactions in which the stockholders of such Party immediately prior to such transaction hold at least 50% of the voting power of the surviving company or ultimate parent company of the surviving company; or (c) as a result of a single or multiple transaction(s) by a Person or group, the occupation of a majority of the seats (other than vacant seats) on the board of directors (or similar governing body of such Party) by any directors or Persons who were not (i) members of such body on the Execution Date of this Agreement, (ii) appointed by members of such body on the Execution Date of this Agreement or by members of such body so appointed, or (iii) nominated for election to such body by any Persons described in preceding clauses (i) or (ii); or (d) the adoption of a plan relating to the liquidation or dissolution of such Party. For purposes of this definition, the terms "group" and "beneficial ownership" shall have the meaning accorded in the U.S. Securities Exchange Act of 1934 and the rules of the U.S. SEC thereunder in effect as of the Execution Date hereof.

1.30 **"Claim"** has the meaning set forth in Section 13.1.

1.31 **"Clinical Investigation Laws"** means Applicable Laws relating to human clinical investigations, such as 21 C.F.R. Parts 50, 54, 56 and 312 and then-current Good Clinical Practice, each as in effect and as amended from time to time.

1.32 **"Clinical Plan"** means the plan governing the Ongoing Phase 1/2 Study, an initial version of which is attached hereto as Exhibit C and as amended from time to time as provided in Section 5.1.

1.33 **"CMC Know-How"** means the Arrowhead Know-How relating to the chemistry, Manufacture, and controls of ARO-HBV, any Licensed Construct or any Licensed Product, including data, procedures, techniques, and information resulting from any test method development and stability testing, process development, process validation, process scale-up, formulation development, delivery system development, quality assurance and quality control development, and other related activities.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1.34 **"Collaboration Activities"** means the Parties' activities (performed directly and/or, as may be permitted hereunder, on their behalf through their Affiliates, Third Party sublicensees and/or Third Party subcontractors) performed under this Agreement, including the Clinical Plan and Development Plan.

1.35 **"Combination Product"** means: (a) a single pharmaceutical formulation containing as its Active Ingredients (i) one or more Licensed Constructs, and (ii) one or more Active Ingredients other than a Licensed Construct; or (b) a bundle of products comprised of (i) one or more single pharmaceutical formulations comprising at least one Licensed Construct, and (ii) one or more other therapeutically effective or Prophylactically Active Products, priced and sold in a single package containing such multiple products or packaged separately but sold together for a single price; in each of the foregoing (a) or (b), in all dosage forms, formulations, presentations, line extensions and package configurations thereof.

1.36 **"Commercialization" or "Commercialize"** means activities directed to marketing, promoting, offering for sale, or selling a product, including commercial manufacturing, launching product, conducting any Post-Marketing Studies, market access activities, price setting and price negotiation activities, managed care contract sales, medical affairs activities, and distribution and importation activities in support thereof.

1.37 **Commercially Reasonable Efforts"** means, with respect to the efforts to be expended by any Party with respect to any objective, those reasonable, diligent, good faith efforts to accomplish such objective that a similarly situated pharmaceutical or biotechnology company in the exercise of its reasonable business discretion would normally use to accomplish a similar objective under similar circumstances. With respect to any objective relating to the research, Development or Commercialization of a Licensed Product by any Party, "Commercially Reasonable Efforts" shall mean those efforts and resources normally used by a similarly situated pharmaceutical or biotechnology company in the exercise of its reasonable business discretion with respect to a product owned or controlled by such Party, or to which such Party has similar rights, which product has similar product characteristics, is of similar market potential and is at a similar stage in its development or life as is such Licensed Product, taking into account all Relevant Factors.

1.38 **"Confidential Information"** has the meaning set forth in Section 11.1.1.

1.39 **"Construct"** means [**].

1.40 **"Control"** means, with respect to any designated intellectual property or right pertaining thereto, possession by a Party (whether directly by ownership (either sole or joint) or license from a Third Party, or indirectly through an Affiliate having ownership or license from a Third Party) of the ability to grant to the other Party a license, sublicense, right of access, or other right to or under such intellectual property or intellectual property right as provided herein, without violating the terms of any agreement with any Third Party, such agreement existing (a) as of the Effective Date or (b) subsequent to the Effective Date if (in the case of this clause (b)) such Party first acquired rights to such intellectual property pursuant to such agreement or other arrangement.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1.41 **"Cover"** means, in reference to a claim of a Patent Right in a particular country or other jurisdiction with respect to particular subject matter (such as a composition of matter, product, manufacturing or other process, or method of use), that the claim (as interpreted under principles of patent law in such jurisdiction) reads on or encompasses such subject matter.

1.42 **"CPR Mediation Procedure"** has the meaning set forth in Section 16.2.

1.43 **"CPR Rules"** has the meaning set forth in Section 16.3.

1.44 **"Cure Period"** has the meaning set forth in Section 15.2.1.

1.45 **"Currency Hedge Rate"** means the weighted average hedge rate to be used for local currency of each country, other than the United States, of the Territory as calculated by Janssen's Affiliate Johnson & Johnson based on the outstanding external foreign currency forward hedge contract(s) of Johnson & Johnson's Global Treasury Services Center (GTJRC) and its Affiliates with Third Party banks.

1.46 **"Current Manufacturing Agreements"** means any and all material agreements by and between Arrowhead and any Third Party relating to the Manufacturing of ARO-HBV, any Licensed Construct or any Licensed Product, in effect (including as to any material provisions surviving any termination) as of the Execution Date.

1.47 **"Develop"** means any and all pre-clinical, clinical, and other activities to study a drug candidate or product and develop it toward Regulatory Approval (including any such activities conducted after such Regulatory Approval other than Post-Marketing Studies) for Commercialization, including toxicology and ADME tests, analytical method development, stability testing, process development and improvement, process validation, process scale-up prior to first Regulatory Approval, formulation development, delivery system development, quality assurance and quality control development, statistical analysis, pre- and post-approval clinical studies or trials, regulatory affairs, regulatory activities and manufacturing activities in support thereof. For clarity, the definition of "Development" shall include all activities under the Clinical Plan and Development Plan but exclude all Commercialization activities. **"Developing"**, **"Development"** and **"Development activities"** shall each have a correlative meaning.

1.48 **"Development Plan"** means the plan governing the Development of any Licensed Product, and initially ARO-HBV, with the exception of the Ongoing Phase 1/2 Study and, if applicable, the research and Development of a Non-ARO-HBV Product under Article IV, an initial version of which is attached hereto as Exhibit D and as amended from time to time as provided in Section 5.2.

1.49 **"Dispute"** means any dispute, claim, or controversy arising from or regarding this Agreement, including the interpretation, application, breach, termination, or validity of any provision hereof. For the avoidance of doubt, any matter within the decision-making authority of the JSC shall not be deemed a Dispute merely if a unanimous decision cannot be reached if one of the Parties has the final decision making authority on such matter; however, if a controversy between the Parties arises regarding the interpretation of any provisions hereunder pertaining to

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any JSC decision that cannot be made due to such controversy, such controversy shall be deemed a Dispute to the extent of such controversy.

1.50 **"Drug Application"** means an NDA, MAA, or equivalent application, submitted to a Regulatory Authority in a particular jurisdiction, for marketing approval of a pharmaceutical or drug product.

1.51 **"Drug Regulation Laws"** means Applicable Laws regulating drugs and pharmaceutical products, such as the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. § 301 *et. seq.*, the Prescription Drug Marketing Act of 1987, the Controlled Substances Act, 21 U.S.C. § 801 *et. seq.*, and policies issued by the FDA, each as in effect and as amended from time to time.

1.52 **"Effective Date"** means the effective date of this Agreement, which shall be the date (following the Execution Date) that is the first Business Day immediately following the date on which the Parties have actual knowledge that all applicable waiting periods under the HSR Act with respect to the transactions contemplated hereunder have expired or have been terminated.

1.53 **"EMA"** means the European Medicines Agency or any successor agency for the EU.

1.54 **"European Union"** or **"EU"** means the countries of the European Economic Area, as it is constituted on the Effective Date and as it may be modified from time to time after the Effective Date.

1.55 **"Execution Date"** has the meaning set forth in the preamble above.

1.56 **"Executive Officers"** means (a) for Arrowhead, the Chief Executive Officer of Arrowhead or any executive officer of Arrowhead delegated authority by the Chief Executive Officer with respect to any particular matter and (b) for Janssen, (i) if a matter pertains to the Development of a Licensed Product, the Global Head of Janssen R&D or the Global Therapeutic Area R&D Head for Janssen Infectious Disease; (ii) if a matter pertains to the Commercialization of a Licensed Product, the Worldwide Chairman, Pharmaceuticals of Johnson & Johnson, the Head of the Global Commercial Strategic Organization or the Global Commercial Strategic Leader for Infectious Disease of Janssen; or (iii) if a matter pertains to the Manufacture of a Licensed Product, the Vice President of Janssen Supply Chain. In the event that the position of any of the Executive Officers identified in this Section no longer exists due to a corporate reorganization, corporate restructuring or the like that results in the elimination or modification of the identified position, the applicable Executive Officer shall be replaced with another senior officer with responsibilities and seniority comparable to the eliminated or modified position.

1.57 **"Exploit"** means to make, have made, import, use, sell or offer for sale, including to research, develop, commercialize, register, manufacture, have manufactured, hold or keep (whether for disposal or otherwise), have used, export, transport, distribute or have distributed by others, promote, market or have sold or otherwise dispose of, or have offered for sale, and convey or grant end-users use rights. **"Exploiting"** and **"Exploitation"** shall each have a correlative meaning.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1.58 **"FCPA"** means the U.S. Foreign Corrupt Practices Act (15 U.S.C. § 78dd-1 et. seq.), as may be amended at the relevant time.

1.59 **"FDA"** means the United States Food and Drug Administration or any successor agency thereto for the United States.

1.60 **"Field"** means all therapeutic, prophylactic and diagnostic uses in humans or animals.

1.61 "**First Commercial Sale**" means, with respect to a given Licensed Product in a country, the first commercial sale for monetary value in an arms-length transaction of such Licensed Product to a Third Party purchaser by or on behalf of a Party, its Affiliate or its Third Party sublicensee in such country following receipt of applicable Regulatory Approval of such Licensed Product in such country; provided, however, that First Commercial Sale shall not include any transfer of a Licensed Product (a) between or among a Party and its Affiliates or Third Party sublicensees (such as contract manufacturers, suppliers, or distributors for consignment, where such transfer is not a transfer to a wholesaler or retailer) or (b) for purposes of patient assistance or for use in a clinical trial.

1.62 **"FTE"** means the equivalent of the work of one qualified employee or agent for the applicable activities, full time, for one year (constituting [**] working hours). For clarity, no more than [**] hours per year (or equivalent pro-rata portion thereof for a period less than 12 months) may be charged for an individual contributing work factoring into any reimbursable FTE Costs hereunder, regardless of how much additional work time is contributed by such individual during such period. An individual contributing work for less than [**] hours per year shall be deemed a fraction of an FTE on a pro-rata basis.

1.63 **"FTE Costs"** means the FTE Rate times the number of FTEs expended during the applicable financial period. The FTE Costs shall be determined based on time (as calculated in pro-rated FTEs) actually spent performing the applicable Development activities, unless another basis is expressly specified herein or otherwise agreed in advance by the Parties in writing.

1.64 **"FTE Rate"** means the monetary rate at which FTEs expended by a Party during the applicable financial reporting period will accrue toward such Party's FTE Costs hereunder. The Parties agree that the FTE Rate for research and Development work shall be [**] US dollars ($[**]) per allocable FTE. Each such FTE Rate shall be adjusted annually, based on changes in the Consumer Price Index (as quoted by the U.S. Department of Labor, Bureau of Labor Statistics) plus [**], with the first adjustment taking effect in the 2019 Janssen Calendar Year. Each Party acknowledges that the foregoing FTE Rate for research and Development work has been set to include all compensation, salary, employee benefits, routine supplies, and other expenses, including support staff and overhead for or directly allocable to an FTE.

1.65 **"G5 Countries"** means France, Germany, Italy, Spain and the United Kingdom.

1.66 **"GAAP"** means United States generally accepted accounting principles applied on a consistent basis.

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1.67 **"General Arrowhead Patent Rights"** has the meaning as set forth in Section 10.3.3(b).

1.68 **"Generic Version"** means, with respect to a Licensed Product, a generic or follow-on version of such Licensed Product that has been approved in the relevant jurisdiction by the applicable Regulatory Authority under 21 USC § 505(j), 21 U.S.C. § 505(b)(2), 21 U.S.C. § 351(k) or any possible future abbreviated approval pathway in the US or a foreign equivalent thereof by referencing any NDA, supplemental NDA, MAA, supplemental MAA or foreign equivalent thereof for such Licensed Product.

1.69 **"Good Clinical Practice"** or **"GCP"** means the current standards for clinical studies for pharmaceutical and biologic products, as set forth in the ICH guidelines and applicable regulations promulgated thereunder, as amended from time to time, and such standards of good clinical practice as are required by the European Union and other Governmental Authorities in countries in which a Licensed Product is intended to be sold to the extent such standards are not less stringent than United States Good Clinical Practice.

1.70 **"Good Laboratory Practice"** or **"GLP"** means the current standards for laboratory activities for pharmaceutical and biologic products, as set forth in the FDA's Good Laboratory Practice regulations or the Good Laboratory Practice principles of the Organization for Economic Co-Operation and Development, as amended from time to time, and such standards of good laboratory practice as are required by the European Union and other Governmental Authorities in countries in which a Licensed Product is intended to be sold, to the extent such standards are not less stringent than United States Good Laboratory Practice.

1.71 **"Good Manufacturing Practice"** or **"GMP"** means the current quality assurance standards that ensure that pharmaceutical and biologic products are consistently produced and controlled in accordance with the quality standards appropriate to their intended use as defined in 21 C.F.R. § 210 and 211, European Directive 2003/94/EC, Eudralex Volume 4 and applicable United States, European Union, Canadian and ICH guidance or equivalent laws in other jurisdictions to the extent no less stringent.

1.72 **"Government Health Care Programs"** means the US Medicare program (Title XVIII of the Social Security Act), the US Medicaid program (Title XIX of the Social Security Act), the TRICARE program, the US Federal employee health benefits program, and other foreign, federal, state and local governmental health care plans and programs.

1.73 **"Government Order"** means any order, writ, judgment, injunction, decree, stipulation, ruling, determination or award entered by or with any Governmental Authority.

1.74 **"Governmental Authority"** means any United States federal, state or local government or any government other than the United States government, or political subdivision thereof, or any multinational organization or authority to the extent empowered to act on behalf of or in the stead of a government, or any authority, agency, or commission entitled to exercise any administrative, executive, judicial, legislative, police, regulatory, pricing or taxing authority or power, any court or tribunal (or any department, bureau or division thereof), or any governmental arbitrator or government empowered arbitral body.

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1.75 **"HBV"** has the meaning set forth in the recitals above.

1.76 **"HDV"** means the hepatitis D virus.

1.77 **"Health Care Laws"** means Applicable Laws relating to Government Health Care Programs, Private Health Care Plans, privacy and confidentiality of patient health information and human biological materials, including, in the United States, federal and state Applicable Laws pertaining to the federal Medicare and Medicaid programs (including the Medicaid rebate program); federal Applicable Laws pertaining to the Federal employees health benefit program and the TRICARE program; federal and state Applicable Laws applicable to health care fraud and abuse, kickbacks, physician self-referral and false claims (including 42 U.S.C. § 1320a-7a, 42 U.S.C. § 1320a-7b, 42 U.S.C. § 1395nn and the federal Civil False Claims Act, 31 U.S.C. § 3729 *et. seq.*); the Health Insurance Portability and Accountability Act of 1996; and 45 C.F.R. Part 46, as well as similar Applicable Laws in the Territory, each as in effect and as amended from time to time.

1.78 **"HSR Act"** means the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, and the rules and regulations promulgated thereunder, or foreign equivalent thereof under Applicable Law.

1.79 **"HSR Clearance"** means, as pertaining to this Agreement, the expiration or termination of all applicable waiting periods and requests for information (and any extensions thereof) under the HSR Act.

1.80 **"HSR Filing"** means (a) filings by Janssen or Arrowhead with the United States Federal Trade Commission and the Antitrust Division of the United States Department of Justice of a Notification and Report Form for Certain Mergers and Acquisitions (as that term is defined in the HSR Act) with respect to the matters set forth in this Agreement, together with all required documentary attachments thereto, or (b) equivalent filings with applicable Governmental Authorities having jurisdiction over requests for HSR Clearance.

1.81 **"Hybridizing Strand"** means [**].

1.82 **"ICH"** means the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use.

1.83 **"IND"** means an Investigational New Drug Application filed with the FDA, or a similar application filed with a Regulatory Authority outside of the United States for authorization to commence a clinical study, such as a clinical trial application or a clinical trial exemption, or any related regulatory submission, license or authorization.

1.84 **"IND Ready"** has the meaning set forth in Section 4.1.

1.85 **"Indemnified Party"** has the meaning set forth in Section 13.1.

1.86 **"Indemnified Persons"** shall mean, with respect to a Party, such Party and its Affiliates, and their respective officers, directors, employees, and agents.

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1.87 **"Indemnifying Party"** has the meaning set forth in Section 13.1.

1.88 **"Indication"** shall mean (a) the treatment of any disease, condition or symptom associated with or induced by HBV infection or HDV infection in humans or animals, (b) the prevention of HBV infection or HDV infection in humans or animals, or (c) the diagnosis of HBV infection or HDV infection in humans or animals.

1.89 **"In-Licensed Arrowhead Patent Rights"** has the meaning set forth in Section 12.5.3.

1.90 **"Invention"** has the meaning set forth in Section 10.2.1.

1.91 **"Janssen Calendar Quarter"** means a financial quarter based on a Janssen Calendar Year; provided, however, that the first Janssen Calendar Quarter and the last Janssen Calendar Quarter may be partial quarters as applicable under the relevant Janssen Calendar Year.

1.92 **"Janssen Calendar Year"** means a year based on Janssen's universal calendar for that year used by Janssen for internal and external reporting purposes (a copy of which for the year 2018 is attached hereto as Exhibit F); provided, however, that the first Janssen Calendar Year and the last Janssen Calendar Year of the applicable period (such as the Royalty Term) may be a partial year as the case may be.

1.93 **"Joint Patent Rights"** shall mean Patent Rights owned jointly by the Parties and in which each Party has an equal and undivided interest.

1.94 **"Joint Steering Committee"** or **"JSC"** means a joint steering committee formed by representatives of each Party that is responsible for providing high-level oversight and decision-making regarding the Parties' activities under this Agreement, as further provided in Article III.

1.95 **"Know-How"** means any and all technical, scientific, and other know-how (whether or not patentable), data, and other information, as well as materials not generally known to the public, including inventions, trade secrets, research and development data, plans, procedures, experimental techniques, material specifications, and assay or test protocols; biological, chemical, pharmacological, toxicological, pharmaceutical, pre-clinical, clinical, safety, and quality control data and information; manufacturing methods and formulas; and molecules, chemical entities, reagents, starting materials, reaction intermediates, building blocks, synthetic products, delivery systems, excipients, ingredients, formulations, and compositions of matter.

1.96 **"Licensed Construct"** means [**].

1.97 **"Licensed Product"** means (a) any pharmaceutical formulation for administration to a subject comprising a Licensed Construct or (b) any Licensed Construct for formulation into such a pharmaceutical formulation.

1.98 **"Losses"** means damages, losses, liabilities, costs (including costs of investigation and defense), fines, penalties, Government Orders, taxes, expenses or amounts paid in settlement (in each case, including reasonable attorneys' and experts fees and expenses), resulting from a

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claim in an Action of a Third Party, and incurred by a Party (or other Indemnified Person as provided in Article XIII) as a result of such Action.

1.99 **"MAA"** means (a) a marketing authorization application filed with (i) the EMA under the centralized EMA filing procedure or (ii) a Regulatory Authority in any country in the European Union if the centralized EMA filing procedure is not used; or (b) any other equivalent or related regulatory submission, in either case to gain approval to market a pharmaceutical or biologic product in any country in the European Union, in each case including, for the avoidance of doubt, amendments thereto and supplemental applications.

1.100 **"Manufacturing"** means activities performed to manufacture a product into final form for end use, including producing and manufacturing starting materials and intermediates used to manufacture such product, filling, finishing, packaging, labeling, performing quality assurance testing and release, and shipping and storing the product.

1.101 **"MHLW"** means the Ministry of Health, Labour and Welfare of Japan and any successor agency thereto.

1.102 **"NDA"** means a new drug application or biologics license application submitted to the FDA for purposes of obtaining Regulatory Approval for a new drug in the United States, for a particular indication, including, for the avoidance of doubt, amendments thereto and supplemental applications.

1.103 **"Net Sales"** means, with respect to a Licensed Product commencing with its First Commercial Sale, the gross sales value of the Licensed Product by or on behalf of Janssen (directly or through any of its Affiliates or Third Party sublicensees) to a Third Party purchaser in an arms-length transaction, less the following customary deductions, determined in accordance with Accounting Standards and standard internal policies and procedures consistently applied throughout Janssen's organization to calculate revenue for financial reporting purposes, to the extent specifically and solely allocated to the sale of such Licensed Product to such purchaser and actually taken, paid, accrued, allowed, included, or allocated based on good faith estimate, in the gross sales prices with respect to such sales (and consistently applied as set forth below):

(a) normal and customary trade, cash and/or quantity discounts, allowances, wholesaler and pharmacy fees, and credits allowed or paid, in the form of deductions actually allowed or actually paid with respect to sales of such Licensed Product (to the extent not already reflected in the amount invoiced) excluding commissions for commercialization;

(b) excise taxes, use taxes, tariffs, sales taxes and customs duties, and/or other government charges imposed on the sale of such Licensed Product to the extent included in the price and separately itemized on the invoice price (but specifically excluding, for clarity, any income taxes assessed against the income arising from such sale) (including VAT, but only to the extent that such VAT taxes are not reimbursable or refundable);

(c) outbound freight, shipment and insurance costs to the extent included in the price and separately itemized on the invoice price;

(d) compulsory payments and cash rebates imposed on sales of such Licensed Product paid to a Governmental Authority (or agent thereof) pursuant to Applicable Law by reason of any national or local health insurance program or similar program, to the extent allowed and taken, including fees levied by a Governmental Authority as a result of Applicable Law;

(e) retroactive price reductions, credits or allowances actually granted upon rejections or returns of such Licensed Product, including for recalls or damaged goods and billing errors, and write-offs for bad debts;

(f) rebates, charge backs and discounts (or equivalents thereof) actually granted to managed health care organizations, pharmacy benefit managers (or equivalents thereof), federal, state/provincial, local or other Government Authorities, or their agencies or purchasers, reimbursers, or trade customers; and

(g) coupons, or discount/rebates associated with co-pay cards.

All aforementioned deductions shall only be allowable to the extent they are commercially reasonable, and shall be determined, on a country-by-country basis, as incurred in the ordinary course of business in type and amount consistent with Janssen's, its Affiliate's, or sublicensee's (as the case may be) business practices consistently applied across its product lines and in compliance with Accounting Standards and verifiable. All such discounts, allowances, credits, rebates and other deductions shall be fairly and equitably allocated to such Licensed Product and other products of the Party and its Affiliates and sublicensees such that such Licensed Product does not bear a disproportionate portion of such deductions. For clarity, sales of a Licensed Product by and between a Party and its Affiliates and sublicensees (including those that are distributors), or between the Parties (or their respective Affiliates or sublicensees), shall be excluded from Net Sales calculations for all purposes so long as such Licensed Product is subsequently resold to a Third Party. For the avoidance of doubt, sales of a Licensed Product for use in conducting clinical trials of such Licensed Product in a country in order to obtain the first Regulatory Approval of such Licensed Product in such country shall be excluded from Net Sales calculations for all purposes. Also, notwithstanding anything to the contrary above, sales of a Licensed Product for any compassionate use or named patient sales shall be excluded from Net Sales calculations to the extent such sales are not reported as revenue by Janssen and its Affiliates. Additionally, for clarity, only a single sales transaction with respect to a particular unit of Licensed Product, made at the time Janssen or any of its Affiliates or sublicensees sells such Licensed Product to a Third Party purchaser in an arms-length transaction, will qualify as the basis for determining the Net Sales amount for such unit. The calculation of Net Sales for any Combination Product shall be adjusted pursuant to Section 8.4.6(c).

1.104 **"Non-ARO-HBV Product"** means any Licensed Product other than an ARO-HBV Product, including analogously Licensed Constructs that are not ARO-HBV.

1.105 **"Non-Breaching Party"** has the meaning set forth in Section 15.2.1.

1.106 **"Notice of Claim"** has the meaning set forth in Section 13.2.1.

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1.107 **"Ongoing Phase 1/2 Study"** means the phase 1/2 clinical study entitled "Study of ARO-HBV in Normal Adult Volunteers and Patients With Hepatitis B Virus (HBV)" and designated as NCT03365947, as such study may be amended from time to time.

1.108 **"Option Right"** has the meaning set forth in Section 4.1.

1.109 **"Option Right Development Plan"** has the meaning set forth in Section 4.2.

1.110 **"Option Right Development Term"** has the meaning set forth in Section 4.2.

1.111 "**Option Right Payment**" has the meaning set forth in Section 8.2.3.

1.112 **"Out-of-Pocket Costs"** means, with respect to a Party, costs and expenses paid by such Party to any Third Party for services or materials provided by such Third Party to directly support the applicable Collaboration activities. For clarity, Out-of-Pocket Costs do not include payments for a Parties' or its Affiliates' internal salaries or benefits, facilities, utilities, general office or facility supplies, insurance or information technology, capital expenditures or the like.

1.113 **"Owned General Arrowhead Patent Rights"** has the meaning set forth in Section 12.5.3

1.114 **"Owned Specific Arrowhead Patent Rights"** has the meaning set forth in Section 12.5.3.

1.115 **"Party"** and **"Parties"** have the meaning set forth in the preamble above.

1.116 **"Patent Controversy"** means any Dispute between the Parties to the extent that it involves an issue relating to the inventorship, claim scope or interpretation, infringement, enforceability, patentability, or validity of any Patent Right hereunder, and including any such issues relevant to any Prosecution activities hereunder.

1.117 **"Patent Costs"** means all Out-of-Pocket Costs reasonably incurred by or on behalf of a Party (such as by a designated Affiliate) in Prosecuting applicable Patent Rights.

1.118 **"Patent Office"** means the United States Patent and Trademark Office, European Patent Office, or other Governmental Authority responsible for the examination of patent applications or granting of patents in a country, region, or supra-national jurisdiction.

1.119 **"Patent Representative"** means the patent attorney or agent representing a Party as described in Section 10.7.

1.120 **"Patent Rights"** means, in reference to a designated invention, all original (priority establishing) patent applications claiming such invention filed anywhere in the world, including provisionals and nonprovisionals, and all related applications thereafter filed, including any continuations, continuations-in-part, divisionals, or substitute applications, any patents issued or granted from any such patent applications, and any reissues, reexaminations, renewals or extensions (including by virtue of any supplementary protection certificates) of any such patents,

and any confirmation patents or registration patents or patents of addition based on any such patents, and all foreign counterparts or equivalents of any of the foregoing.

1.121 **"Patent Term Extension"** means an extension of the term of any issued patent, or a right of protection equivalent to such an extension, granted under law or regulation such as the U.S. Drug Price Competition and Patent Term Restoration Act of 1984 in the United States, the Supplementary Protection Certificate of the member states of the EU, or any other similar law or regulation in any other country or jurisdiction. For example, a pediatric extension obtained by application to or through approval of a Patent Office extending the term of any patent shall be deemed a Patent Term Extension.

1.122 **"Patent Working Group"** means the representatives of both Parties involved in handling certain patent matters as more fully set forth in Section 10.7.

1.123 **"Person"** means any individual, entity or Governmental Authority.

1.124 **"Pharmacovigilance Agreement"** means a written pharmacovigilance agreement between the Parties executed hereunder pursuant to Section 5.6.4.

1.125 **"Phase 1"** means, in reference to a clinical study (or trial) of a Licensed Product, that as described in US federal regulation 21 C.F.R. § 312.21(a).

1.126 **"Phase 2"** means, in reference to a clinical study (or trial) of a Licensed Product, that as described in US federal regulation 21 C.F.R. § 312.21(b). Notwithstanding anything in this Agreement to the contrary, neither the Ongoing Phase 1/2 Study, nor any part thereof, shall be considered a Phase 2 clinical study for the purpose of this Agreement.

1.127 **"Phase 3"** means, in reference to a clinical study (or trial) of a Licensed Product, that as described in US federal regulation 21 C.F.R. § 312.21(c).

1.128 **"Post-Marketing Studies"** means any clinical trials or studies conducted with a Licensed Product after receipt of Regulatory Approval of the Licensed Product, which are conducted voluntarily in order to enhance marketing or scientific knowledge of the Licensed Product and are not required by Regulatory Authorities or are not intended to support Regulatory Approval of a Licensed Product for a new indication or other material change to the product label.

1.129 **"Pre-Existing Acquired Rights from Third Parties"** means any and all agreements by and between Arrowhead and any Third Party, in effect as of the Execution Date, and pursuant to which the Third Party assigns (by express terms, whether or not using the word "assign") Arrowhead any Third Party's Patent Rights or Know-How that, in whole or in part, are necessary or useful for Developing, Manufacturing, or Commercializing any Licensed Product.

1.130 **"Pre-Existing Licenses from Third Parties**" means any and all agreements by and between Arrowhead and any Third Party, in effect as of the Execution Date, and pursuant to which the Third Party grants (by express terms, whether or not using the word "license") Arrowhead any license or sublicense (or use or other Exploitation) rights to or under any Third

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Party's Patent Rights or Know-How that, in whole or in part, are necessary or useful for Developing, Manufacturing, or Commercializing any Licensed Product.

1.131 "Pre-Existing Licenses to Third Parties" means any and all agreements by and between Arrowhead and any Third Party, in effect as of the Execution Date, and pursuant to which Arrowhead or its Affiliates grants (by express terms, whether or not using the word "license") such Third Party any license or sublicense (or use or other Exploitation) rights to or under any Arrowhead Intellectual Property.

1.132 "Pre-Existing Third Party Agreements" means (a) Pre-Existing Licenses to Third Parties; (b) Pre-Existing Licenses from Third Parties; (c) Pre-Existing Acquired Rights from Third Parties; and (d) any other agreements between Arrowhead or its Affiliates and a Third Party in effect as of the Execution Date that contain any terms relating to the Development, Manufacture, or Commercialization of a Licensed Product, ARO-HBV or any Licensed Construct, including Current Manufacturing Agreements (collectively, the **"Additional Pre-Existing Third Party Agreements"**).

1.133 "Primary RNAi Trigger" means [**].

1.134 "Prior CDA" means the Confidential Disclosure Agreement entered into on January 25, 2017 between Arrowhead and Alios Biopharma, Inc., an Affiliate of Janssen.

1.135 "Private Health Care Plans" means non-governmental Third Party health care payors and plans, including insurance companies, health maintenance organizations and other managed care organizations, Blue Cross and Blue Shield plans, and self-funded employers.

1.136 "Product Infringement" has the meaning set forth in Section 10.4.2.

1.137 "Product Trademark Rights" means any Trademark Rights pertaining specifically to any Licensed Product and Controlled by a Party hereunder.

1.138 "Prophylactically Active Product" means a product that prevents any disease, condition or symptom associated with or induced by HBV infection or HDV infection in humans or animals.

1.139 "Prosecuting" means, in reference to a designated Patent Right, preparing a Patent Right in application form for filing in any Patent Office, or performing activities associated with filing, prosecuting, maintaining, defending, or correcting the Patent Right in any Patent Office proceeding or with appeal of a Patent Office decision therefrom, including with respect to any post-grant proceeding, supplemental examination, post-grant review, *inter partes* review, reexamination, reissue, interference, or opposition proceeding in any Patent Office. For the avoidance of doubt, Prosecuting excludes any infringement suit or other legal Action to enforce a Patent Right or declaratory judgment suit or other legal Action initiated by a Third Party to challenge in court the validity or enforceability of a Patent Right. **"Prosecute"** and **"Prosecution"** shall each have a correlative meaning.

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1.140 **"Prosecuting Party"** means the Party with the current right to Prosecute the applicable Patent Right as set forth in Section 10.3.

1.141 **"Prosecution Contact"** means a Party's designated patent attorney or agent identified in a notice to the other Party (as may be updated from time to time) as its contact for communications between the Parties regarding the Prosecuting of any Arrowhead Patent Rights.

1.142 **"Regulatory Approval"** means the approval (including supplements, amendments, pre- and post-approvals), license, registration or authorization of the applicable Regulatory Authority necessary for the marketing and sale of drug product in a country or jurisdiction, including any and all pricing and reimbursement approvals that are reasonably necessary or desirable to obtain in such country or jurisdiction to launch a drug product (even if such approvals are not legally required to launch such drug product in such country or jurisdiction). For purposes of illustration, in addition to approval of a Drug Application: Regulatory Approval in France includes approval of a Drug Application and publication of the reimbursed price level in the official journal and registration on a reimbursement list by or on behalf of Comité Economique des Produits de Santé or Haute Autorité de Santé (or a successor agency); Regulatory Approval in Italy includes publication of reimbursement in the Government's Offical Gazette (by Agenzia Italiana del Farmaco or a successor agency); Regulatory Approval in Germany includes execution of contract with the head association of sick funds (GKV-Spitzenverband, Gesetzlichen Krankenversicherung, or a successor agency); Regulatory Approval in Spain includes authorization by La Comisión Interministerial de Precios de los Medicamentos or La Comisión Nacional para el Uso Racional de los Medicamentos, or a successor agency) for national patient access to reimbursement by or on behalf of a Governmental Authority; and Regulatory Approval in the United Kingdom includes approval by the National Institute for Health and Care Excellence (or a successor agency) to obtain mandatory funding to enable broad market access.

1.143 **"Regulatory Authority"** means any federal, national, multinational, state, provincial or local regulatory agency, department, bureau or other governmental entity with authority over the registration or authorization or marketing and sale of a medicinal product in a country, such as the FDA in the United States, EMA in the EU, and MHLW in Japan.

1.144 **"Regulatory Exclusivity Right"** means a right or protection, granted by a Regulatory Authority in a jurisdiction, providing with respect to a product in such jurisdiction: (a) marketing exclusivity that prevents the Regulatory Authority from accepting or approving a Drug Application (whether new or abbreviated), submitted by a Person other than Janssen (or any of its Affiliates or Third Party sublicensees), such as through new molecular entity or orphan drug exclusivity granted by the FDA, or an exclusive right to sell pursuant to the data exclusivity provisions under EC Directives 2004/27/EC and 2001/83/EC and Regulation 726/2004/EC, or marketing exclusivity granted in respect of pediatric studies under Regulation 1901/2006, or Section 505A(a) of the FD&C Act; or (b) data protection for regulatory data submitted by or on behalf of a Party or its Affiliates relating to a product against unfair commercial use or public release consistent with, or no less stringent than, TRIPs Article 39.3.

1.145 **"Regulatory Filing"** means any documentation comprising or relating to or supporting any filing or application with any Regulatory Authority with respect to a Licensed Product, or its use or potential or investigative use in humans, including any documents submitted

to any Regulatory Authority and all supporting data, including INDs, supportive documents enabling a clinical program, Drug Applications, safety and adverse event reports and all correspondence with any Regulatory Authority with respect to any Licensed Product (including minutes of any meetings, telephone conferences or discussions with any Regulatory Authority).

1.146 **"Relevant Factors"** means all relevant factors that may affect the Development, Regulatory Approval, Manufacturing or Commercialization of a Licensed Product, including (as applicable): actual and potential issues of safety, tolerability, efficacy or stability; expected and actual product profile (including product modality, category and mechanism of action), as such or in comparison with the profile of other products and regimens; stage of development or life cycle status; actual and projected Development, Regulatory Approval, Manufacturing, and Commercialization costs, timelines and budgets; any issues regarding the Manufacturing of the Licensed Product; the likelihood of obtaining Regulatory Approvals for such Licensed Product; the timing of such Regulatory Approvals; the current guidance and requirements for Regulatory Approval for such Licensed Product and similar products and the current and projected regulatory status; labeling or anticipated labeling for such Licensed Product; the then current competitive environment and the likely competitive environment at the time of projected entry into the market; past performance of such Licensed Product or similar products; present and future market potential, as such or taking into account the relevant portfolio or pipeline; present and future relevant patient population; existing or projected pricing, sales, reimbursement, return on investment and profitability; pricing or reimbursement changes in relevant countries; proprietary position, strength and duration of patent protection, anticipated exclusivity and freedom to operate hurdles; legal issues; and other relevant scientific, technical, operational, commercial or economic factors.

1.147 **"Research Collaboration and Option Agreement"** has the meaning set forth in the recitals above.

1.148 **"Right of Reference"** has the meaning set forth for such term in 21 C.F.R. § 314.3(b) or an equivalent right of access or reference under any Applicable Law in any other jurisdiction outside the United States.

1.149 "**RNAi Trigger**" means [**].

1.150 **[***]**.

1.151 **"Royalty Term"**, as applicable to Net Sales of each particular Licensed Product in a given country, means the period from the date of the First Commercial Sale of such particular Licensed Product by or on behalf of Janssen in the given country, until the later of (a) the expiration of the last Valid Claim of the Arrowhead Patent Rights which Covers the composition of matter of the Licensed Construct or its Primary RNAi Trigger or its Targeting Ligand of such Licensed Product in such country; or (b) the termination or expiration of Regulatory Exclusivity Rights protecting the Licensed Product in such country; or (c) [**] from the date of First Commercial Sale in the Territory.

1.152 **"Specific Arrowhead Patent Rights"** has the meaning as set forth in Section 10.3.3(a).

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1.153 **"Targeting Ligand"** means [**].

1.154 **"Taxes"** means any present or future taxes, levies, imposts, duties, charges, assessments or fees of any nature (including any interest thereon).

1.155 **"Term"** means the term of this Agreement as set forth in Section 15.1.

1.156 **"Territory"** means the entire world, including all of its countries and their possessions and territories.

1.157 **"Third Party" or "Third-Party"** means any person, entity, or other party other than a Party to this Agreement or any of its Affiliates.

1.158 **"Third-Party Product Liability Action"** has the meaning set forth in Section 13.4.1.

1.159 **"Threshold Active Construct"** means [**].

1.160 "**Threshold Activity**" means [**].

1.161 **"Trademark Rights"** means all registered and unregistered trademarks (including all common law rights thereto), service marks, trade names, brand names, logos, taglines, slogans, certification marks, internet domain names, trade dress, corporate names, business names and other indicia of origin, together with the goodwill associated with any of the foregoing, and all applications, registrations, extensions, and renewals thereof throughout the world, and all rights therein provided by international treaties and conventions.

1.162 **"United States"**, **"US"** or **"U.S."** means the United States of America, including its territories and possessions.

1.163 **"Upfront Fee"** has the meaning set forth in Section 8.2.1.

1.164 **"Valid Claim"** means a claim (a) of any unexpired patent issued or granted by a Patent Office that has not been revoked or held unenforceable or invalid by a decision of a court or Governmental Authority of competent jurisdiction from which no appeal can be taken, or with respect to which an appeal is not taken within the time allowed for appeal, and that has not been disclaimed or admitted to be invalid or unenforceable through reissue, disclaimer, or otherwise, or (b) of any Patent Right that is being prosecuted in good faith and has not been abandoned or finally disallowed without the possibility of appeal or re-filing of the application and has been pending for less than [**].

1.165 **"Variant"** means [**].

ARTICLE II: LICENSE GRANTS

2.1 Grants.

2.1.1 Development License. Subject to the terms and conditions of this Agreement, Arrowhead hereby grants to Janssen an exclusive (even as to Arrowhead, except to the extent Arrowhead expressly retains or is expressly granted back rights under this Agreement), worldwide license, with the right to sublicense in accordance with Section 2.1.4, under Arrowhead Intellectual Property, to research and have researched and to Develop and have Developed Licensed Constructs and Licensed Products, including ARO-HBV, in the Field in the Territory, and to make and Manufacture, have made and Manufactured, use, have used, and import and have imported Licensed Constructs and Licensed Products, including ARO-HBV, for such purposes. The license rights granted under this Section 2.1.1 shall commence on the Effective Date and run throughout the Term hereof, subject to the termination provisions under Article XV.

2.1.2 Commercialization License. Subject to the terms and conditions of this Agreement, Arrowhead hereby grants to Janssen an exclusive (even as to Arrowhead, except to the extent Arrowhead expressly retains or is expressly granted back rights under this Agreement), worldwide license, with the right to sublicense in accordance with Section 2.1.4, under the Arrowhead Intellectual Property, to Commercialize and have Commercialized, offer for sale and sell, and have offered for sale and sold, Licensed Constructs and Licensed Products, including ARO-HBV, for use in the Field in the Territory, and to Manufacture, have Manufactured, use, have used, and import and have imported Licensed Constructs and Licensed Products, including ARO-HBV for such purposes. The license rights granted under this Section 2.1.2 shall commence on the Effective Date and continue, on a product-by-product and country-by-country basis, throughout the Term hereof, subject to the termination provisions under Article XV.

2.1.3 Know-How Cross-License. Subject to the terms and conditions of this Agreement:

(a) Arrowhead hereby grants to Janssen a royalty-free, perpetual, non-exclusive license to use any Confidential Information that is Arrowhead Know-How and disclosed by Arrowhead to Janssen under this Agreement for any purpose other than the Exploitation of a Licensed Construct or Licensed Product, except such Confidential Information comprising Know-How related solely to the Arrowhead Platform Technology.

(b) Janssen hereby grants to Arrowhead a royalty-free, perpetual, non-exclusive license to use any Confidential Information that is Janssen Know-How disclosed by Janssen to Arrowhead under this Agreement for any purpose other than the Exploitation of a Licensed Construct or Licensed Product, except such Confidential Information comprising (a) Know-How related to Active Ingredients, other than Licensed Constructs or (b) financial and sales data and pricing information relating to Licensed Constructs or Licensed Products.

2.1.4 Sublicensing. In the event that Janssen grants any sublicense of the license rights granted to Janssen under this Section 2.1 to any Affiliates or any Third Parties, Janssen shall remain responsible for its obligations under this Agreement and shall be responsible for the performance of the relevant sublicensee and the compliance by such sublicensee with the terms

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and conditions of this Agreement. Any sublicense granted by Janssen under this Section 2.1 to any Third Party not working under Janssen's or its Affiliates' control and direction shall refer to this Agreement and shall not conflict with Janssen's obligations under this Agreement, and Janssen will, within a reasonable time period after granting such sublicense, provide a copy of the sublicensing agreement to Arrowhead, which agreement may be redacted to omit any terms not relevant to determining Janssen's and the Third Party sublicensee's obligations under this Agreement.

2.2 Licenses Constitute IP under Bankruptcy Code. All rights and licenses granted under or pursuant to any section of this Agreement by one Party to the other, including Section 2.1 hereof, are, and shall otherwise be deemed to be, for the purpose of Section 365(n) of the Bankruptcy Code (or comparable provisions of laws of other jurisdictions) rights to "intellectual property" as defined in Section 101(35A) of the Bankruptcy Code (or comparable provisions of laws of other jurisdictions). Each Party hereby acknowledges, on behalf of itself and its Affiliates, "embodiments" of intellectual property pursuant to the Bankruptcy Code include the following: (a) data from the research and Development of Licensed Products, (b) Licensed Constructs and Licensed Product samples and inventory, (c) Licensed Product formulations, (d) laboratory notebooks and records from either Party's research relating to any Licensed Constructs or Licensed Product, including from the Clinical Plan or Development Plan, (e) results from clinical studies of Licensed Products and the Licensed Constructs therein, (f) Regulatory Filings and Regulatory Approvals relating to Licensed Products, and (g) marketing, advertising and promotional materials relating to Licensed Products.

2.3 Rights in Combination Products. Notwithstanding the terms of any license grant or covenant under this Agreement, no rights will be conveyed or granted by one Party to another hereunder to (a) an Active Ingredient of any Combination Product, whether in Development or Commercialized, where the Active Ingredient is not a Licensed Construct, (b) a product of such Combination Product that is not a Licensed Product, or (c) an Active Ingredient, other than a Licensed Construct, that is otherwise used in combination with a Licensed Product in pre-clinical research, clinical studies or in accordance with an approved product label.

2.4 No Other Rights. No rights other than those expressly set forth in this Agreement are granted by one Party to the other Party hereunder, and no additional rights shall be deemed granted to either Party by implication, estoppel, or otherwise, with respect to any Patent Rights, Know-How, or other intellectual property rights.

ARTICLE III: GOVERNANCE

3.1 Establishment of JSC. Promptly after the Effective Date, the Parties shall establish a Joint Steering Committee (JSC) composed of [**] representatives from Arrowhead and [**] representatives from Janssen (which, for clarity, may include any employees or agents of its Affiliates). The members of the JSC shall be appropriately qualified and experienced in order to make a meaningful contribution to meetings and render decisions within its scope of authority hereunder. Each Party may replace its representatives on the JSC by written notice to the other Party.

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3.2 **JSC Responsibilities**. The JSC shall, subject to Section 3.7, have authority to:

3.2.1 serve as a forum to discuss and monitor the activities under the Clinical Plan and approve changes to the Clinical Plan as provided for in Section 5.1;

3.2.2 serve as a forum to discuss strategic and material issues in relation to the Development Plan and to disclose amendments to and progress of the performance of the Development Plan. For clarity, a Party executing activities shall not be required to seek JSC review of operational decisions involving such activities;

3.2.3 take decisions, by mutual agreement, in relation to the meaning of "Threshold Active Construct" pursuant to Section 1.159;

3.2.4 under the advice of the Patent Working Group, recommend to the Parties certain actions involving Prosecution of the Arrowhead Patent Rights;

3.2.5 serve as a forum to disclose progress of the actions undertaken to remediate possible non-compliance with the terms of this Agreement or with Applicable Laws as provided for in Section 5.8.1; and

3.2.6 in the event that Janssen exercises the Option Right, oversee and monitor Arrowhead's research and Development activities in relation to the Non-ARO-HBV Product and to disclose progress of the performance of such Development activities in accordance with Sections 4.2 and 4.4.

3.3 **Patent Matters**. The JSC shall not discuss any issue relating to any Patent Rights relevant to the Development, Manufacture, or Commercialization of any Licensed Products (including with respect to any of their scope, patentability, validity, Prosecution, or infringement), unless the Patent Representative of each Party is present at the meeting. The Patent Representatives of each Party shall be solely responsible for documenting at their discretion any issues discussed by the JSC relating to any Patent Rights, and the content of such discussions shall be held in strict confidence by the Parties to protect their common interests and preserve the privileged status of any attorney-client communication, advice, or legal opinion reflected therein.

3.4 **JSC Meetings**. The JSC shall meet quarterly until [**], and at such other times as the Parties may agree. The first meeting of the JSC shall be held as soon as reasonably practicable, but in no event later than sixty (60) days after the Effective Date. Meetings shall be held at such place or places as are mutually agreed or by teleconference or videoconference, provided that at least the quorum members of each Party are present at any JSC meeting. Each Party may from time to time invite a reasonable number of participants in addition to its representatives on the JSC (such as Patent Working Group members) to attend any JSC meeting, which additional participants shall not be members and shall attend the JSC meeting on an ad hoc basis in a non-voting capacity. The JSC meetings shall be chaired by Janssen. The chairperson shall set and circulate to all JSC members agendas for JSC meetings in advance. The agendas shall include any matter within the authority of the JSC hereunder reasonably requested by Arrowhead to be addressed. The Parties shall rotate the responsibility for recording, preparing and, within a reasonable time, issuing draft minutes of each JSC meeting to each Party's members for review, and the chairperson shall issue

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to the Parties final minutes signed or otherwise approved in writing (such as via an electronic signature) by a Janssen JSC representative and an Arrowhead JSC representative.

3.5 Meeting Expenses. Each Party shall bear its own costs, including travel expenses, incurred by its JSC members, any additional non-member JSC participants of such Party and Patent Working Group members in connection with their attendance at JSC meetings or Patent Working Group meetings and other activities related to the JSC or Patent Working Group.

3.6 Decision-making. Decisions of the JSC within its scope of authority hereunder shall be made by unanimous vote, with Janssen's representatives to the JSC collectively having one (1) vote and Arrowhead's representatives to the JSC collectively having one (1) vote. Decisions of the JSC shall be memorialized in its meeting minutes. If the JSC fails to reach unanimous decision on a matter within its authority that has been pending in excess of [**] (or such other period as the Parties may agree in writing), the matter shall be referred to applicable Executive Officers of the Parties, who shall attempt to reach a mutual decision. In the event that the Executive Officers cannot reach a mutual decision with regard to such matter, then Janssen shall have the deciding vote, subject to Section 3.7.

3.7 Certain Limitations on Decision-Making.

3.7.1 Modifications to Option Right Development Plan. Any proposed amendment to the Option Right Development Plan shall be subject to the approval of the JSC and the decision-making authority set forth in Section 3.6, provided, however, that Janssen shall not have the deciding vote thereon, and further that Arrowhead shall not unreasonably withhold its consent to any amendment reasonably proposed by Janssen in good faith to the Option Right Development Plan.

3.7.2 Modifications to Clinical Plan and Definition under Section 1.159. Any proposed amendment to the Clinical Plan and the definition under Section 1.159 shall be subject to the approval of the JSC and the decision-making authority set forth in Section 3.6, provided, however, that Janssen shall not have the deciding vote thereon, and further that Arrowhead shall not unreasonably withhold its consent to any amendment reasonably proposed by Janssen in good faith to the Clinical Plan or the definition under Section 1.159.

3.7.3 Prosecution of Patent Rights Governed by Article X. For clarity and notwithstanding any other provision of this Agreement to the contrary, decisions regarding the Prosecution of any Patent Rights shall not be within the JSC's authority, and the provisions of Article X of this Agreement shall govern Prosecution of certain Patent Rights.

3.8 No Authority to Modify Agreement. For clarity and notwithstanding anything to the contrary herein, neither the JSC nor the Patent Working Group shall have any authority to: (a) modify any provision set forth in the body of this Agreement, including any payment conditions or terms or obligations of the Parties, which provisions may be modified only by written agreement of the Parties; or (b) resolve any Disputes.

3.9 Alliance Managers. Each Party shall designate a single alliance manager for coordinating interactions between the Parties regarding any activities contemplated under this

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Agreement (**"Alliance Manager"**). The Alliance Managers will be responsible for the day-to-day worldwide coordination of the Parties' activities under this Agreement and will serve to facilitate routine communication between the Parties. The Alliance Managers shall have experience and knowledge appropriate for managers with such project management responsibilities. Each Party may change its designated Alliance Manager from time to time upon written notice to the other Party.

ARTICLE IV: NON-ARO-HBV PRODUCT RESEARCH

4.1 Janssen has the right in its sole discretion to require Arrowhead to use Commercially Reasonable Efforts to conduct activities to research and Develop a Non-ARO-HBV Product to a point in Development for one such Licensed Product that there is adequate and sufficient data to file an IND thereon ("**IND Ready**"), subject to the terms and conditions of Article IV hereof (the "**Option Right**"). Janssen may exercise the Option Right by giving written notice to Arrowhead at any time prior to [**].

4.2 Upon Janssen's exercise of the Option Right, Arrowhead shall promptly provide Janssen with a proposed plan, timelines and corresponding budget, including details of those activities that are known and can be specified and an outline of those activities requiring additional information, for the research and pre-clinical Development of a Non-ARO-HBV Product to IND Ready. The JSC shall discuss this proposed plan in good faith, make modifications based on such discussions and approve a plan by mutual approval of the JSC (the "**Option Right Development Plan**"). The initial Option Right Development Plan approved by the JSC shall be signed by the Parties and upon signing the Option Right Payment shall be due to Arrowhead in accordance with Section 8.2.3. The Parties may thereafter amend the Option Right Development Plan by mutual approval of the JSC as required by the circumstances and consistent with Arrowhead's obligation of Commercially Reasonable Efforts under Section 4.3. The term of the Option Right Development Plan will be the currently specified term of anticipated activities under the plan and will be amended as the timeline of activities is amended (the "**Option Right Development Term**").

4.3 Upon Janssen's exercise of the Option Right, Arrowhead shall use Commercially Reasonable Efforts for a period of up to [**] of research and Development activities to (a) research and Develop one Non-ARO-HBV Product to IND Ready; and (b) generate and provide Janssen with sufficient pre-clinical Development data in relation to such Non-ARO-HBV Product for Janssen [**].

4.4 Arrowhead shall keep Janssen informed of its research and Development activities under the Option Right Development Plan by (a) informing Janssen in writing of each material development in relation to such research and Development activities, including the identification and characterization of Primary RNAi Triggers, Licensed Constructs and Licensed Products; and (b) disclosing its progress of the performance of the Option Right Development Plan at each JSC meeting.

4.5 Upon completion of the research and Development activities under the Option Right Development Plan, Arrowhead shall promptly deliver to Janssen, at the request of Janssen and at no cost for Janssen, all of Arrowhead's remaining inventory of any Non-ARO-HBV Product. If applicable, the Parties shall enter into an appropriate supply agreement for such supply.

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4.6 Arrowhead shall perform the Development activities under the Option Right Development Plan, and Janssen shall reimburse [**] on a quarterly basis, to the extent they are in accordance with the proposed plan and the budget included in the Option Right Development Plan.

4.7 Janssen shall have the right to request Arrowhead at any time by written notice to immediately cease its research and Development activities under the Option Right Development Plan and such plan will be terminated. In the event of such termination, Janssen shall reimburse [**] actually incurred in the performance of its research and Development activities under the Option Right Development Plan in accordance with the budget.

ARTICLE V: DEVELOPMENT

5.1 Clinical Plan. Arrowhead shall, at its sole cost and expense, be responsible for the conduct and completion of the Ongoing Phase 1/2 Study. The conduct by or on behalf of Arrowhead of the Ongoing Phase 1/2 Study after the Effective Date shall be governed by the Clinical Plan. To the extent permitted by Arrowhead's legal and regulatory obligations, the Parties, through the JSC, may amend the Clinical Plan in due course. Arrowhead shall remain responsible in all cases for all liabilities arising in connection with its performance of, or failure to perform, any activities or obligations with respect to the Ongoing Phase 1/2 Study, prior to the Effective Date and thereafter. For clarity, Section 11.5 shall apply to the Ongoing Phase 1/2 Study.

5.2 Development Plan. Subject to Article IV and Section 5.1 and except as expressly provided otherwise hereunder, Janssen, at its sole cost and expense, shall be solely responsible for the Development of the Licensed Product after the Effective Date. The Development of the Licensed Product by or on behalf of Janssen after the Effective Date shall be conducted pursuant to the Development Plan. The Parties acknowledge that the initial Development Plan, attached to this Agreement as Exhibit D, is preliminary and provides high-level plans for Development activities only. Subject to Section 3.2.2, Janssen shall have the sole right to make all decisions with respect to the amendment and implementation of the Development Plan, provided that, in the event Janssen conducts Phase 2 clinical studies for ARO-HBV [**] which shall be based on discussions with Regulatory Authorities. Janssen shall, through the JSC, notify Arrowhead of any amendment of the Development Plan.

5.3 Development Diligence.

5.3.1 Janssen Development Diligence. Janssen shall use Commercially Reasonable Efforts to conduct Development activities required to obtain Regulatory Approval for a first indication [**] for a ARO-HBV Product and, in the event Janssen elects to Develop a Non-ARO-HBV Licensed Product whether by exercising the Option Right or otherwise, Janssen shall use Commercially Reasonable Efforts to conduct Development activities required to obtain Regulatory Approval for a first indication [**] for such Non-ARO-HBV Product. In the event that such Development activities are successful and based on the available data from such Development activities, Janssen shall use Commercially Reasonable Efforts to seek Regulatory Approval for a first indication for such Licensed Product(s) in the Territory. Arrowhead acknowledges that the foregoing diligence obligation does not necessarily require Janssen (a) to seek Regulatory Approval in all countries in the Territory; and (b) to initiate or continue Development activities for a Licensed Product in a country where, taking into account the Relevant Factors, the

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Commercialization will not be or is likely not to be profitable. It is anticipated by the Parties that Development in the United States and European Union will precede Development in other countries.

5.3.2 Arrowhead Development Diligence. Arrowhead shall use Commercially Reasonable Efforts to conduct and complete the Ongoing Phase 1/2 Study in accordance with the Clinical Plan and to assist Janssen, at no additional cost for Janssen, in finalizing a Development Plan to the extent requested by Janssen.

5.3.3 Development Compliance. Without limiting Sections 5.3.1 and 5.3.2, each Party shall use Commercially Reasonable Efforts to perform its respective Development activities under the Clinical Plan and Development Plan respectively. Each Party (and its Affiliates, sublicensees and Third-Party subcontractors) shall conduct its Development activities in good scientific manner and in compliance with Applicable Law, including laws and regulations regarding environmental, safety, and industrial hygiene, Clinical Investigation Laws, Good Laboratory Practice, Good Clinical Practice and pharmacovigilance requirements. Notwithstanding anything to the contrary herein, a Party shall not be obligated to undertake or continue any Development activities with respect to a Licensed Product if such Party reasonably determines that performance of such Development activity would violate Applicable Law or pose an unacceptable safety risk to clinical study subjects.

5.3.4 Timelines. For clarity, each Party acknowledges that any timelines reflected in the Clinical Plan or Development Plan are good-faith approximations only and shall not be construed as imposing an obligation to strictly adhere to any such timelines, subject to the foregoing in this Section 5.3.

5.4 Transfer of Know-How. Promptly following the Effective Date, Arrowhead shall provide a summary of all Arrowhead Know-How and shall make available such Arrowhead Know-How at the request of Janssen. Arrowhead shall permit Janssen to make copies at Janssen's expense of such requested Arrowhead Know-How, recorded in any form (including laboratory notebook entries, database entries, monographs, reports, and slide presentations), that exists on the Effective Date. Arrowhead shall promptly make available to Janssen and shall permit Janssen to make copies at Janssen's expense of all Arrowhead Know-How, including all clinical data resulting from the Ongoing Phase 1/2 Study, which becomes available following the Effective Date. Notwithstanding any term of this Agreement to the contrary, Arrowhead shall not be obliged to disclose to Janssen [**].

5.5 Regulatory Approvals and Filings.

5.5.1 Arrowhead-Held INDs and other Regulatory Filings. Arrowhead shall own all Regulatory Filings, including any IND, filed by or on behalf of Arrowhead for any Licensed Product and all regulatory approvals and authorizations resulting from such Filings, until completion or termination of the Ongoing Phase 1/2 Study. Arrowhead shall have primary responsibility for interactions with any Regulatory Authority with respect to such INDs and other Regulatory Filings, but shall, to the extent permitted by Applicable Law, including its obligations as owner of the IND, comply with the decisions of the JSC and its obligations under this Agreement. Upon completion or termination of the Ongoing Phase 1/2 Study, Arrowhead will

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assign ownership of all Regulatory Filings, including any IND, for any License Product and all regulatory approvals and authorizations resulting from such Filings to Janssen.

5.5.2 INDs for New Clinical Studies and other Regulatory Filings. Janssen shall have overall responsibility for developing a registration strategy for any Licensed Product. Janssen (directly and through its Affiliates and any Third Party sublicensees or subcontractors) shall be solely responsible for filing (if applicable) and maintaining and shall hold and own (a) all INDs and other Regulatory Filings for any clinical studies of any Licensed Product initiated after the Effective Date, (b) all other Regulatory Filings for any Licensed Product following the Effective Date, (c) all regulatory approvals and authorizations resulting from the filings described in the preceding clauses (a) and (b) and all Regulatory Approvals for a Licensed Product, and (d) all Regulatory Filings and regulatory approvals and authorizations assigned by Arrowhead to Janssen in accordance with Section 5.5.1. Subject to the second sentence of Section 5.5.1, Janssen shall be solely responsible (directly and through its Affiliates and any sublicensees and, where strictly necessary, through Arrowhead) for all interactions with Regulatory Authorities in connection with any Regulatory Filing or the Licensed Product.

5.6 Regulatory Reporting.

5.6.1 Responsibility. Except as expressly provided otherwise herein and subject to Sections 5.1 and 5.5.1, any reports (including adverse event reports) made to any Regulatory Authority in connection with any Development activities for any Licensed Product, shall be made exclusively by Janssen and in accordance with the terms and conditions of the Pharmacovigilance Agreement. In the event that information from Arrowhead is reasonably required for any such report, Arrowhead shall provide such information to Janssen at no cost for Janssen.

5.6.2 Adverse Event Reporting. Promptly after a Party becomes informed of any serious adverse event in any clinical study involving a Licensed Product, it shall notify the other Party and such notifying Party shall thereafter continue to provide additional information to the other Party relevant to such serious adverse event, including to the extent necessary for such other Party to comply with all Applicable Laws (including securities laws or regulations and the applicable rules of any public stock exchange). Arrowhead acknowledges and agrees that Janssen, as the Party having the right to hold any Drug Application for any Licensed Product hereunder, may be required to submit information and file reports to various Regulatory Authorities on a Licensed Product. Arrowhead shall: (a) provide Janssen with all adverse event information and safety-related data available to Arrowhead from any pre-clinical laboratory, animal toxicology or pharmacology studies, or clinical studies, as reasonably may be necessary or expected to be necessary for Janssen to comply with all Applicable Laws pertaining to the Licensed Product; and (b) report and provide such information to Janssen in such a manner and time so as to enable Janssen to comply with all Applicable Laws. Each Party shall handle all serious adverse events information and other safety data that comes into its possession during Development and Commercialization of any Licensed Product hereunder in accordance with all Applicable Laws.

5.6.3 Global Safety Database. Janssen shall establish a global safety database for each Licensed Product Developed hereunder and shall, in relation to such Licensed Product, maintain in the global safety database information relating to adverse events, pregnancy reports, special situation reports, and any other information relating to other adverse events Janssen decides

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to include at its reasonable discretion, including possible safety data within the Arrowhead Know-How. Janssen will use this database for regulatory reporting and for responding to safety queries from Regulatory Authorities. Promptly after the Effective Date and during the Term, Arrowhead shall, and shall cause its Affiliates and Third-Party contractors to, disclose all information relating to adverse events and pregnancy reports from clinical use of Licensed Product in its or their possession to Janssen for storage into its global safety database. Upon Arrowhead's good-faith request, Janssen shall promptly make available to Arrowhead such information from Janssen's global safety database for the Licensed Product as Arrowhead deems necessary in good faith to fulfill its pharmacovigilance reporting and other compliance obligations under Applicable Law to the applicable Regulatory Authority(ies) in connection with its regulatory sponsorship of the Ongoing Phase 1/2 Study.

5.6.4 Pharmacovigilance Agreement. Within [**] of the Effective Date, each Party shall identify its safety representative to the other Party to lead negotiations between the Parties regarding the processes and procedures for sharing adverse event information, which processes and procedures shall be documented in a written pharmacovigilance agreement signed by the Parties (the "**Pharmacovigilance Agreement**") within [**] of the Parties' identification of their respective safety representatives or such other time as the Parties may otherwise agree in writing. The Pharmacovigilance Agreement shall define safety data exchange procedures concerning adverse events, including adverse drug reactions, with respect to any Licensed Products, sufficient to permit each Party and its Affiliates and subcontractors or sublicensees, as the case may be, to comply with requirements of Applicable Laws pertaining to drug safety and pharmacovigilance, including, to the extent applicable, those obligations contained in Health Care Laws imposed by Regulatory Authorities. The Pharmacovigilance Agreement shall reflect that Janssen shall own and maintain a comprehensive (global) safety database of adverse events, pregnancy reports, and other safety data reported anywhere in the world from human use of any Licensed Products anywhere in the Licensed Territory.

5.7 Progress Reporting. At each meeting of the JSC, each Party will report on the Development activities such Party and its Affiliates have performed or caused to be performed under the Clinical Plan or the Development Plan since the last meeting of the JSC, including periodic reviews of preliminary, interim and final data, results and analyses from studies. In addition, each Party shall provide the JSC with such other information as may be reasonably requested by the JSC or the other Party with respect to such Development activities. If a Party fails to adequately report at a meeting of the JSC, the other Party may request, and such Party will provide to such other Party, a written progress report that includes the reasonably requested information.

5.8Auditing.

5.8.1 Compliance Inspections. With respect to any facility or site at which Arrowhead, any of its Affiliates or its Third Party (sub)contractors conducts any Manufacturing, clinical or regulated (e.g., under GLP, GCP, or GMP) Development activities, including Manufacturing clinical supply for use in humans, pursuant to this Agreement, Janssen shall have the right, as permitted by and subject to the terms and conditions of any possible applicable agreement with a Third Party (sub)contractor or as otherwise expressly permitted by the applicable Third Party (sub)contractor, at its expense, upon reasonable written notice to Arrowhead (and if

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applicable, such Affiliate or Third Party (sub)contractor), and during normal business hours, to inspect such facility or site and any records relating thereto, once per year or more often with cause, to verify Arrowhead's compliance with the terms of this Agreement and with all Applicable Laws, including GLP, GCP, and GMP, and current standards for pharmacovigilance practice. Such inspection shall be subject to the confidentiality provisions set forth in Article XI. In the event that such inspection would result in the disclosure of confidential information which is not protected by the confidentiality provisions set forth in Article XI, an appropriate confidentiality agreement shall be entered into. After any such inspection, Janssen shall provide written observations to Arrowhead. In the event that non-compliance with the terms of this Agreement or with Applicable Laws were observed, Arrowhead shall promptly take or, as the case may be, use Commercially Reasonable Efforts to cause the applicable Third Party to promptly take the necessary actions to remediate such non-compliance and shall keep Janssen informed of such actions through the JSC. Arrowhead agrees to use Commercially Reasonable Efforts to include in any contract or other written arrangement with its Third Party (sub)contractors, a clause permitting Janssen to exercise its rights under this Section 5.8.1.

5.8.2 Regulatory Audits. Arrowhead shall cooperate in good faith in the event any Regulatory Authority inspects any site where clinical studies or Manufacturing of clinical supplies of Licensed Products are conducted by or on behalf of Arrowhead pursuant to this Agreement, whether such Audited Site is Arrowhead's or its Affiliate's or contractor's or subcontractor's hereunder, as permitted by and subject to the terms and conditions of any applicable agreement with a Third Party or as otherwise expressly permitted by the applicable Third Party. Arrowhead shall notify Janssen within [**] after receiving notification of any Regulatory Authority inspection, which relates to or reasonably could relate to the Licensed Product or clinical studies for the Licensed Product, at any site where clinical studies or Manufacturing of clinical supplies of Licensed Products are conducted. Taking into account the timing and notice provided by the applicable Regulatory Authority, and the terms of any applicable agreements with Third Parties and Applicable Law, Janssen shall be given a reasonable opportunity to assist in the preparation of the Audited Site for inspection, where appropriate, and to attend any inspection by any Regulatory Authority of the Audited Site, and the summary, or wrap-up, meeting with a Regulatory Authority at the conclusion of such inspection. If such attendance would result in the disclosure of Arrowhead's, its Affiliate's or a Third Party's confidential information unrelated to the subject matter of this Agreement, an appropriate confidentiality agreement covering such unrelated subject matter shall be entered into. In the event that any Audited Site is found to be non-compliant with one or more Applicable Laws, Good Laboratory Practice, Good Clinical Practice, Good Manufacturing Practice, or current standards for pharmacovigilance practice, Arrowhead shall, promptly and in any event within [**] after receiving notification of such non-compliance, submit to Janssen a CAPA plan and shall use Commercially Reasonable Efforts to cause such non-compliant Audited Site to implement such CAPA plan promptly after submission. Arrowhead agrees to use Commercially Reasonable Efforts to include in any agreement or other written arrangement entered into after the Effective Date with its applicable Third Party contractors or subcontractors (as the case may be), a clause permitting Janssen to exercise its rights under this Section 5.8.2.

5.9Rights of Reference and Access to Data. Arrowhead hereby grants to Janssen, and Janssen shall have (directly and through its Affiliates), a Right of Reference with respect to

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INDs, drug master files, if any, and any other Regulatory Filings (whether made before or during the Term hereof) Controlled by Arrowhead related to any Licensed Products, for use by Janssen in Exploitation of its Development and Commercialization rights pursuant to this Agreement. Accordingly, Regulatory Authorities considering any Regulatory Filing relating to a Licensed Product being Developed hereunder shall be permitted to rely on and otherwise use the applicable information in such INDs or other Regulatory Filings. Arrowhead or its Affiliate shall provide a signed statement to this effect, if requested by Janssen, in accordance with 21 C.F.R. § 314.50(g)(3) or the equivalent as required in any other country or region of the world, or otherwise provide appropriate notification of such right of Janssen to the applicable Regulatory Authority. Janssen shall also have a right to review, access and request copies of such Regulatory Filings and any Know-How (including data) therein and use such Know-How in connection with the performance of Janssen's obligations and exercise of its rights under this Agreement, including inclusion of such Know-How in its own Regulatory Filings for Licensed Products.

5.10 Suspension of Clinical Study for Safety Reason. Notwithstanding anything to the contrary herein, if an independent safety board determines that any clinical study of a Licensed Product under the Clinical Plan or Development Plan would pose an unacceptable safety risk for any subjects or patients participating in such study, neither Party shall be obligated to continue such clinical study. Either Party may delay or suspend any Development activities with respect to an ongoing clinical study of a Licensed Product if such Party reasonably believes that such clinical study would pose an unacceptable safety risk.

5.11 Records.

5.11.1 Maintenance of Research Records. Each of the Parties shall maintain, or cause to be maintained, records of its respective Collaboration Activities in material compliance with Applicable Law (including the requirements of GCP, GLP and GMP, in each case to the extent applicable), and the requirements of its corporate records retention policies consistent therewith. Such records shall be complete and accurate and shall fully and properly reflect all work done and results achieved in the performance of the Collaboration Activities in a manner appropriate for any regulatory purpose and, when applicable and permitted under this Agreement, for use in connection with the Prosecution of Patent Rights. Such records shall be retained for the longer of either: (a) such period as is required by such retaining Party's corporate record retention policies; (b) such period as may be required by Applicable Law; or (c) the Term of this Agreement, unless a Party first offers to deliver such records to the other Party for its keeping, and delivers to such Party any records it may reasonably request, before destroying or disposing of such records.

5.11.2 Access to Records. Each Party shall have the right, at mutually agreed times during normal business hours on Business Days and upon reasonable notice, to obtain from the other Party access to and copies (at its own cost) of the records maintained by the other Party pursuant to Section 5.11.1 solely to the extent relating to any Licensed Product or any Development, Manufacturing, or Commercialization activities hereunder or any intellectual property or associated rights licensed or obtained hereunder, to the extent useful or required to (a) enable the requesting Party to conduct reasonable diligence on matters potentially giving rise to liability on the part of the requesting Party according to Applicable Law or the requirements of this Agreement, or to conduct a defense of itself with respect to any such liability, if and to the extent that a fact, circumstance or event has arisen that gives the requesting Party a reasonable

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basis to believe that it has or may incur such liability; (b) to meet its obligations to Regulatory Authorities or to comply with Applicable Laws with respect to a Licensed Product; (c) to Prosecute or enforce any Patent Rights hereunder; or (d) to otherwise Exploit any rights hereunder.

5.12 Conditional Subcontracting. A Party may subcontract any of its research and Development activities hereunder to any Third Party, provided that: (a) such Party executes a written agreement with such Third Party subcontractor that contains, in all material respects, the applicable obligations and covenants hereunder; and (b) Arrowhead may not subcontract to a Third Party for its sponsorship of the Ongoing Phase 1/2 Study without the JSC's prior written approval. A Party engaging any subcontractor shall be responsible for the performance of the subcontractor, and hereby warrants its compliance with the material terms hereof.

ARTICLE VI: COMMERCIALIZATION

6.1 Commercial Diligence. Commencing upon Janssen obtaining first Regulatory Approval for a Licensed Product in a country or jurisdiction, Janssen shall use Commercially Reasonable Efforts to Commercialize a Licensed Product in the country or jurisdiction where Regulatory Approval has been obtained.

6.2 Commercialization Responsibilities. Janssen shall be solely responsible (directly and through its Affiliates and any sublicensees) for all Commercialization activities in the Territory with respect to any Licensed Products in Exploitation of its license rights granted under Section 2.1 as well as all business decisions in connection therewith, subject to the terms of this Agreement. Subject to Section 6.1, each decision whether and when to commercially launch any particular Licensed Product in any particular country or jurisdiction of the Licensed Territory shall be within the discretion of Janssen (acting directly or through its Affiliates and sublicensees). Janssen, directly and through its Affiliates and Third Party sublicensees, will book all sales of Licensed Products made hereunder. Arrowhead acknowledges that nothing herein prohibits Janssen from donating reasonable and customary supplies of Licensed Products for access programs or humanitarian or charitable purposes.

6.3 Trademarks and International Nonproprietary Names. Janssen (directly or through its Affiliates and sublicensees) shall select its own trademarks under which it will Commercialize Licensed Products hereunder and will own the Trademark Rights associated therewith. Janssen (directly or through its Affiliates and sublicensees) shall be solely responsible for the application for an international nonproprietary name in relation to any Licensed Product and for the resulting communication with the World Health Organization.

6.4 Marketing Plans. Following Regulatory Approval of a Licensed Product for any country, Janssen shall, to the extent permitted by Applicable Law, provide to Arrowhead a report on an annual basis summarizing on a high level its marketing plans for the Licensed Product in such country, including medical affairs and marketing activities.

6.5 Conditional Subcontracting. Janssen may subcontract any of its Commercialization activities hereunder to any Third Party, provided that Janssen executes a written agreement with such Third-Party subcontractor that contains, in all material respects, the

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applicable obligations and covenants hereunder. Janssen shall be responsible for the performance of the subcontractor, and hereby warrants its compliance with the material terms hereof.

ARTICLE VII: PRODUCT MANUFACTURE AND SUPPLY

7.1 Responsibility for Manufacture. Subject to section 7.2, Janssen shall be solely responsible (directly and through its Affiliates and any sublicensees), at its sole cost and expense, for overseeing and managing all Licensed Product Manufacturing activities hereunder, including Manufacturing and having Manufactured of clinical supplies of ARO-HBV and Licensed Products for clinical studies under the Development Plan and Manufacturing and having Manufactured its supply of ARO-HBV and Licensed Products otherwise for the Development and/or Commercialization hereunder, but excluding (a) the Manufacturing of Non-ARO-HBV Products useful or required for Arrowhead's research and Development activities under Article IV, if any, and (b) the Manufacturing activities useful or required for the Ongoing Phase 1/2 Study. Subject to Section 5.1, Arrowhead shall be solely responsible (directly and through its Affiliates or any Third Party contractors), at its sole cost and expense, for the latter Manufacturing activities. For clarity, Arrowhead shall not Manufacture ARO-HBV or any ARO-HBV Product for its research and Development activities under Article IV. Janssen shall supply Arrowhead with ARO-HBV or any ARO-HBV Product if and to the extent required for Arrowhead's research and Development activities under Article IV and the Parties shall, if applicable, enter into an appropriate supply agreement for such supply.

7.2 Supply of ARO-HBV. Arrowhead shall supply Janssen, at Janssen's cost, with (a) [**] of ARO-HBV drug substance, promptly following the Effective Date, (b) all remaining supplies of ARO-HBV Product on hand at the completion of dosing in the Ongoing Phase 1/2 Study, promptly following the completion of dosing in the Ongoing Phase 1/2 Study, and (c) at least [**] of ARO-HBV drug substance manufactured, starting in [**], through Arrowhead's Current Manufacturing Agreements, promptly following such supplies becoming available. Thereafter, Arrowhead shall, upon Janssen's request, supply Janssen, at Janssen's cost, with ARO-HBV to the extent reasonably possible under Arrowhead's Current Manufacturing Agreements to the extent permissible under such agreements. For the supply under this Section, cost shall be Arrowhead's Out-Of-Pocket Costs and, for the supply under clause (c), additionally Arrowhead's FTE Costs, without any mark-up being added by Arrowhead. The Parties shall timely enter into the appropriate supply agreement(s) and quality agreement(s) for such supply.

7.3 Existing Manufacturing Contractors. Upon Janssen's request, Arrowhead shall reasonably cooperate with Janssen to secure the cooperation of Arrowhead's Third-Party contractors under any Current Manufacturing Agreements to assist Janssen in its Licensed Product Manufacturing activities hereunder and to enter into a manufacturing and supply agreement in this respect. [**].

7.4 Technical Transfer. Promptly after the Effective Date or promptly after such Know-How becomes available during the Term, Arrowhead shall transfer, and shall use Commercially Reasonable Efforts to cause its Third Party contractors under applicable Pre-Existing Third Party Agreements (including the Current Manufacturing Agreements) to transfer (as permitted by and subject to the terms and conditions of any applicable Pre-Existing Third Party Agreement or as otherwise expressly permitted by the applicable Third Party), to Janssen and its

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designated Affiliate and Third Party sublicensees and subcontractors records or copies of all CMC Know-How. Arrowhead shall bear the expenses incurred by Arrowhead in transferring any such CMC Know-How (including any payments due to its counterparties under any Current Manufacturing Agreements or Pre-Existing Licenses from Third Parties).

7.5 Quality Assurance and Compliance with Laws. Supplies of Licensed Products, ARO-HBV and any Licensed Construct for human use in any Development or Commercialization activities hereunder shall be Manufactured in compliance with (a) all Applicable Laws relating to GMP; and (b) all Applicable Laws relating to the safety, preservation or protection of human health and the environment (including workplace safety, ambient air, surface water, groundwater, land, or subsurface strata) or relating to the handling, treatment, transportation or disposal of waste. For clarity, Janssen shall be authorized to verify Arrowhead's compliance with this Section by conducting an inspection in accordance with Section 5.8.1.

ARTICLE VIII: FINANCIAL PROVISIONS

8.1 US Dollars. For clarity, all references to "dollars", "$" or "USD" mean United States dollars.

8.2 Upfront and Option Fees.

8.2.1 Upfront Fee. Janssen shall pay Arrowhead a one-time non-refundable payment of one hundred seventy-five million US dollars ($175,000,000) within ten (10) Business Days following the Effective Date (the "**Upfront Fee**").

8.2.2 Payment under Research Collaboration and Option Agreement. The payment of [**].

8.2.3 Option Right Payment. Janssen shall pay Arrowhead a one-time non-refundable payment of [**] upon Janssen's exercise of the Option Right and the Parties' signing of the Option Right Development Plan (the "**Option Right Payment**").

8.3 Milestone Payments.

8.3.1 One-Time-Only Development and Approval Milestone Payments. The below ARO-HBV Product milestone amounts shall be payable by Janssen to Arrowhead one time only upon the first achievement of the corresponding milestone event for any ARO-HBV Product. The below Non-ARO-HBV Product milestone amounts shall be payable by Janssen to Arrowhead one time only upon the first achievement of the corresponding milestone event for any Non-ARO-HBV Product, except that such Non-ARO-HBV Product milestone amount shall not be payable in the event that (a) ARO-HBV is no longer in Development or is no longer being Commercialized at the time such milestone event is first achieved for a Non-ARO-HBV Product; and (b) the ARO-HBV Product milestone amount has already been paid for achievement of that milestone event for a ARO-HBV Product.

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Milestone Event	ARO-HBV Product Milestone Amount (USD)	Non-ARO-HBV Product Milestone Amount (USD)
[**]	[**]	[**]
[**]	[**]	[**]
[**]	[**]	[**]
[**]	[**]	[**]
[**]	[**]	[**]
[**]	[**]	[**]
[**]	[**]	[**]

8.3.2 ARO-HBV Product One-Time-Only Sales Milestones. Solely upon the first occurrence (if any) of aggregate annual (total in a single Janssen Calendar Year) reported Net Sales of any ARO-HBV Product sold worldwide by or on behalf of Janssen (directly and through its Affiliates and Third Party sublicensees) hereunder in any Janssen Calendar Year during the Term first attaining the sales threshold as specified in a below sales milestone event, Janssen shall pay the corresponding ARO-HBV Product milestone amount to Arrowhead within [**] following the end of the Janssen Calendar Quarter in which such sales milestone event was attained. In the event multiple sales milestone events are first achieved in a single Janssen Calendar Quarter, the amounts specified below for each such sales milestone event shall be payable at the same time.

ARO-HBV Product Sales Milestone Event	ARO-HBV Product Milestone Amount (USD)
Net Sales greater than $[**]	$[**]
Net Sales greater than $[**]	$[**]

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Net Sales greater than $[**]	$[**]
Net Sales greater than $[**]	$[**]

8.3.3 Non-ARO-HBV Product One-Time-Only Sales Milestones. Solely upon the first occurrence (if any) of aggregate annual (total in a single Janssen Calendar Year) reported Net Sales of a Non-ARO-HBV Product sold worldwide by or on behalf of Janssen (directly and through its Affiliates and Third Party sublicensees) hereunder in any Janssen Calendar Year during the Term first attaining the sales threshold as specified in the sales milestone event set forth below, Janssen shall pay the corresponding Non-ARO-HBV milestone amount to Arrowhead within [**] following the end of the Janssen Calendar Quarter in which such sales milestone event was attained. In the event multiple sales milestone events are first achieved in a single Janssen Calendar Quarter, the amounts specified below for each such sales milestone event shall be payable at the same time.

Non-ARO-HBV Product Sales Milestone Event	**Non-ARO-HBV Product Milestone Amount (USD)**
Net Sales greater than $[**]	$[**]
Net Sales greater than $[**]	$[**]
Net Sales greater than $[**]	$[**]
Net Sales greater than $[**]	$[**]

8.3.4 Each Milestone Amount Paid Once. In the event a milestone set forth in this Section 8.3 is achieved, Janssen shall pay to Arrowhead the milestone amount corresponding to each such milestone only once regardless of whether other Licensed Products achieve such milestone.

8.3.5 Notice and Invoice for Milestone Events. Janssen shall inform Arrowhead in writing, within [**] after the achievement of any milestone hereunder, and, upon such notice, Arrowhead may submit to Janssen an invoice for the applicable milestone amount due.

8.4 Royalty Payments.

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8.4.1 Royalty Term. The royalties for Licensed Products set forth in this Section 8.4 shall, unless the Agreement has been terminated earlier, be paid on a Licensed-Product-by-Licensed-Product basis and country-by-country basis for the Royalty Term for that Licensed Product in that country-of-sale. Upon expiration of the Royalty Term in respect of a Licensed Product in a particular country-of-sale of the Territory, Janssen shall have a fully paid up non-revocable non-exclusive license in such country to Commercialize such Licensed Product.

8.4.2 ARO-HBV Product Royalty Rate. Subject to Section 8.4.4 and subject to any adjustments expressly permitted under Section 8.4.6 below, Janssen shall pay to Arrowhead royalties at the incremental royalty rates on the incremental tiers of aggregate reported Net Sales of ARO-HBV Products in the Territory, during a particular Janssen Calendar Year during the Royalty Term as set forth in the below table.

Net Sales	**ARO-HBV Product Royalty Rate (percentage)**
Net Sales up to and including $[**]	[**]%
Net Sales greater than $[**] up to and including $[**]	[**]%
Net Sales greater than $[**] up to and including $[**]	[**]%
Net Sales greater than $[**]	[**]%

8.4.3 Non-ARO-HBV Product Royalty Rate. Subject to Section 8.4.4 and subject to any adjustments expressly permitted under Section 8.4.6 below, Janssen shall pay to Arrowhead royalties at the incremental royalty rates on the incremental tiers of aggregate reported Net Sales of Non-ARO-HBV Products in the Territory, during a particular Janssen Calendar Year during the Royalty Term as set forth in the below table. For clarity, in the event that multiple Non-ARO-HBV Products are Commercialized, the incremental royalty rates set forth in the below table shall be applied to the aggregate reported Net Sales for each Non-ARO-HBV Product individually and not to the aggregate reported Net Sales for all Non-ARO-HBV Products.

Net Sales	**Non-ARO-HBV Product Royalty Rate (percentage)**
Net Sales up to and including $[**]	[**]%

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Net Sales greater than $[**] up to and including $[**]	[**]%
Net Sales greater than $[**] up to and including $[**]	[**]%
Net Sales greater than $[**]	[**]%

8.4.4 Royalty Rate in Access Territory. In the event that Janssen intends to Commercialize a Licensed Product in one or more countries in the Access Territory, the Parties shall timely enter into good faith negotiations to agree upon an equitable reduction in the royalty rate applicable to the aggregate reported Net Sales of such Licensed Product in such country or countries. Accordingly, and subject to any adjustments expressly permitted under Section 8.4.6, Janssen shall have the right to use the agreed upon royalty rate for the applicable aggregate reported Net Sales of Licensed Products in the Access Territory on a country-by-country basis.

8.4.5 Royalties Due Only Once. The obligation to pay royalties under this Agreement is imposed only once with respect to the same unit of a Licensed Product.

8.4.6 Adjustments to Royalties.

(a) Compulsory License. If at any time in any country a Third Party shall, under a Government Order by a competent Governmental Authority granting or compelling the granting of a license under a Valid Claim of any Arrowhead Patent Rights Covering any Licensed Product sold by or on behalf of Janssen in such country, offer for sale or sell any product in competition with the Licensed Product marketed by or on behalf of Janssen with respect to which royalties become payable by Janssen pursuant to Sections 8.4.2 to 8.4.4, the Parties will confer and in good faith negotiate an equitable reduction in the royalty rate for calculating royalties payable to Arrowhead based on Janssen's and its Affiliates' and Third Party sublicensees' Net Sales of Licensed Product in such country under Sections 8.4.2 to 8.4.4 taking into account the royalty rate payable by the Third Party to Arrowhead under the compulsory license granting the Third Party the right to market the competing product.

(b) Generic Competition. In the event that, in a country, a Generic Version of the Licensed Product has been approved for commercialization in such country, Janssen may reduce the royalty rate for calculating royalties payable to Arrowhead based on Janssen's and its Affiliates' and Third Party sublicensees' Net Sales of such Licensed Product in such country under Sections 8.4.2 to 8.4.4 by [**].

(c) Combination Products. In the event that a Licensed Product is a Combination Product, Net Sales for the purposes of determining royalties to be paid for the Net Sales of such Combination Products pursuant to Sections 8.4.2 to 8.4.4 shall be calculated by multiplying the actual Net Sales of such Combination Product by the fraction [**]; and (b) for which no payment is owed to a Third Party.

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(d) Off-Set for Third-Party Patents. In the event that, at Janssen's discretion, a license under a Third Party's Patent Rights or an agreement is required to resolve or prevent possible allegations that the Development or Commercialization of a Licensed Product infringes such Patent Rights, Janssen shall have the right to deduct from the royalties payable to Arrowhead under this Agreement for the Licensed Product concerned [**] of any royalties, milestone payments, license fees or other payments payable by Janssen for such license or such agreement to such Third Party. In no event shall the royalty adjustment under this Section 8.4.6(d) reduce the applicable royalty rates by more than [**] as compared to the rates set forth in or determined in accordance with Sections 8.4.2 to 8.4.4.

8.5 Third Party Obligations.

8.5.1 Subcontractors. A Party or its designated Affiliate, in entering into any subcontract with a Third Party for the performance of any subcontracted Collaboration Activities hereunder (including in any jurisdiction in which employees or agents of such Third Party have rights to compensation, remuneration or payments for their inventions under Applicable Laws), shall use Commercially Reasonable Efforts to obligate the Third Party subcontractor in a written subcontract agreement to be solely responsible for any compensation, remuneration or payments due to any of the Third Party's employees or agents on account of their performance of any such activities under the subcontract agreement, including any payment obligations that may arise by operation of Applicable Law in a particular country on account of either Party's exercise of any rights hereunder with respect to any Licensed Products that were invented, in whole or in part, by any such Third Party employees or agents in the performance of such activities. If a Party fails to include such an obligation in any of its subcontract agreements with any Third Parties, such Party shall be bear any expense incurred in connection with any such payment obligations that may so arise.

8.5.2 [**]

ARTICLE IX: GENERAL PAYMENT TERMS

9.1 Invoices. Any payment for an amount due to Arrowhead under this Agreement shall be payable, except as otherwise expressly provided herein, within [**] after Janssen's receipt of an invoice from Arrowhead for such amount due. Each invoice shall specifically refer to (a) this Agreement, (b) Janssen's purchase order number if Janssen has provided a purchase order number to Arrowhead in advance of the invoice, and (c) Janssen's tax ID. Invoices shall be dated and printed on official Arrowhead letterhead. No invoice from Arrowhead shall be required for payment of royalties under Section 8.4 or sales milestones under Sections 8.3.2 and 8.3.3.

9.2 Royalty Reporting and Payments. Royalty payments due shall be payable in United States dollars [**] after the end of each Janssen Calendar Quarter during the Term. Each payment of royalties due under this Agreement will be accompanied with a royalty report setting forth, on a Licensed Product-by-Licensed Product and country-by-country basis: (a) the amount of Net Sales of Licensed Product by Janssen, its Affiliates and sublicensees; (b) the conversion of such Net Sales from the currency of sale into US dollars in accordance with Section 9.4, as applicable; and (c) a calculation of the aggregate amount of royalties owed based on such Net

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Sales, including the application of the reductions or credits, if any, made in accordance with the terms of Section 8.4.6.

9.3 Remittance. All payments due to Arrowhead hereunder shall be made in immediately available funds by electronic transfer, by Janssen (or an Affiliate on its behalf) to the bank account identified below or such other bank account as Arrowhead may designate in writing to Janssen. Any payments due and payable under this Agreement on a date that is not a Business Day may be made on the next Business Day. If, at any time, legal restrictions prevent the prompt remittance of part of or all of the royalties due hereunder with respect to any country where Licensed Products are sold, Janssen shall have the right and option to make such payments by depositing the amount thereof in local currency to Arrowhead's accounts in a bank or depository in such country as directed by Arrowhead or by using such lawful means or methods for remitting payment as Janssen may reasonably determine.

[**]

9.4 Currency. All payments under this Agreement shall be payable in United States dollars. With respect to sales of a Licensed Product invoiced in a currency other than US dollars, such amounts and the amounts payable hereunder shall be expressed in their United States dollars equivalent calculated using the method described in the remainder of this Section 9.4. For each Janssen Calendar Year during which royalties become due hereunder, Janssen shall provide: (a) the Currency Hedge Rate to be used for the local currency of each country of the Territory and (b) the detail of each such Currency Hedge Rate in writing to Arrowhead not later than ten (10) Business Days after the Currency Hedge Rates (for countries other than the U.S. where any royalty-bearing sales of Licensed Products hereunder occur) are available from Janssen or its applicable Affiliates, which is customarily at the beginning of December. Each Currency Hedge Rate for a given country will remain constant throughout the entire Janssen Calendar Year. Janssen shall use the Currency Hedge Rates to convert Net Sales to United States dollars for the purpose of calculating royalties.

9.5 Taxes.

9.5.1 Each Party shall be solely responsible for the payment of all Taxes imposed on its share of income arising directly or indirectly from the collaborative efforts of the Parties under this Agreement.

9.5.2 Each Party shall make all payments due to the other Party under this Agreement without deduction or withholding for Taxes except to the extent that any such deduction or withholding is required by Applicable Law in effect at the time of payment. The Parties agree to use Commercially Reasonable Efforts to minimize any withholding or similar Tax imposed upon payments payable under this Agreement and to consult in good faith before taking any action that is reasonably expected to result in the application of a withholding or similar Tax imposed upon payments payable under this Agreement.

9.5.3 Any Tax required to be withheld on amounts payable by the payor Party under this Agreement will be paid by the payor on behalf of the payee Party to the appropriate Governmental Authority, and the payor will furnish the payee with proof of payment of such Tax.

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Any such Tax required to be withheld will be an expense of and borne by the payee. If any such Tax is assessed against and paid by the payor, then the payee shall indemnify and hold harmless the payor from such Tax.

9.5.4 The Parties will cooperate with respect to all documentation required by any taxing Governmental Authority or reasonably requested by either Party to secure a reduction in the rate of applicable withholding Taxes. Within five (5) Business Days following the Execution Date of this Agreement, Arrowhead will deliver to Janssen an accurate and complete Internal Revenue Service Form W-9 and such form shall be updated and renewed as required by Applicable Law.

9.6 Records and Audit Rights.

9.6.1 **Maintenance of Records**. Arrowhead shall keep (and shall cause its Affiliates and applicable Third Party (sub)contractors to keep) complete, true and accurate books and records in accordance with Accounting Standards in sufficient detail for Janssen to determine the payments due and costs incurred under this Agreement. Janssen shall keep (and shall cause its Affiliates and applicable Third Party subcontractors and sublicensees to keep) complete, true and accurate books and records in accordance with Accounting Standards in sufficient detail to permit Arrowhead to confirm the accuracy of Janssen's financial records related to the royalty calculations and calculations of Net Sales hereunder. Each Party will keep such books and records in accordance with Applicable Law and for at least [**] following the date of the payment to which they pertain. In the event that Janssen is requested to reimburse Out-of-Pocket Costs or other costs to Arrowhead, Arrowhead shall provide Janssen with proof of such costs upon Janssen's request.

9.6.2 **Audit Right**. Upon the written request of a Party (as applicable, the **"Auditing Party"**), not more than once every [**], the other Party (the **"Audited Party"**) shall permit an independent certified public accounting firm of internationally recognized standing selected by the Auditing Party and reasonably acceptable to the Audited Party to have confidential access during normal business hours to such of the records of the Audited Party and its applicable Affiliates or Third Party sublicensees or subcontractors as may be reasonably necessary for the sole purpose of verifying the accuracy of any payments made under this Agreement for any period ending not more than [**] prior to the date of such request. For clarity, in the event that Janssen is the Audited Party, access shall be limited to records reasonably necessary for the sole purpose of verifying the royalty and Net Sales calculations hereunder. An audit of the records relating to a particular calendar year may be conducted not more than once. The accounting firm shall provide the Audited Party a copy of its report prior to sharing it with the Auditing Party in order to allow the Audited Party to provide the accounting firm with justifying remarks for inclusion, at the accounting firm's sole discretion, in the report prior to sharing the report with the Auditing Party. The accounting firm shall provide each Party, at the same time, a correct and complete copy of the final report summarizing the final results of such audit, which shall be treated as the Audited Party's Confidential Information. The Auditing Party shall obligate its accounting firm to keep the Audited Party's information confidential and shall, at the request of the Audited Party, cause the Auditing Party's accounting firm to execute a reasonable confidentiality agreement prior to commencing any such audit.

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9.6.3 Audit Fees. The fees charged by an accounting firm engaged by a Party in accordance with Section 9.6.2 shall be paid by the Auditing Party, provided, however, that if the audit uncovers an underpayment or overpayment in favor of the Audited Party exceeding [**] of the total amount due in accordance with this Agreement for the audited period, then the fees of such accounting firm shall be paid by the Audited Party. Any underpayments or overpayments discovered by such audit or otherwise will be paid or refunded promptly by the applicable Party within [**] of the date the Auditing Party delivers to the Audited Party such accounting firm's written report, or as otherwise agreed upon by the Parties, plus interest calculated in accordance with Section 9.8.

9.7 Party Making Payment. Arrowhead acknowledges and agrees that, as may be delegated by Janssen from time to time, an Affiliate of Janssen acting as a paying agent for Janssen may make certain payments due to Arrowhead under this Agreement on behalf of Janssen, provided that Janssen shall remain primarily responsible for any such payments due to Arrowhead under this Agreement.

9.8 Interest on Late Payments. Interest may be assessed by a payee Party on any amounts payable to it under this Agreement which are not paid by the payor Party on or before the due date for payment hereunder. Such interest shall accrue and be calculated on a daily basis at the rate of [**] per annum above the then-current prime rate quoted by Citibank in New York City (but in no event in excess of the maximum rate permissible under Applicable Laws), for the period from the due date for payment until the date of actual payment. The payment of such interest shall not limit the payee Party from exercising any other rights it may have as a consequence of the lateness of any payment from the payor Party.

ARTICLE X: INTELLECTUAL PROPERTY MATTERS

10.1 Reporting of Invention. Arrowhead shall promptly report to the JSC, as well as Janssen's Patent Representative, any material invention made by any of its employees or agents or its Affiliates' or Third-Party subcontractors' employees or agents that Covers the composition of matter of a Licensed Product or any component thereof ("**Arrowhead Invention**").

10.2 Ownership of Inventions.

10.2.1 Inventions. Ownership of any invention arising from any activities hereunder (each an "**Invention**") and any patent rights therein shall follow inventorship as determined pursuant to principles of United States patent law. Accordingly, (a) all Inventions invented solely by one or more employees or agents of a Party (or its Affiliates or Third Party subcontractors or sublicensees) shall be owned solely by such Party, and (b) all Inventions invented jointly by one or more employees or agents of one Party (or its Affiliates or Third Party subcontractors or sublicensees) and by one or more employees or agents of the other Party (or its Affiliates or Third Party subcontractors or sublicensees) shall be owned jointly by the Parties.

10.2.2 Assignment of [**] Invention. In the event an Invention solely made in the course of developing a Licensed Product by one or more employees or agents of Janssen (or its

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Affiliates or Third-Party subcontractors or sublicensees) is [**], Janssen hereby assigns to Arrowhead all right, title and interest in that Invention.

10.2.3 Inventor Compensation. Each Party (directly or through its applicable Affiliate or Third Party subcontractor or sublicensees) shall be solely responsible for any compensation due to it and its Affiliates' and Third Party subcontractors' or sublicensees' employees and agents in connection with the assignment of their respective rights to any Inventions and associated Patent Rights pursuant to this Agreement or the Exploitation of any Party or its Affiliates or Third Party sublicensees hereunder of any such Inventions or associated Patent Rights, including any required by operation of Applicable Law on account of any Commercialization of any such Arrowhead Inventions by or on behalf of Janssen hereunder.

10.3 Prosecution of Patent Rights.

10.3.1 Communications. Each Party shall use reasonable efforts to handle all communications between the Parties under this Section 10.3 through their Prosecution Contacts and keep such communications in strict confidence to protect their attorney-client privileged status.

10.3.2 Reporting of Filings. A Party planning on filing any priority-establishing or original (in each case, with respect to any claims or new matter described in the patent specification) patent application within the Arrowhead Patent Rights hereunder shall use reasonable efforts to provide to the other Party, with reasonable advance time such as at least thirty (30) days prior to proposed Prosecution filing in a Patent Office (such as a draft application or response to an official action), and provide the other Party an opportunity to comment thereon through its Prosecution Contact. Each Party shall provide to the other, promptly after filing, a copy of each priority-establishing or original (whether provisional or nonprovisional) patent application within the Arrowhead Patent Rights as filed in the Patent Office and each other substantive Prosecution filing (including any other patent application filed within the Arrowhead Patent Rights).

10.3.3 Prosecution Responsibility and Coordination.

(a) Arrowhead Patent Rights Covering Licensed Product. With respect to the Arrowhead Patent Rights Covering (a) features of a Licensed Product in Development or Commercialization but excluding Arrowhead Patent Rights Covering Arrowhead Platform Technology, or (b) Arrowhead Platform Technology as applied specifically to a Licensed Product in Development or Commercialization ("**Specific Arrowhead Patent Rights**"), Janssen shall be primarily responsible for Prosecuting Specific Arrowhead Patent Rights, provided that for so long as the Agreement remains in effect, Janssen shall follow any reasonable directions by Arrowhead as provided by its designated Prosecution Contact in Prosecuting such Specific Arrowhead Patent Rights, including with respect to the filing of any continuation, divisional, or other continuing applications. The Specific Arrowhead Patent Rights as of the Execution Date are identified in Exhibits B-1, B-3 and B-5 hereto. During the Term, Arrowhead shall provide Janssen prompt written notice of any changes to the Specific Arrowhead Patent Rights.

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(b) Arrowhead Patent Rights Covering Arrowhead Platform Technology. With respect to Arrowhead Patent Rights Covering Arrowhead Platform Technology that is incorporated in a Licensed Product but is not applied specifically to a Licensed Product in Development or Commercialization ("**General Arrowhead Patent Rights**"), Arrowhead shall be primarily responsible, which may include the use of outside patent counsel mutually acceptable to the Parties and engaged by Arrowhead, to Prosecute (or, if a Third Party has the right to control Prosecution of any General Arrowhead Patent Right under any Pre-Existing Third Party Agreements, to be represented by such Third Party in the Prosecution of) the General Arrowhead Patent Rights, provided that for so long as the Agreement remains in effect, Arrowhead shall, and shall cause the applicable Third Party, if any, and subject to any restrictions or obligations in any Pre-Existing Third Party Agreements, to, follow any reasonable directions by Janssen as provided by its designated Prosecution Contact in Prosecuting such General Arrowhead Patent Rights, including with respect to the filing of any continuation, divisional, or other continuing applications. Notwithstanding the foregoing, Arrowhead shall, upon reasonable request by, and in consultation with, Janssen, use Commercially Reasonable Efforts to file patent applications directed to Licensed Products with the objective of optimizing overall patent protection for Licensed Products. For clarity, the General Arrowhead Patent Rights as of the Effective Date are identified in Exhibits B-2, B-4 and B-5 hereto. During the Term, Arrowhead shall provide Janssen prompt written notice of any changes to the General Arrowhead Patent Rights.

(c) Joint Patent Rights. For any Joint Patent Rights, both Parties shall share primary responsibility, through outside patent counsel mutually selected and engaged by the Parties for Prosecuting such Joint Patent Rights.

(d) Coordination with JSC and Patent Working Group. In Prosecuting Arrowhead Patent Rights, each Party shall: (a) subject to any restrictions or obligations in any Pre-Existing Third Party Agreements, follow the reasonable direction of the JSC (under advice of the Patent Working Group) as to selection of country Patent Offices in the Territory for filing or validating applications to form a family of related Arrowhead Patent Rights; and (b) in the case of Joint Patent Rights, escalate any Prosecution decision on which the Parties cannot agree to the JSC for its decision, under advice of the Patent Working Group in consultation with the Prosecution Contacts, as to how to direct outside counsel with respect to such Prosecution matter involving the Joint Patent Rights.

(e) Prosecution Cooperation. Each Party shall provide all reasonable assistance requested by the other Party for Prosecuting any Arrowhead Patent Rights consistent with the terms hereof, including with respect to the timely completion of Prosecution papers to be filed in any Patent Office (including draft responses to office actions), compliance with Applicable Laws, and recording of assignments to reflect ownership consistent with the terms hereof. A Party Prosecuting any Patent Rights hereunder shall use reasonable efforts to provide the other Party with copies of all material Prosecution papers as filed in or received from any Patent Offices. The Party Prosecuting any Patent Rights hereunder shall, on an annual basis during the Term, provide the other Party with a report identifying the status of any Arrowhead Patent Rights for which it is primarily responsible for Prosecution, provided, however, that for Joint Patent Rights, the Parties shall cooperate to jointly prepare such status report.

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(f) Prosecution Costs for Arrowhead Patent Rights. Each Party responsible to Prosecute Arrowhead Patent Rights shall be solely responsible for all Patent Costs incurred in Prosecuting such Arrowhead Patent Rights (including those payable to any Third Parties under the Pre-Existing Licenses from Third Parties). Each Party shall bear fifty percent (50%) of the Patent Costs incurred in Prosecuting any Joint Patent Rights. Notwithstanding the foregoing, if either Party intends to permit any particular Arrowhead Patent Right that is pending in any Patent Office to lapse or become abandoned (including by failure to validate an allowed multi-jurisdictional patent application, such as may be pending in the European Patent Office, in any possible country), such Party shall notify the other Party of such intention at least sixty (60) days in advance, or within such other practicable time before the date upon which such Patent Right will lapse or become abandoned, and to the extent not prohibited in any Pre-Existing Third Party Agreements, such other Party shall thereupon have the right, but not the obligation, to assume responsibility for the further Prosecution of such Patent Right (and any continuing application based thereon) and all Patent Costs associated therewith, and in such event: (a) the transferring Party shall reasonably cooperate to promptly effect transfer of Prosecution of such Patent Right to the other Party and assign all of its interest in such Arrowhead Patent Right to the other Party; and (b) if such Patent Right is transferred to Janssen, such transferred Patent Right shall no longer be deemed to be an Arrowhead Patent Right for the purpose of determining the duration of Royalty Term and any royalty obligation of Janssen hereunder.

10.4 Patent Enforcement.

10.4.1 Notice.

(a) Each Party shall provide prompt notice to the other Party of any apparent, threatened, or actual infringement by a Third Party of any Arrowhead Patent Rights, or misappropriation of any Arrowhead Know-How, of which the Party becomes aware. The notifying Party shall promptly furnish the other Party with all known details or evidence of such infringement or misappropriation.

(b) Each Party shall provide prompt notice to the other Party of any Third Party communications pertaining to any Arrowhead Patent Rights that the Party receives pursuant to the Drug Price Competition and Patent Term Restoration Act of 1984, including notices pursuant to §§ 101 and 103 of such act from Persons who have filed an abbreviated NDA (ANDA) or a paper NDA, or pursuant to similar such laws in the Territory.

10.4.2 Enforcement Actions. For as long as Janssen has license rights to Commercialize Licensed Products, Janssen shall have the initial right, at its expense and in its own name (or in the name of Arrowhead as may be required under Applicable Law), for bringing any infringement suit or other enforcement Action on account of any Third Party infringement of any Specific Arrowhead Patent Rights based on any alleged making, using, selling, offering for sale, importing, or other Exploitation of any such Licensed Product in infringement of any such Patent Rights, or misappropriation of any Arrowhead Know-How providing any Regulatory Exclusivity Rights for any such Licensed Product, (each a "**Product Infringement**"), by counsel of its own choice, and Arrowhead will cooperate with Janssen as Janssen may reasonably request in connection with any such Action, including by becoming a party to such action at Janssen's cost, provided that Janssen shall reimburse Arrowhead for its Out-of-Pocket Costs reasonably incurred

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in connection with rendering such assistance. If Janssen declines to initiate such an enforcement Action against any unabated Product Infringement it shall notify Arrowhead, who shall thereafter have the right (but not the obligation) at Arrowhead's expense and in its own name, to initiate such Action by counsel of its choice, and Janssen shall cooperate with Arrowhead as Arrowhead may reasonably request, including by becoming a party to such action at Arrowhead's cost, and Arrowhead shall reimburse Janssen for its Out-of-Pocket Costs reasonably incurred in connection with rendering such assistance. A settlement or consent judgment or other voluntary final disposition of an Action brought by a Party under this Section may be entered into without the consent of the other Party, provided that such settlement, consent judgment, or other disposition does not admit the invalidity or unenforceability of any Patent Rights owned or Controlled by the other Party, and provided further that any rights granted to a Third Party to continue any activity upon which such Action was based in such settlement, consent judgment, or other disposition shall be limited to the Third Party's product or activity that was the subject of the Action. Damages recovered and any other amounts awarded in any Actions for Product Infringement under this Section shall be allocated to the Party who brought the Action, after reimbursement of each Party's actual expenses incurred in such Actions as provided hereunder, provided that in the event damage amounts are recovered by Janssen due to the Product Infringement (such as in the form of lost profits or reasonable royalties assessed on account of the Third Party's sales of infringing product), Janssen shall owe Arrowhead royalties as determined in accordance with Section 8.4 as if such damage amounts were Net Sales, after reimbursement of costs incurred in such Action.

10.4.3 Arrowhead shall have the initial right, at its expense and in its own name, for bringing any infringement suit or other enforcement Action on account of any Third Party infringement of any General Arrowhead Patent Rights by counsel of its own choice, and Janssen will cooperate with Arrowhead as Arrowhead may reasonably request in connection with any such Action, including by becoming a party to such action at Arrowhead's cost, provided that Arrowhead shall reimburse Janssen for its Out-of-Pocket Costs reasonably incurred in connection with rendering such assistance. If Arrowhead declines to initiate such an enforcement Action against any unabated Product Infringement and Janssen has license rights to Commercialize Licensed Products, Arrowhead shall notify Janssen, who shall thereafter have the right (but not the obligation) at Janssen's expense and in its own name, to initiate such Action by counsel of its choice, and Arrowhead shall cooperate with Janssen as Janssen may reasonably request, including by becoming a party to such action at Janssen's cost, and Janssen shall reimburse Arrowhead for its Out-of-Pocket Costs reasonably incurred in connection with rendering such assistance. A settlement or consent judgment or other voluntary final disposition of an Action brought by a Party under this Section may be entered into without the consent of the other Party, provided that such settlement, consent judgment, or other disposition does not admit the invalidity or unenforceability of any Patent Rights owned or Controlled by the other Party, and provided further that any rights granted to a Third Party to continue any activity upon which such Action was based in such settlement, consent judgment, or other disposition shall be limited to the Third Party's product or activity that was the subject of the Action. Damages recovered and any other amounts awarded in any Actions for Product Infringement under this Section shall be allocated to the Party who brought the Action, after reimbursement of each Party's actual expenses incurred in such Actions as provided hereunder, provided that in the event damage amounts are recovered by Arrowhead due to the Product Infringement (such as in the form of lost profits or reasonable royalties assessed on account of the Third Party's sales of infringing product), Arrowhead shall deduct royalties as

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determined in accordance with Section 8.4 as if such damage amounts were Net Sales and shall pay Janssen any remaining damage amounts, after reimbursement of costs incurred in such Action.

10.4.4 Other Enforcement Actions. Arrowhead acknowledges that the outcome of any infringement suit or other enforcement Action on account of any Third-Party infringement, other than a Product Infringement, of any Arrowhead Patent Right licensed to Janssen under Section 2.1 may detrimentally impact the scope, validity, or enforceability of such Patent Right with respect to potential Product Infringements. Accordingly, the Parties shall reasonably cooperate with each other with respect to any infringement suit or other enforcement Action on account of any Third-Party infringement of any Arrowhead Patent Right other than the Product Infringements. For clarity, Arrowhead will not be required to enforce any Arrowhead Patent Right against any Third Party infringement other than a Product Infringement, provided that if Arrowhead declines to initiate an enforcement Action reasonably requested by Janssen to abate any Third Party's infringing activities (other than Product Infringement) within the scope of Janssen's exclusive rights under any Arrowhead Patent Rights granted hereunder, then (to the extent permitted by any Pre-Existing Third Party Agreements concerning such Arrowhead Patent Rights, if applicable) upon Janssen's request Arrowhead shall reasonably cooperate with Janssen so that Janssen may initiate at its own expense such an enforcement Action in the same manner described under Section 10.4.2 above (with respect to Product Infringements).

10.5 Maintenance of Freedom to Operate. The Parties shall use Commercially Reasonable Efforts to avoid infringing any Third Party's Patent Rights in conducting any Development activities under the Clinical Plan, Development Plan or, if applicable, Option Right Development Plan. Each Party shall promptly notify the JSC, through the Patent Representatives, in the event such Party becomes aware of any Third Party's Patent Rights that may pertain to any Development activities of the Parties.

10.6 Patent Term Extensions. As long as Janssen retains Commercialization rights for any Licensed Product, upon Janssen's written request (which shall be by a notice identifying the date of the applicable Regulatory Approval of a Licensed Product and the deadline for filing a Patent Term Extension), the Prosecuting Party shall use reasonable efforts, in each country or jurisdiction where Regulatory Approval for any such Licensed Product has been obtained, and if the Applicable Law of such country or jurisdiction permits application for a Patent Term Extension, to apply, at the reasonable direction of Janssen's designated patent counsel, for a Patent Term Extension for a patent within the Arrowhead Patent Rights including a Valid Claim Covering such Licensed Product, which patent (if any) shall be selected at Janssen's reasonable judgment after considering the opinion of Janssen's patent counsel regarding its eligibility for a Patent Term Extension. Janssen shall have the right to: (a) identify in any list of patents in a Drug Application the applicable Arrowhead Patent Right(s) as Janssen reasonably believes is appropriate; (b) commence suit for any Product Infringement of any such Arrowhead Patent Right(s) under Applicable Law as permitted under Section 10.4.2 and 10.4.3; and (c) exercise any rights that may be exercisable by a patent owner, including applying for a Patent Term Extension, of any Arrowhead Patent Right(s) pertaining to an approved Licensed Product Commercialized by Janssen hereunder. Arrowhead agrees to cooperate with Janssen and its Affiliate and Third Party sublicensees of Licensed Products, as applicable, upon Janssen's reasonable request in the exercise of the authorizations granted under this Section, and Arrowhead shall execute such

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documents and take such additional action as Janssen may reasonably request in connection therewith, including, if requested by Janssen, permitting Arrowhead to be joined as a party in any suit for Product Infringement brought by Janssen hereunder on the terms and conditions set forth in Section 10.4.2 and 10.4.3, provided that Janssen shall reimburse Arrowhead all reasonable Out-of-Pocket Costs incurred by Arrowhead in taking such action.

10.7 Patent Working Group. The Parties shall establish a patent working group comprising an equal number of up to three representatives of each Party ("**Patent Working Group**"), including a patent attorney or agent designated by such Party as its lead contact (**"Patent Representative"**), for the sole purposes of alignment of activities under this Article X governing responsibilities for Prosecuting and enforcing Arrowhead Patent Rights or any other patent matters pertaining to the Development, Manufacture, or Commercialization of any Licensed Products hereunder. The Patent Working Group may hold meetings separate from, or in connection with, the meetings of the JSC as appropriate to discuss such patent matters. The Patent Working Group shall advise as appropriate the JSC on such patent matters.

10.8 Product Trademarks. Arrowhead represents and warrants that, as of the Effective Date, it does not own or otherwise control any Product Trademark Rights relating to Primary RNAi Triggers or Licensed Constructs, including any trademark applications or registrations or domain names. Janssen shall have (directly and through its Affiliates and Third Party sublicensees Commercializing Licensed Products) the right to brand, at its discretion, the Licensed Products using trademarks and trade names selected at its discretion and to file for, obtain, and maintain at its discretion and cost Product Trademark Rights in its own name.

ARTICLE XI: CONFIDENTIALITY AND PUBLICITY

11.1 Confidential Information.

11.1.1 To facilitate any activities hereunder, a Party (a "disclosing Party") may provide to the other Party (a "receiving Party"), or a Party (in this case a "receiving Party") may otherwise through activities contemplated by this Agreement come into possession of, Know-How Controlled, licensed, developed, or possessed by the other Party (in this case, a "disclosing Party"), any such items of Know-How, individually or collectively, constituting "**Confidential Information**". Information identified as being confidential that was disclosed by one Party to the other under the Prior CDA shall be considered the disclosing Party's Confidential Information under this Agreement and may be used for the purposes permitted hereunder. The receiving Party shall keep all such Confidential Information of the disclosing Party confidential, and other than as expressly permitted herein, shall not use or disclose, directly or indirectly, any such Confidential Information, whether in tangible or intangible form for any purpose, except pursuant to, and in order to carry out, the terms and objectives of this Agreement, including the exercise of such Party's rights and the performance of such Party's obligations under this Agreement. A disclosing Party shall take reasonable measures, consistent with its ordinary practices, to identify confidential information and material provided by it to the other Party with a "CONFIDENTIAL" or "TRADE SECRET" marking or similar notation. A receiving Party shall use similar efforts to that which it uses to protect its own confidential information, but in no event less than reasonable efforts, to keep the disclosing Party's Confidential Information confidential.

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11.1.2 A receiving Party's obligation of confidentiality and restriction on use as to a disclosing Party's Confidential Information shall last during the Term and for a period of [**] thereafter.

11.1.3 The restrictions on a receiving Party's disclosure and use of the disclosing Party's Confidential Information set forth above in this Section 11.1 shall not apply to any particular Confidential Information to the extent that such Confidential Information:

(a) was known by the receiving Party or its Affiliate prior to disclosure by the disclosing Party or its Affiliate hereunder (as evidenced by the receiving Party's or such Affiliate's written records or other competent evidence);

(b) is or becomes part of the public domain through no fault of the receiving Party or its Affiliates in violation of this Agreement;

(c) is disclosed without restriction to the receiving Party or its Affiliate by a Third Party having a legal right to make such disclosure without violating any confidentiality or non-use obligation that such Third Party has to the disclosing Party or an Affiliate thereof; or

(d) is independently developed by personnel of the receiving Party or its Affiliate without reliance on or access to the Confidential Information (as evidenced by the receiving Party's or such Affiliate's written records or other competent evidence).

11.1.4 For the avoidance of doubt, each receiving Party may use and disclose the other Party's Confidential Information under appropriate confidentiality and non-use obligations substantially equivalent to those in this Agreement, to the receiving Party's Affiliates and, as set forth in written subcontracts as otherwise provided herein, to its Third Party licensees, sublicensees, subcontractors and any other Third Parties to the extent such use and/or disclosure is reasonably necessary to perform its obligations or to exercise the rights granted to it, or reserved by it, under this Agreement. Regardless of the foregoing, the Parties agree that in case of a Third-Party licensee that is a CRO engaged by a Party to conduct clinical studies, the obligations of confidentiality and non-use set forth in such subcontracts may be those customarily entered into with such Third Party licensee by such Party.

11.2 Permitted Use and Disclosures.

11.2.1 A receiving Party may disclose the disclosing Party's Confidential Information as reasonably necessary for purposes expressly provided hereunder, including for: performing its obligations and Clinical Plan or Development Plan work hereunder; Prosecuting and defending any Patent Rights Covering Licensed Product or a component thereof; and making submissions and other disclosures to Regulatory Authorities (and health technology assessment bodies), including in connection with the performance of its obligations or exercise of rights granted hereunder.

11.2.2 A receiving Party may disclose Confidential Information of the disclosing Party to the extent required to be disclosed by the receiving Party to comply with Applicable Laws or to defend or prosecute litigation or comply with an order of a court or

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Government Authority, provided that the receiving Party notifies the disclosing Party of such court order insofar as possible to enable the disclosing Party to take reasonable actions to avoid or minimize the degree of such disclosure and seek protective treatment.

11.2.3 Each Party acknowledges that certain state or federal laws require pharmaceutical companies to disclose information on compensation, gifts, or other remuneration provided to Persons who are health care professionals or providers. Accordingly, a Party may report as it reasonably determines is required by Applicable Law or may voluntarily disclose or make public as it reasonably determines is in accordance with its internal policies or guidelines relating to open payments, Confidential Information about remuneration provided to any such Persons under this Agreement.

11.3 Confidentiality of Agreement Terms. Each Party agrees not to, and to cause its Affiliates not to, disclose to any Third Party any terms of this Agreement without the prior written consent of the other Party hereto, except each Party and its Affiliates may disclose the terms of this Agreement: (a) to advisors (including financial advisors, attorneys and accountants), actual or potential acquisition partners or private investors, and others on a need to know basis, in each case under appropriate confidentiality provisions substantially equivalent to those in this Agreement; (b) to the extent necessary to comply with Applicable Laws and court orders (including securities laws or regulations and the applicable rules of any public stock exchange); or (c) as otherwise expressly permitted hereunder.

11.4 Publicity.

11.4.1 Initial Press Releases. Each Party may issue its respective press release announcing this Agreement (including certain terms thereof) attached in Exhibit G hereto following the Execution Date. Upon issuance of such initial press release, either Party shall thereafter be free to disclose, without the other Party's prior written consent, the existence of this Agreement, the identity of the other Party and those terms of the Agreement which have already been publicly disclosed in accordance herewith.

11.4.2 Further Publicity. Neither Party shall originate any publicity, news release or public announcements, written or oral, whether to the public or press, stockholders or otherwise, relating to this Agreement, including its existence, the subject matter to which it relates, performance under it, or any of its terms, or to any amendment hereto, without the prior written consent of the other Party, save only such announcements or filings that are required by Applicable Laws (including under the rules of any relevant stock exchange or government agency regulating trading in securities of a Party or its parent Affiliate), to be made or that are otherwise agreed by the Parties, which announcements shall be brief and factual. If a Party desires to make any such public announcement not required by Applicable Law, either directly or indirectly (such as through an Affiliate), such Party shall provide the other Party with a draft of the proposed announcement and provide the other Party a reasonable opportunity to comment on the nature, text, and timing of such announcement, which shall be brief and factual.

11.5 Publications. Arrowhead acknowledges and agrees that nothing herein shall prohibit Janssen and its Affiliates from publishing the results of a study involving a Licensed Product, including any Confidential Information as reasonably required for Janssen's compliance

with its then-current policy on the registration and reporting of results of pharmaceutical company-sponsored clinical studies including disclosures made by Janssen on clinicaltrials.gov, and Arrowhead further agrees to provide, and to cause its applicable subcontractors to provide, to Janssen such assistance as reasonably requested in connection with fulfilling the requirements of such policy. In the event Janssen desires to publish any results of the Ongoing Phase 1/2 Study, Janssen shall provide Arrowhead at least [**] to review and comment on such publication prior to submission of such publication, and Janssen shall reasonably consider any such comments provided in a timely manner. In the event Arrowhead desires to publish the results of the Ongoing Phase 1/2 Study, Arrowhead shall provide Janssen at least [**] to review and approve such publication prior to submission of such publication. At the request of Janssen, Arrowhead shall reasonably delay such submission to allow for filing for patent protection of the subject matter of the publication.

ARTICLE XII: REPRESENTATIONS AND WARRANTIES

12.1 **Representations of Authority**. Arrowhead and Janssen each represents and warrants to the other Party that, as of the Execution Date it has, and through the Effective Date shall retain, full right, power and authority to enter into this Agreement and to perform its respective obligations under this Agreement and that it has the right to grant to the other the licenses and sublicenses granted pursuant to this Agreement.

12.2 **Consents**. Each Party represents and warrants to the other Party that, except as provided in Section 17.11 (regarding HSR Clearance) and except for any approvals from Regulatory Authorities (including pricing or reimbursement approvals, Manufacturing approvals or similar approvals necessary for the Development, Manufacture or Commercialization of the Licensed Products therein), all necessary consents, approvals and authorizations of all Government Authorities and other Persons required to be obtained by it as of the Effective Date in connection with the execution, delivery and performance of this Agreement have been obtained by the Effective Date.

12.3 **No Conflict**. Each Party represents and warrants to the other Party that, notwithstanding anything to the contrary in this Agreement, the execution and delivery of this Agreement by such warranting Party, the performance of such Party's obligations hereunder (as contemplated as of the Effective Date), and the licenses and sublicenses to be granted by such Party pursuant to this Agreement (a) do not conflict with or violate any requirement of Applicable Laws existing as of the Effective Date and applicable to such Party, and (b) do not conflict with, violate, breach or constitute a default under any contractual obligations of such Party or any of its Affiliates existing as of the Effective Date. Each Party shall, and shall cause its Affiliates to, comply with all Applicable Laws pertaining to the Development, Manufacture and Commercialization of the Licensed Products, including applicable Drug Regulation Laws, Clinical Investigation Laws and Health Care Laws.

12.4 **Enforceability**. Each Party represents and warrants to the other Party that, as of the Effective Date, this Agreement is a legal and valid obligation binding upon the warranting Party and is enforceable against it in accordance with its terms.

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12.5 Additional Representations and Warranties of Arrowhead. Arrowhead represents and warrants to Janssen that, as of the Execution Date:

12.5.1 Arrowhead is not aware of any claim made against it (a) asserting the invalidity, misuse, unregisterability, unenforceability or non-infringement of any of the Arrowhead Patent Rights or (b) challenging Arrowhead's ownership of, or license rights in, any of the Arrowhead Patent Rights.

12.5.2 The Arrowhead Patent Rights are (and through the Effective Date shall remain) free and clear of any liens, charges and encumbrances (other than non-exclusive licenses under General Arrowhead Patent Rights granted by Arrowhead to Third Parties, which grants do not preclude Janssen from Exploiting the full scope of the licenses granted to Janssen as contemplated hereunder). Neither Arrowhead nor any of its Affiliates or their respective current or former employees, to the best of Arrowhead's knowledge, has misappropriated any of the Arrowhead Know-How from any Third Party, and Arrowhead is not aware of any claim by a Third Party that such misappropriation has occurred.

12.5.3 To the best of Arrowhead's knowledge, Exhibit B-1 and any updates provided thereto, lists all Specific Arrowhead Patent Rights owned solely or jointly by Arrowhead as of the Execution Date (collectively, the "**Owned Specific Arrowhead Patent Rights**"). To the best of Arrowhead's knowledge, Exhibit B-2 and any updates provided thereto, lists all General Arrowhead Patent Rights owned solely or jointly by Arrowhead as of the Execution Date (collectively, the "**Owned General Arrowhead Patent Rights**"). To the best of Arrowhead's knowledge, Exhibit B-3 and any updates provided thereto, lists all Specific Arrowhead Patent Rights acquired by Arrowhead from Third Parties, as of the Execution Date (collectively, the "**Acquired Specific Arrowhead Patent Rights**"). No Third Party has an equal, undivided interest in the Acquired Specific Arrowhead Patent Rights. To the best of Arrowhead's knowledge, Exhibit B-4 and any updates provided thereto, lists all General Arrowhead Patent Rights acquired by Arrowhead from Third Parties, as of the Execution Date (collectively, the "**Acquired General Arrowhead Patent Rights**"). No Third Party has an equal, undivided interest in the Acquired General Arrowhead Patent Rights. To the best of Arrowhead's knowledge, Exhibit B-5 and any updates provided thereto, lists all Specific and General Arrowhead Patent Rights licensed by Arrowhead from Third Parties (collectively, the "**In-Licensed Arrowhead Patent Rights**"). To the best of Arrowhead's knowledge (based on all records that Arrowhead possessed and/or were reasonably available to Arrowhead at any time on or before the Execution Date), the inventorship named as of the Execution Date in each issued Arrowhead Patent Right is correct.

12.5.4 To the best of Arrowhead's knowledge, no written claim of infringement of the Patent Rights of any Third Party has been made nor threatened in writing, (directly or indirectly) against Arrowhead or any of its Affiliates or, to the best of Arrowhead's knowledge, Third Party contractors under any Pre-Existing Third Party Agreements, with respect to the Development, Manufacture or Commercialization of any Licensed Construct, Primary RNAi Triggers or Licensed Product.

12.5.5 To the best of Arrowhead's knowledge, Arrowhead has disclosed to Janssen all Patent Rights of Third Parties that Cover or are related to ARO-HBV.

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12.5.6 There are no judgments or settlements against or owed by Arrowhead or its Affiliates or to which Arrowhead or its Affiliate is a party or, to the best of Arrowhead's knowledge, pending litigation or litigation threatened in writing, in each case relating to any Licensed Construct, Primary RNAi Triggers or Licensed Product.

12.5.7 Neither Arrowhead nor, to Arrowhead's knowledge, any of its Third Party licensors or assignors of any Arrowhead Intellectual Property, is or has been a party to any agreement with the U.S. federal government or an agency thereof pursuant to which the U.S. federal government or such agency provided funding (such as under a grant or contract) for any research or Development work relating to any Licensed Construct, Primary RNAi Triggers or Licensed Product.

12.5.8 Arrowhead has made available to Janssen for review all material information in Arrowhead's possession and control as of the Execution Date that, to the best of Arrowhead's knowledge, pertains to any Licensed Constructs, Primary RNAi Triggers (alone or in any combination) or Licensed Product, or the Development, Manufacture or Commercialization thereof, including complete and correct copies of the following (to the extent there are any) in Arrowhead's possession and control as of the Execution Date: (a) adverse event data and reports; (b) clinical study reports and study data, including all de-identified data, observations, analyses, conclusions, summaries, and reports resulting from the clinical study of any Licensed Constructs or Primary RNAi Triggers initiated before the Execution Date; and (c) Regulatory Authority inspection reports, notices of adverse findings, warning letters, Regulatory Filings and letters and other correspondence with any Regulatory Authorities relating to any Licensed Construct or Primary RNAi Triggers (alone or in any combination) or Licensed Product.

12.5.9 To Arrowhead's knowledge, all of the studies, tests and pre-clinical and clinical studies of any Licensed Construct or Primary RNAi Triggers (alone or in any combination) or Licensed Product conducted prior to, or being conducted on, the Execution Date have been and on the Execution Date are being conducted in material compliance with Applicable Laws.

12.6 Further Representations and Warranties of Arrowhead Regarding Pre-Existing Third Party Agreements. Arrowhead represents and warrants to Janssen that:

12.6.1 Arrowhead has provided Janssen, prior to the Execution Date, with complete, correct and true, reasonably redacted copies of all Pre-Existing Third-Party Agreements (including any amendments thereof) set forth in Exhibit E.

12.6.2 As of the Execution Date, Exhibit E lists all of the Pre-Existing Third-Party Agreements, including any amendments thereto. In particular, Section 1 of Exhibit E is a list of all Pre-Existing Licenses to Third Parties, Section 2 of Exhibit E is a list of all Pre-Existing Licenses from Third Parties, Section 3 of Exhibit E is a list of all Pre-Existing Acquired Rights from Third Parties, and Section 4 of Exhibit E is a list of all Additional Pre-Existing Third Party Agreements.

12.6.3 To the best of Arrowhead's knowledge, none of the terms of any Pre-Existing Third Party Agreement would have a material adverse effect on the Development or Commercialization of any Licensed Product or any other product containing a Primary RNAi

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Trigger as contemplated hereunder. All Pre-Existing Third Party Agreements listed in Exhibit E remain in full force and effect as of the Execution Date, except where noted otherwise in Exhibit E, and to its knowledge, Arrowhead and each Third-Party counterparty has been, and is, in compliance in all material respects with the terms thereof. Arrowhead covenants that it shall use Commercially Reasonable Efforts not to take or omit to take any actions that would constitute a breach of any Pre-Existing Third Party Agreement through the Effective Date and during the Term hereof, and Arrowhead agrees not to enter into any amendment to any Pre-Existing Third Party Agreement through the Effective Date or during the Term hereof, in each case which breach or amendment would have a material adverse effect on the Development or Commercialization of any Licensed Product as contemplated hereunder. During the Term Arrowhead shall provide Janssen with prompt notice of the occurrence of any such breach (or receipt of notice of an allegation of any such breach).

12.6.4 The licenses and rights granted by Arrowhead to Janssen under Sections 2.1.1 and 2.1.2 of this Agreement are not subject to the terms of any Pre-Existing Third Party Agreements. The terms of such agreements listed in Exhibit E do not preclude or prevent Janssen from Exploiting the full scope of the licenses and rights granted to Janssen under Sections 2.1.1 and 2.1.2 of this Agreement.

12.6.5 To the best of Arrowhead's knowledge, Arrowhead has not entered into, and Arrowhead agrees that, through the Effective Date and during the Term, it shall not enter into, any agreements with any Third Party by virtue of which any royalty or milestone payment or other payment would be owed by Janssen to such Third Party as a result of Commercialization of any Licensed Product by or on behalf of Janssen as contemplated hereunder.

12.6.6 Arrowhead is under no obligation to any Third Party concerning a Licensed Construct or a Licensed Product including ARO-HBV and, to the extent such obligation ever existed, conditions triggering such obligation have not been met or have been fully satisfied, as the case may be, to enable Arrowhead to exclusively license ARO-HBV to Janssen.

12.6.7 ARO-HBV was not developed using Patent Rights or Know-How of a Third Party [**].

12.6.8 Arrowhead has not granted any licenses or rights to Third Parties under any Arrowhead Patent Rights or Arrowhead Know-How (a) that conflict with any of the licenses or rights granted by Arrowhead to Janssen under Sections 2.1.1 and 2.1.2 of this Agreement, or (b) to offer for sale, sell, or otherwise Commercialize any Licensed Constructs, Primary RNAi Triggers or Licensed Products in any field, which license has not expired or been terminated prior to the Execution Date.

12.7 No Warranties. EXCEPT AS OTHERWISE EXPRESSLY SET FORTH IN THIS AGREEMENT, NEITHER PARTY MAKES ANY REPRESENTATION OR EXTENDS ANY WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, TO THE OTHER PARTY, AND EACH PARTY HEREBY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. EACH PARTY HEREBY DISCLAIMS ANY REPRESENTATION OR WARRANTY THAT THE DEVELOPMENT, MANUFACTURE AND COMMERCIALIZATION OF LICENSED

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PRODUCTS PURSUANT TO THIS AGREEMENT WILL BE SUCCESSFUL OR THAT ANY PARTICULAR SALES LEVEL WITH RESPECT TO LICENSED PRODUCTS WILL BE ACHIEVED.

12.8 No Debarment. Each Party represents and warrants that, as of the Effective Date, neither it nor any of its Affiliates has been debarred or is subject to debarment, and neither Party nor any of its Affiliates will use in any capacity, in connection with the Development, Manufacture or Commercialization of any products, any person who has been debarred pursuant to Section 306 of the United States Federal Food, Drug, and Cosmetic Act, or who is the subject of a conviction described in such section. Each Party agrees to inform the other Party in writing immediately if it or any person who is performing activities hereunder is debarred or is the subject of a conviction described in Section 306 of the United States Federal Food, Drug, and Cosmetic Act, or if any action, suit, claim, investigation or legal or administrative proceeding is pending or, to the best of such Party's knowledge, is threatened, relating to the debarment or conviction of such Party or any person used in any capacity by such Party or any of its Affiliates in connection with the Development, Manufacture or Commercialization of any Licensed Construct or Licensed Products.

12.9 Compliance with Anti-Corruption Applicable Laws. Each Party shall, and shall cause each of its Affiliates and Third Party subcontractors and sublicensees conducting activities hereunder to, comply with Anti-Corruption Laws.

ARTICLE XIII: INDEMNIFICATION AND INSURANCE

13.1 Indemnification Obligation. Each Party (the "**Indemnifying Party**") shall indemnify and hold harmless the other Party and its Indemnified Persons (collectively, the "**Indemnified Party**") from and against any and all Losses resulting from any Action brought by a Third Party against any Indemnified Party, to the extent such Losses arise from or are based on a claim ("**Claim**") of: (a) the negligence or wilful misconduct of the Indemnifying Party or any of its Indemnified Persons or Third Party sublicensees or subcontractors, in each case in connection with the exercise of such Indemnifying Party's rights, or performance of such Party's obligations, under this Agreement; (b) the Indemnifying Party's or any of its Indemnified Persons' or Third Party sublicensees' or subcontractors' failure to comply with or perform one or more of such Party's or its Indemnified Persons', as applicable, obligations in this Agreement, or the breach or inaccuracy of one or more of such Indemnifying Party's or its Indemnified Persons', as applicable, warranties in this Agreement; (c) the violation of Applicable Law by the Indemnifying Party or any of its Indemnified Persons or Third Party sublicensees or subcontractors in connection with the exercise of such Indemnifying Party's rights, or performance of such Party's obligations, under this Agreement; (d) the performance of any Development or Manufacturing activities by the Indemnifying Party or any of its Indemnified Persons or Third Party sublicensees or subcontractors hereunder; or (e) in the case of Janssen as the Indemnifying Party, its Commercialization, sales, and distribution of any Licensed Products by any of its Indemnified Persons or any of its Third Party sublicensees hereunder; except in each case (with respect to any such Claims) to the extent such Losses arise directly from the negligence, illegal conduct or wilful misconduct of the Indemnified Party or any of its Indemnified Persons, Third Party subcontractors or Third Party sublicensees.

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13.2 Claims for Indemnification.

13.2.1 Notice. In the case of any Action for which an Indemnifying Party may be liable to an Indemnified Person under Section 13.1, the Indemnified Party shall as soon as practicable notify the Indemnifying Party in writing of such Action (a **"Notice of Claim"**). Failure or delay in notifying the Indemnifying Party shall not relieve the Indemnifying Party of any liability it may have to the Indemnified Party, except and only to the extent that such failure or delay causes actual harm to the Indemnifying Party with respect to such Action. The Notice of Claim shall specify in reasonable detail the Action with respect to which such Indemnified Party or any of its Indemnified Persons intends to base a request for indemnification or reimbursement under Section 13.1. Failure to provide such reasonable detail will not relieve the Indemnifying Party of any liability it may have to the Indemnified Party, except and only to the extent that such failure causes actual harm to the Indemnifying Party with respect to such Action. The Indemnified Party shall enclose with the Notice of Claim a copy of all papers served with respect to such Action, if any. The Indemnified Party shall assume the defense, settlement or other disposal of such Action, unless it provides notice within thirty (30) days from the date on which the Indemnifying Party received the Notice of Claim that it waives it right to assume the defense of such Action and any litigation resulting therefrom with counsel of its choice. Provided that the Indemnified Party has waived its right to assume the defense of an Action pursuant to this Section, then, subject to Section 13.2.3, the Indemnifying Party shall have the obligation to defend, settle and otherwise dispose of such Action.

13.2.2 Cooperation. The Parties shall act in good faith in responding to, defending against, settling or otherwise dealing with such Action pursuant to the terms hereof; provided that (a) an Indemnified Party shall not be obligated to enter into or consent to the entry of any judgment or settlement in relation to any Action as provided in Section 13.2.3, and (b) in any event, an Indemnifying Party shall not be relieved of its obligations under this Section 13.2.2 as a result of any failure of the Indemnified Party to cooperate as provided in this Section 13.2.2, except to the extent that the Indemnifying Party is actually prejudiced by such breach. The Parties shall also cooperate in any such defense by giving each other reasonable access to all non-privileged information relevant thereto to the extent permitted by Applicable Law.

13.2.3 Control by the Indemnifying Party. If the Indemnifying Party assumes control of an Action in accordance with Section 13.2.1, (a) the Indemnified Party may retain separate co-counsel at its sole cost and expense and participate in the defense of the Action, but the Indemnifying Party shall continue to control the investigation, defense and settlement thereof, and (b) the Indemnifying Party will not, without the prior written consent of the Indemnified Party, which shall not be unreasonably withheld, conditioned or delayed, consent to the entry of any judgment or enter into any settlement with respect to the Action to the extent such judgment or settlement (i) provides for equitable relief (or any other relief other than solely for money damages) against the Indemnified Party or any of its Indemnified Persons, or liability or obligation that cannot be assumed and performed by the Indemnifying Party in full (without any recourse to the Indemnified Party and its Indemnified Persons), (ii) provides for any monetary relief that will not be fully discharged by the Indemnifying Party (without any recourse to the Indemnified Party and its Indemnified Persons) concurrently with the effectiveness of such judgment or settlement, (iii) does not effect a full and unconditional release of the Indemnified Party and its Indemnified

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Persons with respect to all claims in such Action (or the portion thereof to which the judgment or settlement relates), or (iv) that contains an admission of wrongdoing on the part of the Indemnified Party or its Indemnified Persons.

13.2.4 **Interim Control**. Unless and until the Indemnifying Party (if any) is determined with respect to any particular Action, the Party subject to such Action shall have the right to defend and control such Action, but shall not have the right to consent to the entry of any judgment or enter into any settlement with respect to the Action for which it would be seeking indemnification or reimbursement hereunder without the prior written consent of the other Party (which consent shall not be unreasonably withheld, conditioned or delayed).

13.2.5 **Unauthorized Settlements**. The Indemnified Party will not consent to the entry of any judgment or enter into any settlement with respect to any Action for which it is seeking indemnification hereunder without the prior written consent of the Indemnifying Party (which consent shall not be unreasonably withheld, conditioned or delayed), and such Indemnifying Party shall not be obligated to indemnify or reimburse the Indemnified Party hereunder for any settlement entered into, or any judgment that was consented to, by the Indemnified Party without the Indemnifying Party's prior written consent.

13.2.6 **Allocation**. If, in any Action under this Article XIII, the Indemnified Party incurs an amount consisting of both Losses for which the Indemnifying Party is obliged to indemnify the Indemnified Party and Losses not covered by such indemnification, then, to the extent not otherwise determined in a court of competent jurisdiction, the Parties agree to act in good faith and use their reasonable endeavours to determine a fair and reasonable allocation of such Losses. The allocation between the Parties of any such Losses, if not otherwise determined in a court of competent jurisdiction, shall, if the Parties do not reach agreement in writing on such allocation, be determined by arbitration pursuant to Section 16.3. The Parties or the arbitrator, as the case may be, shall make such allocation based on the indemnification and reimbursement principles set forth in this Article XIII. Notwithstanding the foregoing, the Parties shall not be entitled to refer any Dispute with respect to Losses arising under an Action pursuant to this Section 13.2.6 to arbitration to the extent that the liability of either Party for such Losses is being contested in such Action (or any other Action that would be binding with respect to such first Action).

13.3 **Mitigation**. The Indemnified Party shall, and shall procure that its Indemnified Persons shall, in each instance, take reasonable steps to mitigate any Losses they suffer arising in connection with any Action in respect of which they seek an indemnity from the other Party under this Agreement.

13.4 **Conduct of Product Liability Claims**. The provisions of this Section 13.4 shall govern with respect to any Third-Party Product Liability Action for which a Party seeks indemnification pursuant to Section 13.1, and the provisions of this Section 13.4 shall control in the event of any conflict between such provisions and those of Section 13.2 above.

13.4.1 **Product Liability Actions**. A Party becoming aware of any Third Party asserting or filing any product liability Claim or Action based thereon relating to the human use (whether in clinical studies or through Commercialization by Janssen hereunder) of a Licensed Product with alleged defects (whether design defects, manufacturing defects, or defects in sales or

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promoting) (**"Third-Party Product Liability Action"**) against a Party, shall promptly notify the other Party. In the event a Third-Party Product Liability Action is initiated against a single Party for which it seeks or shall seek indemnification from the other as an Indemnifying Party under Section 13.1, the Indemnifying Party shall have control over such Action. In such case, the Indemnifying Party shall have the right to control the defense of such Action, but shall notify and keep the Indemnified Party apprised in writing of such Action and shall consider and take into account the Indemnified Party's reasonable interests and requests and suggestions regarding the defense of such Action. In the event that a Third-Party Product Liability Action is initiated against both Parties, Janssen shall have control over the response to such Third-Party Product Liability Action.

13.4.2 **Cooperation**. The non-controlling Party of a Third-Party Product Liability Action shall reasonably cooperate with the controlling Party in the preparation and formulation of a defense to such Third-Party Product Liability Action, and in taking other steps reasonably necessary to respond to such Third-Party Product Liability Action. The controlling Party shall have the sole and exclusive right to select its counsel for the defense of such Third-Party Product Liability Action. If required under Applicable Law in order for the controlling Party to maintain a suit in response to such Third-Party Product Liability Action, the non-controlling Party shall join as a party to the suit. The controlling Party shall assume and pay all of its own Out-of-Pocket Costs incurred in connection with any litigation or proceedings related to such Third-Party Product Liability Action, including the fees and expenses of the counsel selected by it, as well as the reasonable Out-of-Pocket Costs of the non-controlling Party associated with providing assistance requested by the controlling Party or joining the suit if requested by the controlling Party or required to maintain the suit. Subject to the foregoing, (a) each Party shall be responsible for its legal expenses incurred in such Action, and (b) the non-controlling Party shall have the right, in its discretion and at its expense, to participate and be represented in any such suit by legal counsel selected by the non-controlling Party and reasonably acceptable to the controlling Party. The controlling Party shall not settle or compromise any Third-Party Product Liability Action without the consent of the other Party, which consent shall not be unreasonably withheld.

13.5 **Insurance**.

13.5.1 Each Party shall procure and maintain in full force and effect insurance (or self-insure sufficiently to provide materially the same level and type of protection) adequate to cover its obligations and liabilities hereunder during the Term and for a period of [**] thereafter, consistent with normal business practices of companies similarly situated. It is understood that such insurance shall not be construed to create a limit of either Party's liability with respect to its indemnification obligations under this Agreement.

13.5.2 Prior to the initiation of any clinical study or related Development activities under this Agreement, the Party responsible for the applicable activity shall secure and maintain in full force and effect clinical study insurance (including any self-insured arrangements) in compliance with Applicable Law in those territories where clinical studies are conducted.

13.5.3 The Parties have the right to elect to self-insure all or part of the limits described above. Upon written request, each Party shall provide the other with a certificate of insurance evidencing the required coverage hereunder. Notwithstanding the foregoing, either

Party's failure to maintain adequate insurance shall not relieve that Party of its obligations set forth in this Agreement.

13.6 Limitation of Liability. NOTWITHSTANDING THE PROVISIONS OF SECTION 16.3.12, NOTHING HEREIN IS INTENDED TO OR SHALL LIMIT OR RESTRICT THE INDEMNIFICATION RIGHTS OR OBLIGATIONS OF ANY PARTY UNDER THIS ARTICLE XIII.

ARTICLE XIV: SCOPE OF RELATIONSHIP

14.1 Until the longer of the [**] anniversary of the Effective Date or the [**] anniversary of the end of the Option Right Development Term, Arrowhead and its Affiliates shall not conduct or participate in, or advise, assist or enable any Third Party to conduct or participate in, or fund any work with respect to (a) any treatment of any disease, condition or symptom associated with or induced by HBV infection or HDV infection in humans or animals; (b) prevention of HBV infection or HDV infection in humans or animals; or (c) the diagnosis of HBV infection or HDV infection in humans or animals; or grant any Third Party any license or other rights to any such treatment, prevention or diagnosis.

14.2 Until the longer of the [**] anniversary of the Effective Date or the [**] anniversary of the end of the Option Right Development Term, Janssen and its Affiliates shall not (a) conduct or participate in, or advise, assist or enable any Third Party to conduct or participate in, the Development or Commercialization of any double-stranded RNAi oligonucleotide intended to inhibit the expression of HBV other than the Licensed Product(s), or (b) Develop or Commercialize any Licensed Product outside the Indication without Arrowhead's explicit written consent, which consent shall not be unreasonably withheld by Arrowhead.

14.3 During the Term, neither Party or its Affiliates shall conduct or participate in, or advise, assist or enable any Third Party to conduct or participate in, or fund any work with respect to any Primary RNAi Trigger for any purpose other than the Exploitation of Licensed Constructs or Licensed Products in accordance with the terms of this Agreement.

14.4 Except for the restrictions expressly set forth in this Agreement, nothing in this Agreement shall be construed to restrict the right of either Party or any of its Affiliates to engage in any business activity, investment or other opportunity anywhere in the world, including the right of Janssen or Arrowhead or any of their Affiliates to Develop and Commercialize any product that directly or indirectly competes with a Licensed Product in any field.

ARTICLE XV: TERM AND TERMINATION

15.1 Agreement Term. Unless terminated earlier in accordance with this Article XV, the term of this Agreement (the **"Term"**) shall commence on the Effective Date and shall expire upon the expiration of the Royalty Term for any Licensed Product sold hereunder.

15.2 Early Termination for Breach.

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15.2.1 Notice of Default and Cure Period. Upon any material breach of this Agreement by a Party (the **"Breaching Party"**), the other Party (the **"Non-Breaching Party"**) shall have the right to give the Breaching Party notice specifying the nature of such material breach. If the breach of this Agreement is curable, then the Breaching Party shall have a period of [**] from the date of receipt of the notice (the **"Cure Period"**) to cure such material breach in a manner that effectively remedies the harm to the Non-Breaching Party caused by the material breach. Notwithstanding the foregoing, if such breach, by its nature, is curable, but is not reasonably curable within the Cure Period, then provided that such breach is not of a payment obligation hereunder, such Cure Period shall be extended if the Breaching Party provides a written plan for curing such breach to the Non-Breaching Party and uses Commercially Reasonable Efforts to cure such breach in accordance with such written plan, provided that no such extension shall exceed [**] (for an extended Cure Period totaling [**]) without the consent of the Non-Breaching Party. For clarity, this provision shall not restrict in any way either Party's right to notify the other Party of any other breach or to demand the cure of any other breach.

15.2.2 Termination Right for Default. The Non-Breaching Party shall have the right to terminate this Agreement with immediate effect by written notice to the Breaching Party: (a) in the event the Breaching Party does not notify the Non-Breaching Party within [**] of its notice under Section 15.2.1 that the Breaching Party disputes that it has committed a material breach or that it intends to cure such breach in accordance with Section 15.2.1; (b) in the event that the Breaching Party has not cured the material breach within the Cure Period; and (c) in the event that the material breach is not curable. Notwithstanding the foregoing, if a Party in good faith raises a Dispute regarding any such termination (including with respect to the existence or materiality of a breach or the sufficiency of a cure) pursuant to the Dispute resolution procedures under Sections 16.1 to 16.3, such termination shall be effective only upon a conclusion of the Dispute resolution procedures in Sections 16.1 to 16.3 resulting in a determination that there has been an uncured material breach (or, if earlier, abandonment of the Dispute by the Breaching Party). For the avoidance of doubt, the exercise of a termination right under this Section 15.2 by a Non-Breaching Party shall be without prejudice to its right to seek damages or any other remedy on account of the Breaching Party's material breach that may be available at law or in equity, subject to the terms hereof.

15.3 Early Termination for Bankruptcy.

15.3.1 In the event of the Bankruptcy of a Party (or its successor in interest in the event this Agreement is assigned as permitted hereunder), the other Party may terminate this Agreement with immediate effect by written notice to the bankrupt Party.

15.3.2 All licenses and other rights granted pursuant to this Agreement by one Party to the other are, and will otherwise be deemed to be, for purposes of Section 365(n) of the U.S. Bankruptcy Code (or comparable provisions of laws of other jurisdictions), licenses of right to "intellectual property" as defined under Section 101 of the U.S. Bankruptcy Code (or comparable provisions of Applicable Laws of other jurisdictions). Notwithstanding anything to the contrary herein, the Parties agree that, in lieu of a Party who is licensed (or sublicensed) any rights from a Party in Bankruptcy terminating this Agreement in its entirety as provided in Section 15.3.1 above: (a) the Party who is a licensee of such rights from the other Party under this Agreement shall, upon such other Party's Bankruptcy, retain and may fully exercise all of the

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rights and elections under the U.S. Bankruptcy Code (or comparable Applicable Laws of other jurisdictions); and (b) in the event of the commencement of a bankruptcy proceeding by or against a Party under the U.S. Bankruptcy Code (or comparable provisions of Applicable Laws of other jurisdictions), the Party that is not a party to such Bankruptcy proceeding shall be entitled to a complete duplicate of (or complete access to, as appropriate) any such intellectual property and all embodiments of such intellectual property to which it is granted license or other rights hereunder, and the same, if not already in its possession, will be promptly delivered to it (i) upon any such commencement of a bankruptcy proceeding upon its written request therefor, unless the Party subject to such proceeding elects to continue to perform all of its obligations under this Agreement, or (ii) if not delivered under subsection (i) above, following the rejection of this Agreement by or on behalf of the Party subject to such proceeding upon written request therefor by the non-subject Party. All rights, powers and remedies granted hereunder to a Party as a licensee of any intellectual property rights as provided in this Section are in addition to and not in substitution for any and all other rights, powers and remedies now or hereafter existing at law or in equity, in the event of the commencement of a bankruptcy proceeding by or against the granting Party under Applicable Law, and the licensee Party, in addition to the rights, powers and remedies expressly provided herein, shall be entitled to exercise all other such rights and powers and resort to all other such remedies as may now or hereafter exist at law or in equity in such event.

15.4 Termination by Janssen for Safety Concern. Janssen may terminate this Agreement with immediate effect by written notice to Arrowhead in the event that Janssen determines, in its good-faith judgment, that continued Development or Commercialization of a Licensed Product would be unethical or unreasonable due to a safety-related reason, such as if Janssen believes, based on its good-faith assessment of relevant data, that continuation of human use of a Licensed Product has resulted in, or has a significant risk of resulting in, the occurrence of a safety or tolerability finding that would raise material concerns regarding the clinical benefit of the Licensed Product for its target population (for example, harm significantly in excess of an acceptable side-effect profile). Such termination shall be effective immediately upon Janssen's written notice to Arrowhead.

15.5 Discretionary Termination by Janssen. Janssen shall have the right to terminate this Agreement for convenience at any time by written notice, which termination shall be effective (a) [**] from the date of such notice in the event that notice is given prior to the First Commercial Sale of any Licensed Product; and (b) [**] from the date of such notice in the event that notice is given following the First Commercial Sale of any Licensed Product.

15.6 Consequences of Early Termination. Upon the effective date of early termination of this Agreement, the following shall apply:

15.6.1 Licenses.

(a) With the exception of the licenses granted in Section 2.1.3, the licenses and other rights granted by one Party to the other in Article II shall terminate and revert to the granting Party, except to the extent necessary to enable the grantee Party (or its Affiliates) to perform any obligations or exercise any rights that survive such termination of this Agreement as may be expressly provided in this Agreement or in any written agreement of the Parties;

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(b) In the event of an early termination of this Agreement by Janssen pursuant to Sections 15.4 or 15.5, Janssen shall, subject to Section 2.3, grant Arrowhead, upon Arrowhead's request, a worldwide, royalty-free, perpetual, exclusive (even as to Janssen, except to the extent Janssen expressly retains rights under this Agreement) license under Patent Rights and Know-How Controlled by Janssen to Develop or Commercialize Licensed Products which are actively in clinical Development or Commercialized at the time of termination. Such Patent Rights and Know-How shall be limited to those reasonably necessary or useful to continue the Development or Commercialization of such Licensed Products. In the event of such license grant, Janssen and its Affiliates shall retain a non-exclusive license to such licensed rights for research purposes.

15.6.2 Patent Matters. Arrowhead shall assume from Janssen the sole responsibility for the Prosecution, defense and enforcement of any Arrowhead Patent Rights for which Janssen was the Party responsible for Prosecution. Upon Arrowhead's request, Janssen shall reasonably cooperate in transferring to Arrowhead responsibility for the Prosecution, defense and enforcement of such Arrowhead Patent Rights, and shall provide Arrowhead with copies, at Arrowhead's expense, of any requested documents in its possession relating thereto.

15.6.3 Transfer of Know-How. In the event of an early termination of this Agreement by Janssen pursuant to Sections 15.4 or 15.5, Janssen shall provide to Arrowhead all Know-How generated by Janssen under this Agreement that is reasonably necessary or useful to continue the Development or Commercialization of Licensed Products which are actively in clinical Development or Commercialized at the time of termination, except that Janssen shall not provide to Arrowhead Know-How in relation to (a) an Active Ingredient of any Combination Product, whether in Development or Commercialized, where the Active Ingredient is not a Licensed Construct, (b) a product of such Combination Product that is not a Licensed Product, or (c) an Active Ingredient, other than a Licensed Construct, that is otherwise used in combination with a Licensed Product in pre-clinical research, clinical studies or in accordance with an approved product label.

15.6.3 Remaining Inventory. Janssen (and its Affiliates and sublicensees), with Arrowhead's consent, which will not be unreasonably withheld, shall have the right to sell or have sold any remaining inventory of Licensed Products following the effective date of termination of the Agreement.

15.6.4 Clinical Studies. Where any clinical study of any Licensed Product is ongoing upon termination, each Party shall continue, at its cost, the clinical study for which it, its Affiliate, (sub)contractor or sublicensee is the regulatory sponsor, solely as deemed necessary by such Party based on reasonable medical judgment to protect the safety, health or welfare of subjects participating in the relevant clinical study, until such point as the study is completed or, if earlier, such Party determines that it is ethical to terminate such study or otherwise cease supporting it.

15.6.5 Orderly Wind-Down. Upon early termination, the Parties shall coordinate in good faith to wind down Development, Manufacturing, and Commercialization activities under this Agreement relating to any Licensed Products ongoing at the effective date of such termination, including the withdrawal of any Licensed Products from the market, the withdrawal of any Regulatory Approvals pertaining to any Licensed Products and a final reconciliation of all

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payments due under this Agreement. For clarity, following any early termination neither Party may submit or resubmit any Drug Application for a Licensed Product, following such termination, except if, and to the extent, this Agreement or any other written agreement between the Parties expressly provides that a Party may otherwise do so.

15.6.6 No Waiver for Termination Due to Breach. For the avoidance of doubt, an aggrieved Party that terminates this Agreement for material breach may also seek damages and other relief for such material breach and (for the avoidance of doubt) for any other breach of this Agreement.

15.7 Return of Confidential Information. Upon expiration or early termination of this Agreement, a receiving Party shall, at the other Party's request (and to the extent and when permitted by Applicable Law), destroy, redact, or return, and cause its Affiliates and Third Party subcontractors and sublicensees to destroy, redact, or return all records to the extent containing, and all materials constituting, the other Party's Confidential Information in its possession and control, and, upon request, provide written certification of such destruction, redaction, or return, except that: (a) the receiving Party may retain in strict confidence one copy of the other Party's Confidential Information for the receiving Party's legal archival purposes; and (b) the foregoing requirement to destroy, redact, or return the other Party's Confidential Information shall not apply with respect to any such Confidential Information of the disclosing Party to the extent that this Agreement or any other written agreement between the Parties (or their respective Affiliates) expressly provides that a Party retains the right to use such Confidential Information (such as by virtue of being a joint owner, or by survival of Janssen's license rights on a paid-up basis following expiration (without early termination) of this Agreement).

15.8 Survival. In the event of expiration or termination of this Agreement for any reason, the provisions of Articles I, IX (with respect to accrued payment obligations), XI, XII, XIII, XV, XVI, and XVII and Sections 2.1.3, 2.3, 2.4, 5.9 (provided that this Section shall survive only in the event of expiration of this Agreement), 5.11, 10.2, 10.3.3(c) and 14.4 shall survive, as well as any other provisions that, as apparent from their nature and context are intended to continue or to remain (such as for interpretation purposes). For clarity, Article XIV shall not survive the termination of this Agreement. Further for the avoidance of doubt, upon expiration or termination of this Agreement for any reason, neither Party shall be released from any obligation that accrued prior to the end of the Term hereof. Accordingly, termination or expiration of the Agreement, in whole or in part (including relinquishment of any license right granted hereunder) for any reason, shall be without prejudice to any obligations that accrued prior to such termination or expiration, including any payments due hereunder (regardless of when payable) and any and all damages arising from any breach. In addition, any payments accrued prior to such termination or expiration shall become payable upon the effective date of such termination or expiration or at such earlier time as otherwise provided hereunder.

ARTICLE XVI: DISPUTE RESOLUTION

16.1 Referral to Executive Officers. In the event of a Dispute, except for a Patent Controversy, either Party may refer the matter to the Parties' Executive Officers for attempted resolution. The Executive Officers, in the presence of their legal advisors, shall attempt in good faith to resolve any Dispute through negotiations. If the Executive Officers are unable to resolve

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a Dispute referred to them within ten (10) Business Days (or such other period as may be agreed by the Parties in writing) after such referral, and subject to any other provisions of this Agreement, such Dispute shall be resolved as provided below in this Article.

16.2 Mediation. If the Executive Officers are unable to resolve a Dispute referred to them pursuant to Section 16.1 within ten (10) Business Days (or such other period as may be agreed by the Parties in writing) after such referral, the Parties shall first attempt in good faith to resolve any Dispute by confidential mediation in accordance with the then-current Mediation Procedure of the International Institute for Conflict Prevention and Resolution ("**CPR Mediation Procedure**") (www.cpradr.org) before initiating arbitration. The CPR Mediation Procedure shall control, except where it conflicts with these provisions, in which case these provisions control. The mediator shall be chosen pursuant to CPR Mediation Procedure. The mediation shall be held in New York, New York. Either Party may initiate mediation by written notice to the other Party. The Parties agree to select a mediator within twenty (20) days of the notice and the mediation will begin promptly after the selection. The mediation will continue until the mediator, or either Party, declares in writing, no sooner than after the conclusion of one full day of a substantive mediation conference attended on behalf of each Party by a senior business person with authority to resolve the Dispute, that the Dispute cannot be resolved by mediation. In no event, however, shall mediation continue more than sixty (60) days from the initial notice by a Party to initiate meditation unless the Parties agree in writing to extend that period. Any period of limitations that would otherwise expire between the initiation of mediation and its conclusion shall be extended until twenty (20) days after the conclusion of the mediation. No discussions between the Parties attempting to resolve a Dispute under Section 16.1 or this Section 16.2 shall be admissible in arbitration of the Dispute.

16.3 Arbitration. If the Parties fail to reach resolution pursuant to mediation in accordance with Section 16.2 above, and a Party desires to pursue resolution of a Dispute, then the Dispute shall be submitted by either Party for resolution in arbitration pursuant to the then current CPR Non-Administered Arbitration Rules ("**CPR Rules**") (www.cpradr.org), except where they conflict with these provisions, in which case these provisions control.

16.3.1 The arbitration will be held in New York, New York. All aspects of the arbitration shall be treated as confidential.

16.3.2 The arbitrators will be chosen from the CPR Panel of Distinguished Neutrals, unless a candidate not on such panel is approved by both Parties. Each arbitrator shall be a lawyer with at least 15 years' experience with a law firm or corporate law department of over 25 lawyers or who was a judge of a court of general jurisdiction. To the extent that the Dispute requires special expertise, the Parties will so inform CPR prior to the beginning of the selection process.

16.3.3 The arbitration tribunal shall consist of three arbitrators, of whom each Party shall designate one in accordance with the "screened" appointment procedure provided in CPR Rule 5.4. The chair will be chosen in accordance with CPR Rule 6.4. If, however, the aggregate award sought by the Parties is less than $[**] and equitable relief is not sought, a single arbitrator shall be chosen in accordance with the CPR Rules.

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16.3.4 Candidates for the arbitrator position(s) may be interviewed by representatives of the Parties in advance of their selection, provided that all Parties are represented.

16.3.5 The Parties agree to select the arbitrator(s) within 45 days of initiation of the arbitration. The hearing will be concluded within nine (9) months after selection of the arbitrator(s) and the award will be rendered within sixty (60) days of the conclusion of the hearing, or of any post hearing briefing, which briefing will be completed by both sides within forty-five (45) days after the conclusion of the hearing. In the event the Parties cannot agree upon a schedule, then the arbitrator(s) shall set the schedule following the time limits set forth above as closely as practical.

16.3.6 The Parties shall have the right to conduct and enforce pre-hearing discovery in accordance with the then current Federal Rules of Civil Procedure, unless otherwise agreed by the Parties in writing. All discovery conducted pursuant to the arbitration proceedings will be subject to the then current Federal Rules of Civil Procedure, unless otherwise agreed by the Parties in writing.

16.3.7 The hearing will be concluded in ten (10) hearing days or less. Multiple hearing days will be scheduled consecutively to the greatest extent possible. A transcript of the testimony adduced at the hearing shall be made and shall be made available to each Party.

16.3.8 The arbitrator(s) shall decide the merits of any Dispute in accordance with the law governing this Agreement, without application of any principle of conflict of laws that would result in reference to a different law. The arbitrator(s) may not apply principles such as "amiable compositeur" or "natural justice and equity."

16.3.9 The arbitrator(s) are expressly empowered to decide dispositive motions in advance of any hearing and shall endeavor to decide such motions as would a United States District Court Judge sitting in the jurisdiction whose substantive law governs.

16.3.10 The arbitrator(s) shall render a written opinion stating the reasons upon which the award is based. The Parties consent to the jurisdiction of the United States District Court for the district in which the arbitration is held for the enforcement of these provisions and the entry of judgment on any award rendered hereunder. Should such court for any reason lack jurisdiction, any court with jurisdiction may act in the same fashion.

16.3.11 Each Party has the right to seek from the appropriate court provisional remedies such as attachment, preliminary injunction, replevin, etc. to avoid irreparable harm, maintain the status quo, or preserve the subject matter of the Dispute. Rule 14 of the CPR Rules does not apply to this Agreement.

16.3.12 EACH PARTY HERETO WAIVES: ITS RIGHT TO TRIAL BY JURY OF ANY ISSUE UNDERLYING A DISPUTE WITHIN THE SCOPE OF THE SECTIONS 16.2 or 16.3; AND, WITH THE EXCEPTION OF RELIEF MANDATED BY STATUTE, ANY CLAIM FOR PUNITIVE, EXEMPLARY, MULTIPLIED, INDIRECT, OR CONSEQUENTIAL DAMAGES OR ATTORNEY FEES.

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16.4 Interim or Provisional Relief. Nothing in this Agreement, including Section 16.5, shall preclude either Party from seeking interim or provisional relief in any court of competent jurisdiction, including a temporary restraining order, preliminary injunction or other interim equitable relief concerning a Dispute with the other Party, either prior to or during the dispute resolution procedures set forth in this Article XVI, to protect the interests of such Party.

16.5 Consent to Jurisdiction. Each Party, for the purpose of enforcing an award under Section 16.3 or for seeking interim or provisional relief as contemplated in Section 16.4 with respect to any Disputed breach of this Agreement, agrees not to raise any objection at any time to the laying or maintaining of the venue of any action, suit or proceeding for such purpose in any state or federal Court sitting in New York, irrevocably waives any claim that such action, suit or other proceeding has been brought in an inconvenient forum, and further irrevocably waives the right to object, with respect to such action, suit or other proceeding, that such Court does not have any jurisdiction over such Party. Each Party further agrees that service of any process, summons, notice or document by registered mail to such Party's notice address provided for in this Agreement shall be effective service of process for any action, suit or proceeding in the Court with respect to any matters to which it has submitted to jurisdiction in this Section 16.5.

16.6 No Claims against Employees. Each Party undertakes to make no claim and bring no proceedings in connection with this Agreement or its subject matter against any director, officer, employee or agent of the other Party (apart from claims based on fraud or willful misconduct). This undertaking is intended to give protection to individuals: it does not prejudice any right which a Party might have to claim against another Party.

ARTICLE XVII: MISCELLANEOUS

17.1 Assignment; Successors.

17.1.1 Assignment; Successors. The terms and provisions hereof shall inure to the benefit of, and be binding upon, the Parties and their respective successors and permitted assigns. Except as expressly permitted in this Agreement, neither Party may, without the prior written consent of the other Party, assign or otherwise transfer this Agreement. Notwithstanding the foregoing, (a) either Party, without such consent, may assign or otherwise transfer this Agreement and its rights and obligations hereunder in whole or in part to an Affiliate; provided, that, except as set forth in clause (b) below, such assignment or transfer to an Affiliate shall terminate automatically at such time, if any, as such Affiliate ceases to be wholly-owned, directly or indirectly, by Arrowhead or Johnson & Johnson (the New Jersey corporation), as the case may be, unless such Affiliate owns (i) more than fifty percent (50%) of the voting equity of Arrowhead or Janssen, or (ii) substantially all the assets of Arrowhead and its Affiliates or Janssen and its Affiliates, as the case may be, relating to the Licensed Product, and (b) either Party, without such consent, may assign its rights under this Agreement, whether by contract or operation of law, to any Third Party that acquires all or substantially all of the business or assets of such Party (whether by merger, reorganization, acquisition, sale or otherwise) relating to the Licensed Product. No assignment of this Agreement to a Third Party shall be valid and effective unless and until the assignee agrees in writing to be bound by all of the terms and conditions of this Agreement and all Ancillary Agreements surviving such assignment. Any assignment of this Agreement not in accordance with this Section 17.1 shall be null and void.

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17.1.2 Rights Not Diminished. Subject to the terms and conditions hereof, no right of a Party shall be diminished and no obligation of a Party increased during the Term as a result of a permitted assignment by the other Party to a Third Party hereunder, including as a result of a Change of Control of the other Party.

17.2 Waiver. The failure of any Party to assert a right hereunder or to insist upon compliance with any term or condition of this Agreement shall not constitute a waiver of that right or excuse a similar subsequent failure to perform any such term or condition by the other Party. No waiver shall be effective unless it has been given in writing and signed by the Party giving such waiver. The exercise of any right hereunder by a Party in the event of the other's default does not constitute an election of remedies or prevent the exercise of any or all other rights (all rights and remedies being cumulative).

17.3 Choice of Law. This Agreement, its interpretation, construction and performance and the rights granted and obligations arising hereunder, shall be governed by, and construed in accordance with, the laws of the State of New York of the United States of America, exclusive of its conflicts of law rules.

17.4 Notices. All notices given under this Agreement by either Party to the other Party shall be in the English language, in writing (which shall exclude e-mail),and shall refer specifically to this Agreement and shall be delivered personally, sent by nationally-recognized overnight courier or sent by registered or certified mail, postage prepaid, return receipt requested, to the following respective addresses (or to such other address as may be specified by notice from time to time by the relevant Party):

If to Arrowhead:	Arrowhead Pharmaceuticals, Inc. 225 S. Lake Ave, Suite 1050 Pasadena, CA 91101 Attention: General Counsel
With a copy to:	Gibson Dunn & Crutcher 555 Mission Street, Suite 3000 San Francisco, CA 94105 Attention: Ryan Murr
If to Janssen:	Janssen Pharmaceuticals, Inc. 1125 Trenton-Harbourton Road Titusville, NJ 08560
With a copy to:	Office of the General Counsel Johnson & Johnson One Johnson & Johnson Plaza New Brunswick, NJ 08933 Attention: General Counsel, Pharmaceuticals

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17.4.1 Without prejudice to any earlier time at which a notice may be actually given and received, a properly addressed notice shall in any event be deemed to have been received: (a) when delivered, if personally delivered during the recipient's normal business hours; (b) on the Business Day after dispatch, if sent by nationally-recognized overnight courier and proof of delivery is obtained; and (c) on the third (3rd) Business Day following the date of mailing, if sent by mail.

17.4.2 Where proceedings have been commenced in any arbitration hereunder or court of competent jurisdiction, any documents issued in the course of those proceedings will be served in accordance with the procedural rules governing the service of documents in those proceedings.

17.4.3 This Section 17.4 shall apply to notices required to be given by one Party to the other under this Agreement. Other communications between the Parties that are routine in nature, such as communications between Alliance Managers or the Parties' members of the JSC regarding their ongoing activities performed in the ordinary course of their work under this Agreement, may be made via e-mail. All notices and communications between the Parties hereunder shall be in the English language.

17.5 **Severability**. If the whole or any provision of this Agreement is held to be invalid, illegal or unenforceable in any jurisdiction for any reason, then, to the fullest extent permitted by Applicable Law, (a) in the case of the illegality, invalidity or unenforceability of the whole of this Agreement, it shall terminate in relation to the jurisdiction in question; and (b) in the case of illegality, invalidity or unenforceability of any provision of this Agreement, that part shall be severed from this Agreement in the jurisdiction in question (but shall remain in full force and effect in all other jurisdictions) and (i) all other provisions hereof shall remain in full force and effect in the relevant jurisdiction and shall be liberally construed in order to carry out the intent of the Parties as nearly as may be possible, and (ii) the Parties agree to use reasonable efforts to negotiate a provision, in replacement of the provision held invalid, illegal or unenforceable, that is consistent with Applicable Law in the relevant jurisdiction and accomplishes, as nearly as possible, the original intention of the Parties with respect thereto.

17.6 **Integration**. This Agreement constitutes the entire agreement between the Parties hereto with respect to the subject matter of this Agreement and supersedes all previous agreements (executed before the Execution Date hereof), whether written or oral. The terms of this Agreement may be amended only in writing signed by duly authorized representatives of each of the Parties. In the event of a conflict between any terms of any exhibit or other appendix to this Agreement and the body of this Agreement, the body of this Agreement shall control.

17.7 **Independent Contractors; No Agency**. Neither Party shall have any responsibility for the hiring, firing or compensating the other Party's employees or agents for any employee benefits. No employee or representative of a Party, including any of its (or its Affiliates') JSC members, shall have any authority to bind or obligate the other Party to this Agreement to pay any sum or in any manner whatsoever, or to create or impose any contractual or other liability on the other Party. For all purposes and notwithstanding any other provision of this Agreement to the contrary, nothing in this Agreement shall be construed as establishing a partnership or joint venture relationship between the Parties.

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17.8 Performance by Affiliates. Except as expressly prohibited hereunder, either Party may use one or more of its Affiliates to perform its obligations and duties hereunder, provided that such Party shall remain liable hereunder for the timely payment and performance of all of its obligations and duties hereunder.

17.9 Force Majeure. No Party shall be deemed to have defaulted under or breached this Agreement for failure or delay in fulfilling or performing any term of this Agreement, except for the payment of any amounts under this Agreement, when such failure or delay is caused by or results from causes beyond the reasonable control of the non-performing Party, including fires, floods, embargoes, shortages, epidemics, quarantines, war, acts of war (whether war be declared or not), terrorism, insurrections, riots, civil commotion, acts of God or acts, omissions or delays in acting by any Governmental Authority. The non-performing Party shall notify the other Party of such force majeure within five (5) Business Days after such occurrence by giving written notice to the other Party stating the nature of the event, its anticipated duration, and any action being taken to avoid or minimize its effect. The suspension of performance shall be of no greater scope and no longer duration than is necessary and the non-performing Party shall use, throughout the period of suspension of performance, Commercially Reasonable Efforts to remedy its inability to perform; provided, however, that in the event the suspension of performance continues for ninety (90) days after the date such force majeure commences, the Parties shall meet to discuss in good faith how to proceed in order to accomplish the objectives of this Agreement; and provided, further, however, that if the suspension of performance continues for more than one (1) year after the date such force majeure commences, either (a) Janssen in the event that Arrowhead is the non-performing Party, or (b) Arrowhead in the event that Janssen is the non-performing Party, shall have the right to terminate this Agreement upon notice to non-performing Party. For purposes of this Agreement a force majeure shall not include a failure to commit sufficient resources, financial or otherwise, to the activities to be conducted pursuant to this Agreement or general market or economic conditions.

17.10 Construction. The headings used herein are for reference and convenience only, and will not enter into the interpretation of this Agreement. References to Sections include subsections, which are part of the related Section. Except as otherwise explicitly specified to the contrary, (a) references to a Section, Article, or Exhibit means a Section or Article of, or Exhibit to, this Agreement and all subsections thereof, unless another agreement is specified; (b) references to a particular statute or regulation include all rules and regulations thereunder and any successor statute, rules or regulations then in effect, in each case, including any then-current amendments thereto; (c) words in the singular or plural form include the plural and singular form, respectively; (d) capitalized terms not expressly defined herein that are corollaries (such as pluralizations and changes in tense) to capitalized terms defined herein shall have the corresponding meanings (e) unless the context requires a different interpretation, the word “or” has the inclusive meaning that is typically associated with the phrase “and/or”; (f) terms “including,” “include(s),” “such as,” and “for example” as used in this Agreement mean including the generality of any description preceding such term and will be deemed to be followed by “without limitation”; (g) whenever this Agreement refers to a number of days, such number will refer to calendar days unless Business Days are specified; (h) “herein”, “hereunder”, “hereof”, and the like shall be understood to refer to this Agreement in its entirety, and not the particular provision or Section in which they appear; (i) references to a particular Party include such Party's successors and assigns to the extent not

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prohibited by this Agreement; (j) all words used in this Agreement will be construed to be of such gender or number as the circumstances require; (k) references to "persons" includes individuals, bodies corporate (wherever incorporated), unincorporated associations and partnerships; (l) the words "comprise", "comprising", "contain", "containing", "include" and "including" are used in their open, non-limiting form, and shall be understood to include the words "without limitation" even if not expressly stated; (m) all references to "dollars" or "$" shall mean United States dollars.

17.11 HSR Clearance; Termination Upon HSR Denial. If either or each of the Parties reasonably determines that an HSR Filing is required by Applicable Law to consummate the transactions contemplated hereunder, each Party shall, within ten (10) Business Days of the Execution Date (or such later time as may be agreed to in writing by the Parties), file with the United States Federal Trade Commission and the Antitrust Division of the United States Department of Justice, and/or with any equivalent Governmental Authority in any other country, as the case may be, any HSR Filing under the HSR Act with respect to the transactions contemplated hereunder. Each Party shall use reasonable efforts to do, or cause to be done, all things necessary, proper and advisable to, as promptly as practicable, take all actions necessary to make the HSR Filings required of any of the Parties or their respective Affiliates under the HSR Act. The Parties shall cooperate with one another to the extent reasonably necessary in the preparation of any such HSR Filing. Each Party shall be responsible for its own Out-of-Pocket Costs and expenses, including filing fees, associated with any HSR Filing. If the Parties make an HSR Filing hereunder, then this Agreement shall terminate (a) at the election of either Party, immediately upon notice to the other Party, if the U.S. Federal Trade Commission or the U.S. Department of Justice, or an equivalent Governmental Authority outside of the United States, seeks a preliminary injunction under the antitrust or competition laws against any Party to enjoin the transactions contemplated by this Agreement or takes a final decision by which it refuses to provide its approval to the transactions contemplated by this Agreement where such approval is required by Applicable Law; (b) at the election of either Party, immediately upon notice to the other Party, in the event that the United States Federal Trade Commission or the United States Department of Justice, or an equivalent Governmental Authority outside of the United States, obtains a preliminary injunction under the antitrust or competition laws against any Party to enjoin the transactions contemplated by this Agreement; or (c) at the election of either Party, immediately upon notice to the other Party, in the event that the date of HSR Clearance shall not have occurred on or prior to ninety (90) days after the effective date of the HSR Filing.

17.12 Execution in Counterparts; Facsimile Signatures. This Agreement may be executed in counterparts, each of which counterparts, when so executed and delivered, shall be deemed to be an original, and all of which counterparts, taken together, shall constitute one and the same instrument even if both Parties have not executed the same counterpart. Facsimile or portable document format (i.e., .pdf), execution and delivery of this Agreement by a Party constitutes a legal, valid and binding execution and delivery of this Agreement by such Party.

[Remainder of this page intentionally blank.]

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IN WITNESS WHEREOF, each Party has caused this Agreement to be duly executed by its authorized representative on the respective date written herein below.

Arrowhead Pharmaceuticals, Inc.

By:/s/ Christopher Anzalone
Name: Christopher Anzalone, Ph.D.
Title: President and CEO
Date: October 3, 2018

Janssen Pharmaceuticals, Inc.

By:/s/ Flavia Pearse
Name: Flavia Pearse
Title: Treasurer
Date: October 3, 2018

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Exhibit A

Access Territory

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Exhibit B

Arrowhead Patent Rights

Exhibit B-1

Owned Specific Arrowhead Patent Rights

ARWR Docket ID	Country	Application Number	Earliest Non-Provisional Filing Date	Earliest Referenced Provisional Date	Actual Application Filing Date	Status	Patent Number
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Exhibit B-2

Owned General Arrowhead Patent Rights

ARWR Docket ID	Country	Application Number	Earliest Non-Provisional Filing Date	Earliest Referenced Provisional Date	Actual Application Filing Date	S
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Exhibit B-3

Acquired Specific Arrowhead Patent Rights

Docket ID	Country	Application Number	Earliest Non-Provisional Filing Date	Earliest Referenced Provisional Date	Actual Application Filing Date	Status
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[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

Docket ID	Country	Application Number	Earliest Non-Provisional Filing Date	Earliest Referenced Provisional Date	Actual Application Filing Date	Status
	[**]	[**]	[**]	[**]	[**]	[**]
	[**]	[**]	[**]	[**]	[**]	[**]
	[**]	[**]	[**]	[**]	[**]	[**]
	[**]	[**]	[**]	[**]	[**]	[**]
	[**]	[**]	[**]	[**]	[**]	[**]

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Exhibit B-4

Acquired General Arrowhead Patent Rights

Not applicable

Exhibit B-5

In-Licensed Arrowhead Patent Rights

Specific	General
Not applicable	Not applicable

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Exhibit C

Initial version of Clinical Plan

[**]

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

Exhibit D

Initial version of Development Plan

[**]

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

Exhibit E

Pre-Existing Third Party Agreements

Section 1. Pre-Existing Licenses to Third Parties

- First Collaboration and License Agreement, entered into as of September 28, 2016, by and between Amgen Inc. and Arrowhead Pharmaceuticals, Inc.
- Second Collaboration and License Agreement, entered into as of September 28, 2016, by and between Amgen Inc. and Arrowhead Pharmaceuticals, Inc.

Section 2. Pre-Existing Licenses from Third Parties

- Asset Purchase and Exclusive License Agreement by and between Arrowhead Pharmaceuticals, Inc. (f/k/a Arrowhead Research Corporation) and Novartis Institutes for BioMedical Research, Inc., effective as of March 3, 2015.

Section 3. Pre-Existing Acquired Rights from Third Parties

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[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

Exhibit F

Janssen Universal Calendar for 2018

	M	T	W	T	F	S	S
	1	2	3	4	5	6	7
JAN	8	9	10	11	12	13	14
(4 Weeks)	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				
FEB				1	2	3	4
(4 Weeks)	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28				
				1	2	3	4
MAR	5	6	7	8	9	10	11
(5 Weeks)	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	
							1
	2	3	4	5	6	7	8
APR	9	10	11	12	13	14	15
(4 Weeks)	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30						
MAY		1	2	3	4	5	6
(4 Weeks)	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31			
					1	2	3
JUN	4	5	6	7	8	9	10
(5 Weeks)	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	
							1

	M	T	W	T	F	S	S
	2	3	4	5	6	7	8
JUL	9	10	11	12	13	14	15
(4 Weeks)	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					
AUG			1	2	3	4	5
(4 Weeks)	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31		
						1	2
SEP	3	4	5	6	7	8	9
(5 Weeks)	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	1	2	3	4	5	6	7
OCT	8	9	10	11	12	13	14
(4 Weeks)	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				
NOV				1	2	3	4
(4 Weeks)	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30		
						1	2
DEC	3	4	5	6	7	8	9
(5 Weeks)	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30

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Exhibit G

Initial Press Releases

Arrowhead's press release

PRESS RELEASE
Oct. 4, 2018

Arrowhead Enters $3.7 Billion License and Collaboration Agreements with Janssen

- Upon closing, Arrowhead to receive $250 million, consisting of $175 million upfront payment from Janssen and $75 million equity investment from Johnson & Johnson Innovation – JJDC, Inc.
- Arrowhead eligible to receive additional $3.5 billion in potential milestone payments, and potential further royalties on commercial sales
- Janssen to receive a worldwide exclusive license for ARO-HBV and an option to collaborate on up to three new targets
- Arrowhead will hold a conference call and webcast today, Oct. 4, at 8:30 a.m. ET

PASADENA, Calif., Oct. 4, 2018 — Arrowhead Pharmaceuticals Inc. (NASDAQ: ARWR) today announced that it entered into a license and collaboration agreement with Janssen Pharmaceuticals, Inc., part of the Janssen Pharmaceutical Companies of Johnson & Johnson, to develop and commercialize ARO-HBV. In addition, Arrowhead entered into a research collaboration and option agreement with Janssen to potentially collaborate for up to three additional RNA interference (RNAi) therapeutics against new targets to be selected by Janssen. The transactions have a combined potential value of over $3.7 billion for Arrowhead.

Under the terms of the agreement, Arrowhead will receive $175 million as an upfront payment. Separately, Johnson & Johnson Innovation – JJDC, Inc. (JJDC) will make a $75 million equity investment in Arrowhead at a price of $23.00 per share of Arrowhead common stock.

Arrowhead is eligible to receive up to approximately $1.6 billion in milestone payments for the HBV license agreement, including a $50 million milestone payment linked to a Phase 2 study. Arrowhead is also eligible to receive approximately $1.9 billion in option and milestone payments

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for the collaboration agreement related to up to three additional targets. Arrowhead is further eligible to receive tiered royalties up to mid teens on product sales.

“This agreement represents an important next step for ARO-HBV. Arrowhead has established a leadership position in the field over the past several years, and Janssen’s proven development capabilities, global commercial reach, and commitment to HBV make it the ideal partner to potentially accelerate our goal of bringing a functional cure to patients with chronic HBV,” said Christopher Anzalone, Ph.D., Arrowhead’s president and CEO. “The collaboration also represents further validation of the TRiM™ platform and provides an important opportunity to create up to three additional novel medicines by leveraging Arrowhead’s speed and expertise in RNAi drug discovery and Janssen’s clinical development and commercial capabilities.”

Under the agreement, Janssen receives a worldwide exclusive license to the ARO-HBV program, Arrowhead’s third-generation subcutaneously administered RNAi therapeutic candidate being developed as a potentially curative therapy for patients with chronic hepatitis B virus infection. Beyond AROHBV1001, Arrowhead’s ongoing Phase 1/2 study of ARO-HBV, Janssen will be wholly responsible for clinical development and commercialization.

Janssen can also select up to three new targets, against which Arrowhead will develop clinical candidates. These potential new candidates will leverage Arrowhead’s proprietary TRiM™ platform, and do not include Arrowhead’s current pipeline. Arrowhead will perform discovery, optimization, and preclinical development, entirely funded by Janssen, sufficient to allow the filing of a U.S. Investigational New Drug application or equivalent, at which time Janssen will have the option to take an exclusive license. If the option is exercised, Janssen will be wholly responsible for clinical development and commercialization

The closing of the transactions is subject to clearance under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, and is expected to close during the fourth quarter of 2018.

Conference Call and Webcast Details

Investors may access a live audio webcast on the Company's website at http://ir.arrowheadpharma.com/events.cfm. For analysts that wish to participate in the conference call, please dial 855-215-6159 or 315-625-6887 and provide Conference ID 2649806.

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A replay of the webcast will be available on the company's website approximately two hours after the conclusion of the call and will remain available for 90 days. An audio replay will also be available approximately two hours after the conclusion of the call and will be available for 3 days. To access the audio replay, dial 855-859-2056 or 404-537-3406 and provide Conference ID 2649806.

About AROHBV1001

AROHBV1001 (NCT03365947) is evaluating the safety, tolerability, and pharmacokinetic effects of single-ascending doses (SAD) of ARO-HBV in healthy adult volunteers, as well as the safety, tolerability, and pharmacodynamic effects of multiple-ascending doses (MAD) of ARO-HBV in patients with chronic HBV. Dosing in the SAD portion of the study is complete and included five cohorts at dose levels of 35, 100, 200, 300, and 400 mg. Dosing in the MAD portion of the study is ongoing and includes cohorts receiving three doses of ARO-HBV either weekly, bi-weekly, or monthly. Arrowhead submitted a late-breaking abstract with clinical data to the Liver Meeting®, the Annual Meeting of the American Association for the Study of Liver Disease (AASLD), being held in November 2018.

About Arrowhead Pharmaceuticals

Arrowhead Pharmaceuticals develops medicines that treat intractable diseases by silencing the genes that cause them. Using a broad portfolio of RNA chemistries and efficient modes of delivery, Arrowhead therapies trigger the RNA interference mechanism to induce rapid, deep, and durable knockdown of target genes. RNA interference, or RNAi, is a mechanism present in living cells that inhibits the expression of a specific gene, thereby affecting the production of a specific protein. Arrowhead's RNAi-based therapeutics leverage this natural pathway of gene silencing.

For more information, please visit www.arrowheadpharma.com, or follow us on Twitter @ArrowheadPharma. To be added to the Company's email list and receive news directly, please visit http://ir.arrowheadpharma.com/email-alerts.

Safe Harbor Statement under the Private Securities Litigation Reform Act:

This news release contains forward-looking statements within the meaning of the "safe harbor" provisions of the Private Securities Litigation Reform Act of 1995. These statements are based upon our current expectations and speak only as of the date hereof. Our actual results may differ materially and adversely from those expressed in any forward-looking statements as a result of various factors and uncertainties, including the safety and efficacy of our product candidates, the duration and impact of regulatory delays in

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our clinical programs, our ability to finance our operations, the future success of our scientific studies, our ability to successfully develop drug candidates, the timing for starting and completing clinical trials, rapid technological change in our markets, and the enforcement of our intellectual property rights. Our most recent Annual Report on Form 10-K and subsequent Quarterly Reports on Form 10-Q discuss some of the important risk factors that may affect our business, results of operations and financial condition. We assume no obligation to update or revise forward-looking statements to reflect new events or circumstances.

Contacts:
Arrowhead Pharmaceuticals, Inc.
Vince Anzalone, CFA
626-304-3400
ir@arrowheadpharma.com

Investors and Media:
LifeSci Advisors, LLC
Brian Ritchie
212-915-2578
britchie@lifesciadvisors.com
www.lifesciadvisors.com

Source: Arrowhead Pharmaceuticals, Inc.

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Janssen's press release

JANSSEN ANNOUNCES EXCLUSIVE, WORLDWIDE LICENSE AGREEMENT WITH ARROWHEAD PHARMACEUTICALS TO DEVELOP AND COMMERCIALIZE A NEW TREATMENT FOR CHRONIC HEPATITIS B VIRAL INFECTION

Agreement expands breadth of Janssen's hepatitis B virus development portfolio

TITUSVILLE, N.J., October 4, 2018 – The Janssen Pharmaceutical Companies of Johnson & Johnson today announced that Janssen Pharmaceuticals, Inc., (Janssen) has entered into an agreement with Arrowhead Pharmaceuticals, Inc., (Arrowhead) for an exclusive, worldwide license to develop and commercialize ARO-HBV, a Phase 1/2 subcutaneous, ribonucleic acid interference (RNAi) therapy candidate being investigated for the treatment of chronic hepatitis B viral infection.

Under the agreement, Arrowhead will complete the ongoing Phase 1/2 clinical trial for ARO-HBV, a next-generation RNAi therapy candidate which is designed to silence HBV gene products by specifically targeting two regions of the HBV genome. Janssen will lead the clinical development from Phase 2b onwards. Arrowhead will receive an initial upfront payment, potential development and commercial milestone payments and potential future royalties. Separately, Johnson & Johnson Innovation – JJDC, Inc., will make an equity investment in Arrowhead.

Janssen and Arrowhead also agreed to a research collaboration to develop RNAi therapeutics directed against additional targets using Arrowhead's proprietary Targeted RNAi Molecule (TRiM™) platform. If Janssen exercises its option for such RNAi therapeutics, Arrowhead will be eligible to receive additional payments.

Hepatitis B viral infection presents a major global health concern and places a significant burden on the 257 million people living with the disease worldwide.[1,2] While a prophylactic vaccine for hepatitis B exists, many people living with chronic hepatitis B remain uncured by current treatments and endure lifelong therapy.[1] RNAi therapy candidates such as ARO-HBV have been shown to have an effect on hepatitis B viral infection replication pathways and on the production of viral proteins, providing another avenue for investigation into treatments in this area.[3]

"An important objective within Janssen is to develop highly effective combination products that cure people living with chronic hepatitis B infections," said Mathai Mammen, M.D., Ph.D., Global Head, Janssen Research & Development, LLC. "Working with the talented Arrowhead team and their RNAi therapy candidate adds to the strength of our hepatitis B portfolio and substantially increases our confidence that we can achieve our objective."

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

The transactions are subject to clearance under the Hart-Scott-Rodino Antitrust Improvements Act and expected to close in Q4 2018.

About the Janssen Pharmaceutical Companies of Johnson & Johnson
At the Janssen Pharmaceutical Companies of Johnson & Johnson, we are working to create a world without disease. Transforming lives by finding new and better ways to prevent, intercept, treat and cure disease inspires us. We bring together the best minds and pursue the most promising science. We are Janssen. We collaborate with the world for the health of everyone in it. Learn more at www.janssen.com and follow us at @JanssenGlobal. Janssen Pharmaceuticals, Inc. and Janssen Research & Development, LLC are part of the Janssen Pharmaceutical Companies of Johnson & Johnson.

About Johnson & Johnson Innovation – JJDC, Inc.
Johnson & Johnson Innovation – JJDC, Inc. (JJDC) is the strategic venture capital arm of Johnson & Johnson and a long-term investment partner to global healthcare entrepreneurs. Founded in 1973, JJDC continues a legacy of customizing deals for data-driven companies across the continuum of healthcare, with the goal of turning great ideas into transformative new pharmaceutical, medical device and consumer healthcare products. Visit our website at www.jjdc.com.

Cautions Concerning Forward-Looking Statements

This press release contains "forward-looking statements" as defined in the Private Securities Litigation Reform Act of 1995 regarding a new license and collaboration agreement and the continued development of potential treatment regimens for hepatitis B. The reader is cautioned not to rely on these forward-looking statements. These statements are based on current expectations of future events. If underlying assumptions prove inaccurate or known or unknown risks or uncertainties materialize, actual results could vary materially from the expectations and projections of Janssen Pharmaceuticals, Inc., Johnson & Johnson Innovation – JJDC, Inc., any of the other Janssen Pharmaceutical Companies and/or Johnson & Johnson. Risks and uncertainties include, but are not limited to: the potential that the expected benefits and opportunities related to the collaboration may not be realized or may take longer to realize than expected; challenges and uncertainties inherent in product development, including uncertainty of clinical success and obtaining regulatory approvals; uncertainty of commercial success for new indications and therapeutic combinations; competition, including technological advances, new products and patents attained by competitors; challenges to patents; product efficacy or safety concerns resulting in product recalls or regulatory action; changes in behaviour and spending patterns or financial distress of purchasers of health care products and services; changes to applicable laws and regulations, including global health care reforms and trends toward health care cost containment. A further list and description of these risks, uncertainties and other factors can be found in Johnson & Johnson's Annual Report on Form 10-K for the year ended December 31, 2017, including in the sections captioned "Cautionary Note Regarding Forward-Looking Statements" and "Item 1A Risk Factors," in the company's most recently filed Quarterly Report on Form 10-Q and the company's subsequent filings with the Securities and Exchange Commission. Copies of these filings are available online at www.sec.gov, www.jnj.com or on request from Johnson & Johnson. None of the Janssen Pharmaceutical Companies or Johnson & Johnson undertakes to update any forward-looking statement as a result of new information or future events or developments.

References

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1. World Health Organization (WHO). Hepatitis B. July 2017. Available at: http://www.who.int/mediacentre/factsheets/fs204/en/ Last accessed September 2018.
2. World Health Organization (WHO). Draft global health sector strategy on viral hepatitis, 2016-2021 Sixty-ninth World Health Assembly provisional agenda item 15.1. Document A69/32. April 2016. Available at: http://apps.who.int/gb/ebwha/pdf_files/WHA69/A69_32-en.pdf?ua=1 Last accessed September 2018.
3. Yuen MF *et. al.*, RNA interference therapy with ARC-520 Injection results in long term off-therapy antigen reductions in treatment naïve, HBeAg positive and negative patients with chronic HBV. Poster FRI-362 presented at EASL 2018, April 13, 2018 [LINK].

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[**]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT UNDER RULE 24B-2 OF THE SECURITIES EXCHANGE ACT OF 1934

EXECUTION VERSION

RESEARCH COLLABORATION AND OPTION AGREEMENT

This Research Collaboration and Option Agreement (***"Agreement"***), made as of the date of execution by the last Party to sign below (the "***Execution Date***") and effective as of the Effective Date as defined below, is by and between Arrowhead Pharmaceuticals, Inc., a Delaware corporation with a place of business at 225 South Lake Avenue, Suite 1050, Pasadena, California 91101, USA ("**Arrowhead**"), and Janssen Pharmaceuticals, Inc., a Pennsylvania corporation with a place of business at 1125 Trenton-Harbourton Road, Titusville, New Jersey 08560, USA ("**Janssen**"). Arrowhead and Janssen are at times referred to herein individually as a "***Party***" and collectively as the "**Parties**".

RECITALS

WHEREAS, Arrowhead possesses certain information, materials, and experience in research and drug design relating to oligonucleotides and oligonucleotide constructs;

WHEREAS, Janssen, directly and through certain of its Affiliates, has extensive experience and expertise in the research, development and commercialization of pharmaceutical products;

WHEREAS, the Parties desire to enter into an alliance to facilitate Arrowhead's conduct of research and development aimed at identifying and characterizing novel oligonucleotides and oligonucleotide constructs active against selected targets suitable for development by Janssen into pharmaceutical products; and

WHEREAS, Janssen is willing to provide certain support for such research and development, and Arrowhead is willing to provide Janssen with options to exclusively license rights in such oligonucleotides and oligonucleotide constructs; and

WHEREAS Arrowhead and Janssen, are entering into a Collaboration and License Agreement in relation to oligonucleotides and oligonucleotide constructs, including the construct in clinical development known as ARO-HBV, which inhibits expression of the hepatitis B virus (the "***License Agreement***").

NOW, THEREFORE, in consideration of the mutual promises and covenants set forth below and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

ARTICLE I: DEFINITIONS

Unless the context otherwise requires, the terms in this Agreement with initial letters capitalized shall have the meanings described below or the meaning as designated in the indicated places throughout this Agreement.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1.1 **"Access Territory"** means those countries set forth in Exhibit A.

1.2 **"Accounting Standards"** means GAAP or International Financial Reporting Standards (IFRS), as appropriate, as generally and consistently applied in compliance with Applicable Laws throughout the relevant company's organization at the relevant time.

1.3 **"Acquired General Arrowhead Patent Rights"** has the meaning as set forth in Section 12.5.3.

1.4 **"Acquired Specific Arrowhead Patent Rights"** has the meaning as set forth in Section 12.5.3

1.5 **"Action"** means any claim, action, cause of action or suit (whether in contract or tort or otherwise), litigation (whether at law or in equity, whether civil or criminal), controversy, assessment, arbitration, investigation, hearing, charge, complaint, demand, notice or proceeding of, to, from, by or before any Governmental Authority.

1.6 **"Active Ingredient"** means clinically-active material that provides a pharmacological activity in a pharmaceutical or biologic product (excluding formulation components, such as coatings, stabilizers, excipients or solvents, adjuvants or controlled release technologies).

1.7 **"Affiliate"** means, with respect to a designated Party or entity, any entity controlling, controlled by, or under common control with such Party or entity. For purposes of this definition only, "control" means: (a) where the entity is a corporate entity, direct or indirect ownership of 50% or more of the stock or shares having the right to vote for the election of directors of such entity; and (b) where the entity is other than a corporate entity, the possession, directly or indirectly, of the power to direct, or cause the direction of, the management or policies of such entity, whether through the ownership of voting securities, by contract or otherwise.

1.8 **"Agreement"** has the meaning set forth in the preamble above.

1.9 **"Alliance Manager"** has the meaning set forth in Section 3.9.

1.10 [Intentionally Left Blank]

1.11 **"Anti-Corruption Laws"** means the FCPA and related regulations in the United States, and equivalent anti-bribery laws and regulations under Applicable Laws in other jurisdictions.

1.12 **"Applicable Laws"** means the applicable provisions of any national, supranational, regional, state and local laws, treaties, statutes, rules, regulations, administrative codes, guidance, ordinances, judgments, decrees, directives, injunctions, orders, permits, of or from any court, arbitrator, Regulatory Authority, or Governmental Authority having jurisdiction over or related to the subject item.

1.13 [Intentionally Left Blank]

1.14 [Intentionally Left Blank]

1.15 **"Arrowhead Intellectual Property"** means Arrowhead Patent Rights and Arrowhead Know-How, collectively.

1.16 **"Arrowhead Invention"** has the meaning set forth in Section 10.1.

1.17 **"Arrowhead Know-How"** means Know-How Controlled by, or on behalf of, Arrowhead or its Affiliates at any time that is necessary or reasonably useful to Exploit Licensed Constructs or Licensed Products including CMC Know-How.

1.18 **"Arrowhead Patent Rights"** means Patent Rights Controlled by, or on behalf of, Arrowhead or its Affiliates at any time that are necessary or reasonably useful to Exploit Licensed Constructs or Licensed Products, provided that such Patent Rights Covering inventions that are Arrowhead Platform Technology shall be limited to Patent Rights Covering inventions made as of the Effective Date and thereafter for the longer of the three-year period following the Effective Date or the end of the Research Period. Arrowhead Patent Rights includes General Arrowhead Patent Rights and Specific Arrowhead Patent Rights.

1.19 "**Arrowhead Platform Technology**" means targeted RNAi molecule technology Controlled by Arrowhead utilizing targeting ligand-mediated delivery of RNAi designated by Arrowhead as its TRiM™ platform.

1.20 "**Assay**" means [**].

1.21 **"Audited Party"** has the meaning set forth in Section 9.6.2.

1.22 **"Audited Site"** means any site or facility of a Party or any of its Affiliates, Third Party sublicensees, or Third Party contractors or subcontractors hereunder, as the case may be, on which any clinical study or Manufacturing of Licensed Products for human use is conducted, and which is undergoing an inspection or audit by a Regulatory Authority or a Party as provided hereunder.

1.23 **"Auditing Party"** has the meaning set forth in Section 9.6.2.

1.24 **"Bankruptcy"** means, with respect to a Party, that: (a) the Party has been declared insolvent or bankrupt by a court of competent jurisdiction; or (b) a voluntary or involuntary petition in bankruptcy is filed in any court of competent jurisdiction against the Party and such petition has not dismissed within ninety (90) days after filing; or (c) the Party has made or executed an assignment of substantially all of its assets for the benefit of creditors.

1.25 **"Bankruptcy Code"** means Title 11 of the United States Code, as may be amended or superseded from time to time.

1.26 **"Breaching Party"** has the meaning set forth in Section 15.2.1.

1.27 **"Business Day"** means a weekday on which banking institutions in the City of New York, New York are open for business.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1.28 **"CAPA"** means a written recovery plan or proposal of corrective and preventative actions.

1.29 **"Change of Control"** means, with respect to a specified Party: (a) the acquisition, directly or indirectly, by a Person or group (whether in a single transaction or multiple transactions) of more than 50% of the voting power of such Party or of beneficial ownership of (or the right to acquire such beneficial ownership of) more than 50% of the outstanding equity or convertible securities of such Party (including by tender offer or exchange offer); (b) any merger, consolidation, share exchange, business combination, recapitalization, sale of a majority of assets of (i.e., having a fair market value (as determined by the board of directors of such Party in good faith) in excess of 50% of the fair market value of all the assets of such Party and its subsidiaries immediately prior to such sale), or similar corporate transaction involving such Party (whether or not including one or more wholly owned subsidiaries of such Party), other than: (i) transactions involving solely such Party and/or one or more Affiliates, on the one hand, and one or more of such Party 's Affiliates, on the other hand, and/or (ii) transactions in which the stockholders of such Party immediately prior to such transaction hold at least 50% of the voting power of the surviving company or ultimate parent company of the surviving company; or (c) as a result of a single or multiple transaction(s) by a Person or group, the occupation of a majority of the seats (other than vacant seats) on the board of directors (or similar governing body of such Party) by any directors or Persons who were not (i) members of such body on the Execution Date of this Agreement, (ii) appointed by members of such body on the Execution Date of this Agreement or by members of such body so appointed, or (iii) nominated for election to such body by any Persons described in preceding clauses (i) or (ii); or (d) the adoption of a plan relating to the liquidation or dissolution of such Party. For purposes of this definition, the terms "group" and "beneficial ownership" shall have the meaning accorded in the U.S. Securities Exchange Act of 1934 and the rules of the U.S. SEC thereunder in effect as of the Execution Date hereof.

1.30 **"Claim"** has the meaning set forth in Section 13.1.

1.31 **"Clinical Investigation Laws"** means Applicable Laws relating to human clinical investigations, such as 21 C.F.R. Parts 50, 54, 56 and 312 and then-current Good Clinical Practice, each as in effect and as amended from time to time.

1.32 [Intentionally Left Blank]

1.33 **"CMC Know-How"** means the Arrowhead Know-How relating to the chemistry, Manufacture, and controls of any Licensed Construct or any Licensed Product, including data, procedures, techniques, and information resulting from any test method development and stability testing, process development, process validation, process scale-up, formulation development, delivery system development, quality assurance and quality control development, and other related activities.

1.34 **"Collaboration Activities"** means the Parties' activities (performed directly and/or, as may be permitted hereunder, on their behalf through their Affiliates, Third Party sublicensees and/or Third Party subcontractors) performed under this Agreement, including the Development Plan.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1.35 **"Combination Product"** means: (a) a single pharmaceutical formulation containing as its Active Ingredients (i) one or more Licensed Constructs, and (ii) one or more Active Ingredients other than a Licensed Construct; or (b) a bundle of products comprised of (i) one or more single pharmaceutical formulations comprising at least one Licensed Construct, and (ii) one or more other therapeutically effective or Prophylactically Active Products, priced and sold in a single package containing such multiple products or packaged separately but sold together for a single price; in each of the foregoing (a) or (b), in all dosage forms, formulations, presentations, line extensions and package configurations thereof.

1.36 **"Commercialization" or "Commercialize"** means activities directed to marketing, promoting, offering for sale, or selling a product, including commercial manufacturing, launching product, conducting any Post-Marketing Studies, market access activities, price setting and price negotiation activities, managed care contract sales, medical affairs activities, and distribution and importation activities in support thereof.

1.37 **Commercially Reasonable Efforts"** means, with respect to the efforts to be expended by any Party with respect to any objective, those reasonable, diligent, good faith efforts to accomplish such objective that a similarly situated pharmaceutical or biotechnology company in the exercise of its reasonable business discretion would normally use to accomplish a similar objective under similar circumstances. With respect to any objective relating to the research, Development or Commercialization of a Licensed Product by any Party, "Commercially Reasonable Efforts" shall mean those efforts and resources normally used by a similarly situated pharmaceutical or biotechnology company in the exercise of its reasonable business discretion with respect to a product owned or controlled by such Party, or to which such Party has similar rights, which product has similar product characteristics, is of similar market potential and is at a similar stage in its development or life as is such Licensed Product, taking into account all Relevant Factors.

1.38 **"Confidential Information"** has the meaning set forth in Section 11.1.1.

1.39 **"Construct"** means [**].

1.40 **"Control"** means, with respect to any designated intellectual property or right pertaining thereto, possession by a Party (whether directly by ownership (either sole or joint) or license from a Third Party, or indirectly through an Affiliate having ownership or license from a Third Party) of the ability to grant to the other Party a license, sublicense, right of access, or other right to or under such intellectual property or intellectual property right as provided herein, without violating the terms of any agreement with any Third Party, such agreement existing (a) as of the Effective Date or (b) subsequent to the Effective Date if (in the case of this clause (b)) such Party first acquired rights to such intellectual property pursuant to such agreement or other arrangement.

1.41 **"Cover"** means, in reference to a claim of a Patent Right in a particular country or other jurisdiction with respect to particular subject matter (such as a composition of matter, product, manufacturing or other process, or method of use), that the claim (as interpreted under principles of patent law in such jurisdiction) reads on or encompasses such subject matter.

1.42 **"CPR Mediation Procedure"** has the meaning set forth in Section 16.2.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1.43 **"CPR Rules"** has the meaning set forth in Section 16.3.

1.44 **"Cure Period"** has the meaning set forth in Section 15.2.1.

1.45 **"Currency Hedge Rate"** means the weighted average hedge rate to be used for local currency of each country, other than the United States, of the Territory as calculated by Janssen's Affiliate Johnson & Johnson based on the outstanding external foreign currency forward hedge contract(s) of Johnson & Johnson's Global Treasury Services Center (GTJRC) and its Affiliates with Third Party banks.

1.46 [Intentionally Left Blank]

1.47 **"Develop"** means any and all pre-clinical, clinical, and other activities to study a drug candidate or product and develop it toward Regulatory Approval (including any such activities conducted after such Regulatory Approval other than Post-Marketing Studies) for Commercialization, including toxicology and ADME tests, analytical method development, stability testing, process development and improvement, process validation, process scale-up prior to first Regulatory Approval, formulation development, delivery system development, quality assurance and quality control development, statistical analysis, pre- and post-approval clinical studies or trials, regulatory affairs, regulatory activities and manufacturing activities in support thereof. For clarity, the definition of "Development" shall include all activities under the Development Plan but exclude all Commercialization activities. **"Developing"**, **"Development"** and **"Development activities"** shall each have a correlative meaning.

1.48 **"Development Plan"** means the plan governing the Development of any Licensed Products which describes in reasonable detail the tasks and activities that Janssen is performing, and plans to perform, excluding costs estimates, in compliance with Commercially Reasonable Efforts to Develop Licensed Products and will contain a level of detail consistent with Janssen's development plans for its similar products at similar stages of development.

1.49 **"Dispute"** means any dispute, claim, or controversy arising from or regarding this Agreement, including the interpretation, application, breach, termination, or validity of any provision hereof. For the avoidance of doubt, any matter within the decision-making authority of the JSC shall not be deemed a Dispute merely if a unanimous decision cannot be reached if one of the Parties has the final decision making authority on such matter; however, if a controversy between the Parties arises regarding the interpretation of any provisions hereunder pertaining to any JSC decision that cannot be made due to such controversy, such controversy shall be deemed a Dispute to the extent of such controversy.

1.50 **"Drug Application"** means an NDA, MAA, or equivalent application, submitted to a Regulatory Authority in a particular jurisdiction, for marketing approval of a pharmaceutical or drug product.

1.51 **"Drug Regulation Laws"** means Applicable Laws regulating drugs and pharmaceutical products, such as the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. § 301 *et. seq.*, the Prescription Drug Marketing Act of 1987, the Controlled Substances Act, 21 U.S.C. § 801 *et. seq.*, and policies issued by the FDA, each as in effect and as amended from time to time.

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1.52 **"Effective Date"** means the effective date of this Agreement, which shall be the date (following the Execution Date) that is the first Business Day immediately following the date on which the Parties have actual knowledge that all applicable waiting periods under the HSR Act with respect to the transactions contemplated hereunder have expired or have been terminated.

1.53 **"EMA"** means the European Medicines Agency or any successor agency for the EU.

1.54 **"European Union"** or **"EU"** means the countries of the European Economic Area, as it is constituted on the Effective Date and as it may be modified from time to time after the Effective Date.

1.55 **"Execution Date"** has the meaning set forth in the preamble above.

1.56 **"Executive Officers"** means (a) for Arrowhead, the Chief Executive Officer of Arrowhead and (b) for Janssen, (i) if a matter pertains to the Development of a Licensed Product, the Global Head of Janssen R&D or the Global Therapeutic Area R&D Head for Janssen Cardiovascular and Metabolism; (ii) if a matter pertains to the Commercialization of a Licensed Product, the Worldwide Chairman, Pharmaceuticals of Johnson & Johnson, the Head of the Global Commercial Strategic Organization or the Global Commercial Strategic Leader for Cardiovascular and Metabolism of Janssen; or (iii) if a matter pertains to the Manufacture of a Licensed Product, the Vice President of Janssen Supply Chain. In the event that the position of any of the Executive Officers identified in this Section no longer exists due to a corporate reorganization, corporate restructuring or the like that results in the elimination or modification of the identified position, the applicable Executive Officer shall be replaced with another senior officer with responsibilities and seniority comparable to the eliminated or modified position.

1.57 **"Exploit"** means to make, have made, import, use, sell or offer for sale, including to research, develop, commercialize, register, manufacture, have manufactured, hold or keep (whether for disposal or otherwise), have used, export, transport, distribute or have distributed by others, promote, market or have sold or otherwise dispose of, or have offered for sale, and convey or grant end-users use rights. **"Exploiting"** and **"Exploitation"** shall each have a correlative meaning.

1.58 **"FCPA"** means the U.S. Foreign Corrupt Practices Act (15 U.S.C. § 78dd-1 et. seq.), as may be amended at the relevant time.

1.59 **"FDA"** means the United States Food and Drug Administration or any successor agency thereto for the United States.

1.60 **"Field"** means all therapeutic, prophylactic and diagnostic uses in humans or animals.

1.61 "**First Commercial Sale**" means, with respect to a given Licensed Product in a country, the first commercial sale for monetary value in an arms-length transaction of such Licensed Product to a Third Party purchaser by or on behalf of a Party, its Affiliate or its Third Party sublicensee in such country following receipt of applicable Regulatory Approval of such Licensed

Product in such country; provided, however, that First Commercial Sale shall not include any transfer of a Licensed Product (a) between or among a Party and its Affiliates or Third Party sublicensees (such as contract manufacturers, suppliers, or distributors for consignment, where such transfer is not a transfer to a wholesaler or retailer) or (b) for purposes of patient assistance or for use in a clinical trial.

1.62 **"FTE"** means the equivalent of the work of one qualified employee or agent for the applicable activities, full time, for one year (constituting [**] working hours). For clarity, no more than [**] hours per year (or equivalent pro-rata portion thereof for a period less than 12 months) may be charged for an individual contributing work factoring into any reimbursable FTE Costs hereunder, regardless of how much additional work time is contributed by such individual during such period. An individual contributing work for less than [**] hours per year shall be deemed a fraction of an FTE on a pro-rata basis.

1.63 **"FTE Costs"** means the FTE Rate times the number of FTEs expended during the applicable financial period. The FTE Costs shall be determined based on time (as calculated in pro-rated FTEs) actually spent performing the applicable research and Development activities, unless another basis is expressly specified herein or otherwise agreed in advance by the Parties in writing.

1.64 **"FTE Rate"** means the monetary rate at which FTEs expended by a Party during the applicable financial reporting period will accrue toward such Party's FTE Costs hereunder. The Parties agree that the FTE Rate for research and Development work shall be [**] US dollars ($[**]) per allocable FTE. Each such FTE Rate shall be adjusted annually, based on changes in the Consumer Price Index (as quoted by the U.S. Department of Labor, Bureau of Labor Statistics) [**], with the first adjustment taking effect in the 2019 Janssen Calendar Year. Each Party acknowledges that the foregoing FTE Rate for research and Development work has been set to include all compensation, salary, employee benefits, routine supplies, and other expenses, including support staff and overhead for or directly allocable to an FTE.

1.65 **"G5 Countries"** means France, Germany, Italy, Spain and the United Kingdom.

1.66 **"GAAP"** means United States generally accepted accounting principles applied on a consistent basis.

1.67 **"General Arrowhead Patent Rights"** has the meaning as set forth in Section 10.3.3(b).

1.68 **"Generic Version"** means, with respect to a Licensed Product, a generic or follow-on version of such Licensed Product that has been approved in the relevant jurisdiction by the applicable Regulatory Authority under 21 USC § 505(j), 21 U.S.C. § 505(b)(2), 21 U.S.C. § 351(k) or any possible future abbreviated approval pathway in the US or a foreign equivalent thereof by referencing any NDA, supplemental NDA, MAA, supplemental MAA or foreign equivalent thereof for such Licensed Product.

1.69 **"Good Clinical Practice"** or **"GCP"** means the current standards for clinical studies for pharmaceutical and biologic products, as set forth in the ICH guidelines and applicable

regulations promulgated thereunder, as amended from time to time, and such standards of good clinical practice as are required by the European Union and other Governmental Authorities in countries in which a Licensed Product is intended to be sold to the extent such standards are not less stringent than United States Good Clinical Practice.

1.70 **"Good Laboratory Practice"** or **"GLP"** means the current standards for laboratory activities for pharmaceutical and biologic products, as set forth in the FDA's Good Laboratory Practice regulations or the Good Laboratory Practice principles of the Organization for Economic Co-Operation and Development, as amended from time to time, and such standards of good laboratory practice as are required by the European Union and other Governmental Authorities in countries in which a Licensed Product is intended to be sold, to the extent such standards are not less stringent than United States Good Laboratory Practice.

1.71 **"Good Manufacturing Practice"** or **"GMP"** means the current quality assurance standards that ensure that pharmaceutical and biologic products are consistently produced and controlled in accordance with the quality standards appropriate to their intended use as defined in 21 C.F.R. § 210 and 211, European Directive 2003/94/EC, Eudralex Volume 4 and applicable United States, European Union, Canadian and ICH guidance or equivalent laws in other jurisdictions to the extent no less stringent.

1.72 **"Government Health Care Programs"** means the US Medicare program (Title XVIII of the Social Security Act), the US Medicaid program (Title XIX of the Social Security Act), the TRICARE program, the US Federal employee health benefits program, and other foreign, federal, state and local governmental health care plans and programs.

1.73 **"Government Order"** means any order, writ, judgment, injunction, decree, stipulation, ruling, determination or award entered by or with any Governmental Authority.

1.74 **"Governmental Authority"** means any United States federal, state or local government or any government other than the United States government, or political subdivision thereof, or any multinational organization or authority to the extent empowered to act on behalf of or in the stead of a government, or any authority, agency, or commission entitled to exercise any administrative, executive, judicial, legislative, police, regulatory, pricing or taxing authority or power, any court or tribunal (or any department, bureau or division thereof), or any governmental arbitrator or government empowered arbitral body.

1.75 [Intentionally Left Blank]

1.76 [Intentionally Left Blank]

1.77 **"Health Care Laws"** means Applicable Laws relating to Government Health Care Programs, Private Health Care Plans, privacy and confidentiality of patient health information and human biological materials, including, in the United States, federal and state Applicable Laws pertaining to the federal Medicare and Medicaid programs (including the Medicaid rebate program); federal Applicable Laws pertaining to the Federal employees health benefit program and the TRICARE program; federal and state Applicable Laws applicable to health care fraud and abuse, kickbacks, physician self-referral and false claims (including 42 U.S.C. § 1320a-7a, 42

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U.S.C. § 1320a-7b, 42 U.S.C. § 1395nn and the federal Civil False Claims Act, 31 U.S.C. § 3729 *et. seq.*); the Health Insurance Portability and Accountability Act of 1996; and 45 C.F.R. Part 46, as well as similar Applicable Laws in the Territory, each as in effect and as amended from time to time.

1.78 **"HSR Act"** means the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, and the rules and regulations promulgated thereunder, or foreign equivalent thereof under Applicable Law.

1.79 **"HSR Clearance"** means, as pertaining to this Agreement, the expiration or termination of all applicable waiting periods and requests for information (and any extensions thereof) under the HSR Act.

1.80 **"HSR Filing"** means (a) filings by Janssen or Arrowhead with the United States Federal Trade Commission and the Antitrust Division of the United States Department of Justice of a Notification and Report Form for Certain Mergers and Acquisitions (as that term is defined in the HSR Act) with respect to the matters set forth in this Agreement, together with all required documentary attachments thereto, or (b) equivalent filings with applicable Governmental Authorities having jurisdiction over requests for HSR Clearance.

1.81 **"Hybridizing Strand"** means [**].

1.82 **"ICH"** means the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use.

1.83 **"IND"** means an Investigational New Drug Application filed with the FDA, or a similar application filed with a Regulatory Authority outside of the United States for authorization to commence a clinical study, such as a clinical trial application or a clinical trial exemption, or any related regulatory submission, license or authorization.

1.84 [Intentionally Left Blank]

1.85 **"Indemnified Party"** has the meaning set forth in Section 13.1.

1.86 **"Indemnified Persons"** shall mean, with respect to a Party, such Party and its Affiliates, and their respective officers, directors, employees, and agents.

1.87 **"Indemnifying Party"** has the meaning set forth in Section 13.1.

1.88 [Intentionally Left Blank].

1.89 **"In-Licensed Arrowhead Patent Rights"** has the meaning set forth in Section 12.5.3.

1.90 **"Invention"** has the meaning set forth in Section 10.2.1.

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1.91 **"Janssen Calendar Quarter"** means a financial quarter based on a Janssen Calendar Year; provided, however, that the first Janssen Calendar Quarter and the last Janssen Calendar Quarter may be partial quarters as applicable under the relevant Janssen Calendar Year.

1.92 **"Janssen Calendar Year"** means a year based on Janssen's universal calendar for that year used by Janssen for internal and external reporting purposes (a copy of which for the year 2018 is attached hereto as Exhibit F); provided, however, that the first Janssen Calendar Year and the last Janssen Calendar Year of the applicable period (such as the Royalty Term) may be a partial year as the case may be.

1.93 **"Joint Patent Rights"** shall mean Patent Rights owned jointly by the Parties and in which each Party has an equal and undivided interest.

1.94 **"Joint Steering Committee"** or **"JSC"** means a joint steering committee formed by representatives of each Party that is responsible for providing high-level oversight and decision-making regarding the Parties' activities under this Agreement, as further provided in Article III.

1.95 **"Know-How"** means any and all technical, scientific, and other know-how (whether or not patentable), data, and other information, as well as materials not generally known to the public, including inventions, trade secrets, research and development data, plans, procedures, experimental techniques, material specifications, and assay or test protocols; biological, chemical, pharmacological, toxicological, pharmaceutical, pre-clinical, clinical, safety, and quality control data and information; manufacturing methods and formulas; and molecules, chemical entities, reagents, starting materials, reaction intermediates, building blocks, synthetic products, delivery systems, excipients, ingredients, formulations, and compositions of matter.

1.96 **"Licensed Construct"** means [**].

1.97 **"Licensed Product"** means (a) any pharmaceutical formulation for administration to a subject comprising a Licensed Construct or (b) any Licensed Construct for formulation into such a pharmaceutical formulation.

1.98 **"Losses"** means damages, losses, liabilities, costs (including costs of investigation and defense), fines, penalties, Government Orders, taxes, expenses or amounts paid in settlement (in each case, including reasonable attorneys' and experts fees and expenses), resulting from a claim in an Action of a Third Party, and incurred by a Party (or other Indemnified Person as provided in Article XIII) as a result of such Action.

1.99 **"MAA"** means (a) a marketing authorization application filed with (i) the EMA under the centralized EMA filing procedure or (ii) a Regulatory Authority in any country in the European Union if the centralized EMA filing procedure is not used; or (b) any other equivalent or related regulatory submission, in either case to gain approval to market a pharmaceutical or biologic product in any country in the European Union, in each case including, for the avoidance of doubt, amendments thereto and supplemental applications.

1.100 **"Manufacturing"** means activities performed to manufacture a product into final form for end use, including producing and manufacturing starting materials and intermediates used

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to manufacture such product, filling, finishing, packaging, labeling, performing quality assurance testing and release, and shipping and storing the product.

1.101 **"MHLW"** means the Ministry of Health, Labour and Welfare of Japan and any successor agency thereto.

1.102 **"NDA"** means a new drug application or biologics license application submitted to the FDA for purposes of obtaining Regulatory Approval for a new drug in the United States, for a particular indication, including, for the avoidance of doubt, amendments thereto and supplemental applications.

1.103 **"Net Sales"** means, with respect to a Licensed Product commencing with its First Commercial Sale, the gross sales value of the Licensed Product by or on behalf of Janssen (directly or through any of its Affiliates or Third Party sublicensees) to a Third Party purchaser in an arms-length transaction, less the following customary deductions, determined in accordance with Accounting Standards and standard internal policies and procedures consistently applied throughout Janssen's organization to calculate revenue for financial reporting purposes, to the extent specifically and solely allocated to the sale of such Licensed Product to such purchaser and actually taken, paid, accrued, allowed, included, or allocated based on good faith estimate, in the gross sales prices with respect to such sales (and consistently applied as set forth below):

(a) normal and customary trade, cash and/or quantity discounts, allowances, wholesaler and pharmacy fees, and credits allowed or paid, in the form of deductions actually allowed or actually paid with respect to sales of such Licensed Product (to the extent not already reflected in the amount invoiced) excluding commissions for commercialization;

(b) excise taxes, use taxes, tariffs, sales taxes and customs duties, and/or other government charges imposed on the sale of such Licensed Product to the extent included in the price and separately itemized on the invoice price (but specifically excluding, for clarity, any income taxes assessed against the income arising from such sale) (including VAT, but only to the extent that such VAT taxes are not reimbursable or refundable);

(c) outbound freight, shipment and insurance costs to the extent included in the price and separately itemized on the invoice price;

(d) compulsory payments and cash rebates imposed on sales of such Licensed Product paid to a Governmental Authority (or agent thereof) pursuant to Applicable Law by reason of any national or local health insurance program or similar program, to the extent allowed and taken, including fees levied by a Governmental Authority as a result of Applicable Law;

(e) retroactive price reductions, credits or allowances actually granted upon rejections or returns of such Licensed Product, including for recalls or damaged goods and billing errors, and write-offs for bad debts;

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(f) rebates, charge backs and discounts (or equivalents thereof) actually granted to managed health care organizations, pharmacy benefit managers (or equivalents thereof), federal, state/provincial, local or other Government Authorities, or their agencies or purchasers, reimbursers, or trade customers; and

(g) coupons, or discount/rebates associated with co-pay cards.

All aforementioned deductions shall only be allowable to the extent they are commercially reasonable, and shall be determined, on a country-by-country basis, as incurred in the ordinary course of business in type and amount consistent with Janssen's, its Affiliate's, or sublicensee's (as the case may be) business practices consistently applied across its product lines and in compliance with Accounting Standards and verifiable. All such discounts, allowances, credits, rebates and other deductions shall be fairly and equitably allocated to such Licensed Product and other products of the Party and its Affiliates and sublicensees such that such Licensed Product does not bear a disproportionate portion of such deductions. For clarity, sales of a Licensed Product by and between a Party and its Affiliates and sublicensees (including those that are distributors), or between the Parties (or their respective Affiliates or sublicensees), shall be excluded from Net Sales calculations for all purposes so long as such Licensed Product is subsequently resold to a Third Party. For the avoidance of doubt, sales of a Licensed Product for use in conducting clinical trials of such Licensed Product in a country in order to obtain the first Regulatory Approval of such Licensed Product in such country shall be excluded from Net Sales calculations for all purposes. Also, notwithstanding anything to the contrary above, sales of a Licensed Product for any compassionate use or named patient sales shall be excluded from Net Sales calculations to the extent such sales are not reported as revenue by Janssen and its Affiliates. Additionally, for clarity, only a single sales transaction with respect to a particular unit of Licensed Product, made at the time Janssen or any of its Affiliates or sublicensees sells such Licensed Product to a Third Party purchaser in an arms-length transaction, will qualify as the basis for determining the Net Sales amount for such unit. The calculation of Net Sales for any Combination Product shall be adjusted pursuant to Section 8.5.5(c).

1.104 [Intentionally Left Blank]

1.105 **"Non-Breaching Party"** has the meaning set forth in Section 15.2.1.

1.106 **"Notice of Claim"** has the meaning set forth in Section 13.2.1.

1.107 [Intentionally Left Blank]

1.108 [Intentionally Left Blank]

1.109 [Intentionally Left Blank]

1.110 [Intentionally Left Blank]

1.111 [Intentionally Left Blank]

1.112 **"Out-of-Pocket Costs"** means, with respect to a Party, costs and expenses paid by such Party to any Third Party for services or materials provided by such Third Party to directly

support the applicable Collaboration activities, including the Research Plan. For clarity, Out-of-Pocket Costs do not include payments for a Parties' or its Affiliates' internal salaries or benefits, facilities, utilities, general office or facility supplies, insurance or information technology, capital expenditures or the like.

1.113 **"Owned General Arrowhead Patent Rights"** has the meaning set forth in Section 12.5.3.

1.114 **"Owned Specific Arrowhead Patent Rights"** has the meaning set forth in Section 12.5.3.

1.115 **"Party"** and **"Parties"** have the meaning set forth in the preamble above.

1.116 **"Patent Controversy"** means any Dispute between the Parties to the extent that it involves an issue relating to the inventorship, claim scope or interpretation, infringement, enforceability, patentability, or validity of any Patent Right hereunder, and including any such issues relevant to any Prosecution activities hereunder.

1.117 **"Patent Costs"** means all Out-of-Pocket Costs reasonably incurred by or on behalf of a Party (such as by a designated Affiliate) in Prosecuting applicable Patent Rights.

1.118 **"Patent Office"** means the United States Patent and Trademark Office, European Patent Office, or other Governmental Authority responsible for the examination of patent applications or granting of patents in a country, region, or supra-national jurisdiction.

1.119 **"Patent Representative"** means the patent attorney or agent representing a Party as described in Section 10.7.

1.120 **"Patent Rights"** means, in reference to a designated invention, all original (priority establishing) patent applications claiming such invention filed anywhere in the world, including provisionals and nonprovisionals, and all related applications thereafter filed, including any continuations, continuations-in-part, divisionals, or substitute applications, any patents issued or granted from any such patent applications, and any reissues, reexaminations, renewals or extensions (including by virtue of any supplementary protection certificates) of any such patents, and any confirmation patents or registration patents or patents of addition based on any such patents, and all foreign counterparts or equivalents of any of the foregoing.

1.121 **"Patent Term Extension"** means an extension of the term of any issued patent, or a right of protection equivalent to such an extension, granted under law or regulation such as the U.S. Drug Price Competition and Patent Term Restoration Act of 1984 in the United States, the Supplementary Protection Certificate of the member states of the EU, or any other similar law or regulation in any other country or jurisdiction. For example, a pediatric extension obtained by application to or through approval of a Patent Office extending the term of any patent shall be deemed a Patent Term Extension.

1.122 **"Patent Working Group"** means the representatives of both Parties involved in handling certain patent matters as more fully set forth in Section 10.7.

1.123 **"Person"** means any individual, entity or Governmental Authority.

1.124 **"Phase 1"** means, in reference to a clinical study (or trial) of a Licensed Product, that as described in US federal regulation 21 C.F.R. § 312.21(a).

1.125 **"Phase I Ready Data"** means the data that is required to make a determination of whether a product is suitable to enter Phase I clinical development in respect to a Target which on a Target-by-Target basis is specified in Section 4.1.4.

1.126 **"Phase 1 Ready Package"** means a data package containing all material Know How, including completed Phase I Ready Data and the chemical structures and sequences, related to a particular Licensed Construct or Licensed Product, and a summary of key data, including the chemical structures and sequences, relating to other significant Licensed Constructs and Licensed Products for a Program.

1.127 **"Phase 2"** means, in reference to a clinical study (or trial) of a Licensed Product, that as described in US federal regulation 21 C.F.R. § 312.21(b).

1.128 **"Phase 3"** means, in reference to a clinical study (or trial) of a Licensed Product, that as described in US federal regulation 21 C.F.R. § 312.21(c).

1.129 **"Post-Marketing Studies"** means any clinical trials or studies conducted with a Licensed Product after receipt of Regulatory Approval of the Licensed Product, which are conducted voluntarily in order to enhance marketing or scientific knowledge of the Licensed Product and are not required by Regulatory Authorities or are not intended to support Regulatory Approval of a Licensed Product for a new indication or other material change to the product label.

1.130 **"Pre-Existing Acquired Rights from Third Parties"** means any and all agreements by and between Arrowhead and any Third Party, in effect as of the Target acceptance under Section 4.1.2, and pursuant to which the Third Party assigns (by express terms, whether or not using the word "assign") Arrowhead any Third Party's Patent Rights or Know-How that, in whole or in part, are necessary or useful for Developing, Manufacturing, or Commercializing any Licensed Product.

1.131 **"Pre-Existing Licenses from Third Parties**" means any and all agreements by and between Arrowhead and any Third Party, in effect as of the Target acceptance under Section 4.1.2, and pursuant to which the Third Party grants (by express terms, whether or not using the word "license") Arrowhead any license or sublicense (or use or other Exploitation) rights to or under any Third Party's Patent Rights or Know-How that, in whole or in part, are necessary or useful for Developing, Manufacturing, or Commercializing any Licensed Product.

1.132 **"Pre-Existing Licenses to Third Parties"** means any and all agreements by and between Arrowhead and any Third Party, in effect as of the Target acceptance under Section 4.1.2, and pursuant to which Arrowhead or its Affiliates grants (by express terms, whether or not using the word "license") such Third Party any license or sublicense (or use or other Exploitation) rights to or under any Arrowhead Intellectual Property.

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1.133 "Pre-Existing Third Party Agreements" means (a) Pre-Existing Licenses to Third Parties; (b) Pre-Existing Licenses from Third Parties; (c) Pre-Existing Acquired Rights from Third Parties; and (d) any other agreements between Arrowhead or its Affiliates and a Third Party in effect as of the Target acceptance under Section 4.1.2 that contain any terms relating to the Development, Manufacture, or Commercialization of a Licensed Product or any Licensed Construct (collectively, the **"Additional Pre-Existing Third Party Agreements"**).

1.134 "Primary RNAi Trigger" means [**].

1.135 "Prior CDA" means the Confidential Disclosure Agreement entered into on January 25, 2017 between Arrowhead and Alios Biopharma, Inc., an Affiliate of Janssen.

1.136 "Private Health Care Plans" means non-governmental Third Party health care payors and plans, including insurance companies, health maintenance organizations and other managed care organizations, Blue Cross and Blue Shield plans, and self-funded employers.

1.137 "Product Infringement" has the meaning set forth in Section 10.4.2.

1.138 "Product Trademark Rights" means any Trademark Rights pertaining specifically to any Licensed Product and Controlled by a Party hereunder.

1.139 "Program" means, with reference to a Target, the Know How, Patent Rights, Research Plan, RNAi Triggers, Constructs, Licensed Products, Development Plan, Regulatory Filings, Regulatory Approvals, Trademarks, Commercialization Plans, and all activities related thereto, and all licenses and rights therein, directed to or associated with the exploitation of the Constructs and Licensed Products that are identified as such based on such Target.

1.140 "Prophylactically Active Product" means a product that prevents any disease, condition or symptom associated with or induced by action on the Target in humans or animals.

1.141 "Prosecuting" means, in reference to a designated Patent Right, preparing a Patent Right in application form for filing in any Patent Office, or performing activities associated with filing, prosecuting, maintaining, defending, or correcting the Patent Right in any Patent Office proceeding or with appeal of a Patent Office decision therefrom, including with respect to any post-grant proceeding, supplemental examination, post-grant review, *inter partes* review, reexamination, reissue, interference, or opposition proceeding in any Patent Office. For the avoidance of doubt, Prosecuting excludes any infringement suit or other legal Action to enforce a Patent Right or declaratory judgment suit or other legal Action initiated by a Third Party to challenge in court the validity or enforceability of a Patent Right. **"Prosecute"** and **"Prosecution"** shall each have a correlative meaning.

1.142 "Prosecuting Party" means the Party with the current right to Prosecute the applicable Patent Right as set forth in Section 10.3.

1.143 "Prosecution Contact" means a Party's designated patent attorney or agent identified in a notice to the other Party (as may be updated from time to time) as its contact for communications between the Parties regarding the Prosecuting of any Arrowhead Patent Rights.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

1.144 **"Regulatory Approval"** means the approval (including supplements, amendments, pre- and post-approvals), license, registration or authorization of the applicable Regulatory Authority necessary for the marketing and sale of drug product in a country or jurisdiction, including any and all pricing and reimbursement approvals that are reasonably necessary or desirable to obtain in such country or jurisdiction to launch a drug product (even if such approvals are not legally required to launch such drug product in such country or jurisdiction). For purposes of illustration, in addition to approval of a Drug Application: Regulatory Approval in France includes approval of a Drug Application and publication of the reimbursed price level in the official journal and registration on a reimbursement list by or on behalf of Comité Economique des Produits de Santé or Haute Autorité de Santé (or a successor agency); Regulatory Approval in Italy includes publication of reimbursement in the Government's Offical Gazette (by Agenzia Italiana del Farmaco or a successor agency); Regulatory Approval in Germany includes execution of contract with the head association of sick funds (GKV-Spitzenverband, Gesetzlichen Krankenversicherung, or a successor agency); Regulatory Approval in Spain includes authorization by La Comisión Interministerial de Precios de los Medicamentos or La Comisión Nacional para el Uso Racional de los Medicamentos, or a successor agency) for national patient access to reimbursement by or on behalf of a Governmental Authority; and Regulatory Approval in the United Kingdom includes approval by the National Institute for Health and Care Excellence (or a successor agency) to obtain mandatory funding to enable broad market access.

1.145 **"Regulatory Authority"** means any federal, national, multinational, state, provincial or local regulatory agency, department, bureau or other governmental entity with authority over the registration or authorization or marketing and sale of a medicinal product in a country, such as the FDA in the United States, EMA in the EU, and MHLW in Japan.

1.146 **"Regulatory Exclusivity Right"** means a right or protection, granted by a Regulatory Authority in a jurisdiction, providing with respect to a product in such jurisdiction: (a) marketing exclusivity that prevents the Regulatory Authority from accepting or approving a Drug Application (whether new or abbreviated), submitted by a Person other than Janssen (or any of its Affiliates or Third Party sublicensees), such as through new molecular entity or orphan drug exclusivity granted by the FDA, or an exclusive right to sell pursuant to the data exclusivity provisions under EC Directives 2004/27/EC and 2001/83/EC and Regulation 726/2004/EC, or marketing exclusivity granted in respect of pediatric studies under Regulation 1901/2006, or Section 505A(a) of the FD&C Act; or (b) data protection for regulatory data submitted by or on behalf of a Party or its Affiliates relating to a product against unfair commercial use or public release consistent with, or no less stringent than, TRIPs Article 39.3.

1.147 **"Regulatory Filing"** means any documentation comprising or relating to or supporting any filing or application with any Regulatory Authority with respect to a Licensed Product, or its use or potential or investigative use in humans, including any documents submitted to any Regulatory Authority and all supporting data, including INDs, supportive documents enabling a clinical program, Drug Applications, safety and adverse event reports and all correspondence with any Regulatory Authority with respect to any Licensed Product (including minutes of any meetings, telephone conferences or discussions with any Regulatory Authority).

1.148 **"Relevant Factors"** means all relevant factors that may affect the Development, Regulatory Approval, Manufacturing or Commercialization of a Licensed Product, including (as

applicable): actual and potential issues of safety, tolerability, efficacy or stability; expected and actual product profile (including product modality, category and mechanism of action), as such or in comparison with the profile of other products and regimens; stage of development or life cycle status; actual and projected Development, Regulatory Approval, Manufacturing, and Commercialization costs, timelines and budgets; any issues regarding the Manufacturing of the Licensed Product; the likelihood of obtaining Regulatory Approvals for such Licensed Product; the timing of such Regulatory Approvals; the current guidance and requirements for Regulatory Approval for such Licensed Product and similar products and the current and projected regulatory status; labeling or anticipated labeling for such Licensed Product; the then current competitive environment and the likely competitive environment at the time of projected entry into the market; past performance of such Licensed Product or similar products; present and future market potential, as such or taking into account the relevant portfolio or pipeline; present and future relevant patient population; existing or projected pricing, sales, reimbursement, return on investment and profitability; pricing or reimbursement changes in relevant countries; proprietary position, strength and duration of patent protection, anticipated exclusivity and freedom to operate hurdles; legal issues; and other relevant scientific, technical, operational, commercial or economic factors.

1.149 **"Research Period"** means, with respect to a Program, the period commencing upon the JSC's approval of the initial Research Plan and ending on the second anniversary of such approval, unless earlier terminated or extended in accordance with the provisions of this Agreement.

1.150 **"Research Plan"** means, with respect to a Target, a two (2) year written plan of goals, activities, FTEs, and costs associated therewith as approved by the JSC.

1.151 **"Research Plan Budget"** shall mean the budget for conducting activities pursuant to the Research Plan during a given Janssen Calendar Year and the one (1) succeeding Janssen Calendar Year, as developed and approved by the JSC in accordance with Section 3.2, which budget shall be updated and amended concurrently with the Research Plan in accordance with Section 4.3.

1.152 **"Research Plan Costs"** shall mean FTE Costs and Out-of-Pocket Costs incurred by the Parties and their Affiliates following the Effective Date for research and Development, in each case to the extent incurred under the Research Plan in accordance with the Research Plan Budget

1.153 **"Right of Reference"** has the meaning set forth for such term in 21 C.F.R. § 314.3(b) or an equivalent right of access or reference under any Applicable Law in any other jurisdiction outside the United States.

1.154 "**RNAi Trigger**" [**].

1.155 **"Royalty Term"**, as applicable to Net Sales of each particular Licensed Product in a given country, means the period from the date of the First Commercial Sale of such particular Licensed Product by or on behalf of Janssen in the given country, until the later of (a) the expiration of the last Valid Claim of the Arrowhead Patent Rights which Covers the composition of matter

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of the Licensed Construct or its Primary RNAi Trigger or its Targeting Ligand of such Licensed Product in such country; or (b) the termination or expiration of Regulatory Exclusivity Rights protecting the Licensed Product in such country; or (c) [**] from the date of First Commercial Sale in the Territory.

1.156 **"Specific Arrowhead Patent Rights"** has the meaning as set forth in Section 10.3.3(a).

1.157 **"Target"** means a target chosen by the Parties in accordance with Section 4.1.2**.**

1.158 **"Targeting Ligand"** means [**].

1.159 **"Taxes"** means any present or future taxes, levies, imposts, duties, charges, assessments or fees of any nature (including any interest thereon).

1.160 **"Term"** means the term of this Agreement as set forth in Section 15.1.

1.161 **"Territory"** means the entire world, including all of its countries and their possessions and territories.

1.162 **"Third Party" or "Third-Party"** means any person, entity, or other party other than a Party to this Agreement or any of its Affiliates.

1.163 **"Third-Party Product Liability Action"** has the meaning set forth in Section 13.4.1.

1.164 **"Threshold Active Construct"** means [**].

1.165 "**Threshold Activity**" means [**].

1.166 **"Trademark Rights"** means all registered and unregistered trademarks (including all common law rights thereto), service marks, trade names, brand names, logos, taglines, slogans, certification marks, internet domain names, trade dress, corporate names, business names and other indicia of origin, together with the goodwill associated with any of the foregoing, and all applications, registrations, extensions, and renewals thereof throughout the world, and all rights therein provided by international treaties and conventions.

1.167 **"United States"**, **"US"** or **"U.S."** means the United States of America, including its territories and possessions.

1.168 **"Valid Claim"** means a claim (a) of any unexpired patent issued or granted by a Patent Office that has not been revoked or held unenforceable or invalid by a decision of a court or Governmental Authority of competent jurisdiction from which no appeal can be taken, or with respect to which an appeal is not taken within the time allowed for appeal, and that has not been disclaimed or admitted to be invalid or unenforceable through reissue, disclaimer, or otherwise, or (b) of any Patent Right that is being prosecuted in good faith and has not been abandoned or finally disallowed without the possibility of appeal or re-filing of the application and has been pending for less than [**].

1.169 **"Variant"** means [**].

ARTICLE II: LICENSE GRANTS

2.1 **Janssen Rights**.

2.1.1 JANSSEN'S RIGHTS TO EXPLOIT LICENSED CONSTRUCTS OR LICENSED PRODUCTS, AND OBLIGATIONS OF PAYMENT THEREFORE UNDER THE PROVISIONS IN SECTION 2.1.2(B), ARTICLES V, VI, AND VIII, SHALL BE CONDITIONAL AND CONTINGENT ON JANSSEN'S PAYMENT OF THE OPTION EXERCISE FEE FOR THE APPLICABLE PROGRAM, AS WELL AS ANY OTHER PROVISIONS THAT, AS APPARENT FROM THEIR NATURE AND CONTEXT, ARE INTENDED TO BECOME EFFECTIVE AFTER SUCH PAYMENT.

2.1.2 **Arrowhead Development and Commercial Licenses**.

(a) Development License. Subject to the terms and conditions of this Agreement, Arrowhead hereby grants to Janssen an exclusive (even as to Arrowhead, except to the extent Arrowhead expressly retains or is expressly granted back rights under this Agreement), worldwide license, with the right to sublicense in accordance with Section 2.1.4, under Arrowhead Intellectual Property, to research and have researched, and to Develop and have Developed Licensed Constructs and Licensed Products, in the Field in the Territory, and to make and Manufacture, have made and Manufactured, use, have used, and import and have imported Licensed Constructs and Licensed Products for such purposes. The license rights granted under this Section 2.1.2 shall commence, on a Program-by-Program basis, when Arrowhead provides Janssen with a Target Reply accepting a Target, and run throughout the Term hereof, subject to the termination provisions under Article XV.

(b) Commercialization License. Subject to the terms and conditions of this Agreement, Arrowhead hereby grants to Janssen an exclusive (even as to Arrowhead, except to the extent Arrowhead expressly retains or is expressly granted back rights under this Agreement), worldwide license, with the right to sublicense in accordance with Section 2.1.4, under the Arrowhead Intellectual Property, to Commercialize and have Commercialized, offer for sale and sell, and have offered for sale and sold, Licensed Constructs and Licensed Products, for use in the Field in the Territory, and to make, have made, use, have used, and import and have imported Licensed Constructs and Licensed Products for such purposes. The license rights granted under this Section 2.1.2 shall continue, on a product-by-product and country-by-country basis, throughout the Term hereof, subject to the termination provisions under Article XV.

2.1.3 **Know-How Cross-License**. Subject to the terms and conditions of this Agreement:

(a) Arrowhead hereby grants to Janssen a royalty-free, perpetual, non-exclusive license to use any Confidential Information that is Arrowhead Know-How and disclosed by Arrowhead to Janssen under this Agreement for any purpose other than the Exploitation of a Licensed Construct or Licensed Product, except such Confidential Information comprising Know-How related solely to the Arrowhead Platform Technology.

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(b) Janssen hereby grants to Arrowhead a royalty-free, perpetual, non-exclusive license to use any Confidential Information that is Janssen Know-How disclosed by Janssen to Arrowhead under this Agreement for any purpose other than the Exploitation of a Licensed Construct or Licensed Product, except such Confidential Information comprising (a) Know-How related to Active Ingredients, other than Licensed Constructs or (b) financial and sales data and pricing information relating to Licensed Constructs or Licensed Products.

2.1.4 Sublicensing. In the event that Janssen grants any sublicense of the license rights granted to Janssen under this Section 2.1 to any Affiliates or any Third Parties, Janssen shall remain responsible for its obligations under this Agreement and shall be responsible for the performance of the relevant sublicensee and the compliance by such sublicensee with the terms and conditions of this Agreement. Any sublicense granted by Janssen under this Section 2.1 to any Third Party not working under Janssen's or its Affiliates' control and direction shall refer to this Agreement and shall not conflict with Janssen's obligations under this Agreement, and Janssen will, within a reasonable time period after granting such sublicense, provide a copy of the sublicensing agreement to Arrowhead, which agreement may be redacted to omit any terms not relevant to determining Janssen's and the Third Party sublicensee's obligations under this Agreement.

2.2 Licenses Constitute IP under Bankruptcy Code. All rights and licenses granted under or pursuant to any section of this Agreement by one Party to the other, including Section 2.1 hereof, are, and shall otherwise be deemed to be, for the purpose of Section 365(n) of the Bankruptcy Code (or comparable provisions of laws of other jurisdictions) rights to "intellectual property" as defined in Section 101(35A) of the Bankruptcy Code (or comparable provisions of laws of other jurisdictions). Each Party hereby acknowledges, on behalf of itself and its Affiliates, "embodiments" of intellectual property pursuant to the Bankruptcy Code include the following: (a) data from the research and Development of Licensed Products, (b) Licensed Constructs and Licensed Product samples and inventory, (c) Licensed Product formulations, (d) laboratory notebooks and records from either Party's research relating to any Licensed Constructs or Licensed Product, including from the Clinical Plan or Development Plan, (e) results from clinical studies of Licensed Products and the Licensed Constructs therein, (f) Regulatory Filings and Regulatory Approvals relating to Licensed Products, and (g) marketing, advertising and promotional materials relating to Licensed Products.

2.3 Rights in Combination Products. Notwithstanding the terms of any license grant or covenant under this Agreement, no rights will be conveyed or granted by one Party to another hereunder to (a) an Active Ingredient of any Combination Product, whether in Development or Commercialized, where the Active Ingredient is not a Licensed Construct, (b) a product of such Combination Product that is not a Licensed Product, or (c) an Active Ingredient, other than a Licensed Construct, that is otherwise used in combination with a Licensed Product in pre-clinical research, clinical studies or in accordance with an approved product label.

2.4 No Other Rights. No rights other than those expressly set forth in this Agreement are granted by one Party to the other Party hereunder, and no additional rights shall be deemed granted to either Party by implication, estoppel, or otherwise, with respect to any Patent Rights, Know-How, or other intellectual property rights.

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ARTICLE III: GOVERNANCE

3.1 Establishment of JSC. Promptly after the Effective Date, the Parties shall establish a Joint Steering Committee (JSC) composed of [**] representatives from Arrowhead and [**] representatives from Janssen (which, for clarity, may include any employees or agents of its Affiliates). The members of the JSC shall be appropriately qualified and experienced in order to make a meaningful contribution to meetings and render decisions within its scope of authority hereunder. Each Party may replace its representatives on the JSC by written notice to the other Party.

3.2 JSC Responsibilities. The JSC shall, subject to Section 3.7, have authority to:

3.2.1 approve the Research Plan for each Target;

3.2.2 approve the Research Plan Budget for each Target;

3.2.3 review and approve any amendments to the Research Plans;

3.2.4 set and modify the Threshold Activity for each Target;

3.2.5 review the efforts of and make recommendations to the Parties in the conduct of the Programs;

3.2.6 periodically review the overall goals and results of the Programs, and approve any proposed changes to the Research Plans as relevant data become available;

3.2.7 establish subcommittees or working groups to oversee the day-to-day activities under the Research Plan;

3.2.8 address such other matters relating to the activities of the Program as either Party may bring before the JSC; and

3.2.9 attempt to resolve any disputes on an informal basis.

3.3 Patent Working Group. The JSC shall not discuss any issue relating to any Patent Rights relevant to the research, Development, Manufacture, or Commercialization of any Licensed Products (including with respect to any of their scope, patentability, validity, Prosecution, or infringement), unless the Patent Representative of each Party is present at the meeting. The Patent Representatives of each Party shall be solely responsible for documenting at its discretion any issues discussed by the JSC relating to any Patent Rights, and the content of such discussions shall be held in strict confidence by the Parties to protect their common interests and preserve the privileged status of any attorney-client communication, advice, or legal opinion reflected therein.

3.4 JSC Meetings. The JSC shall meet quarterly until the termination of the last Research Period, or at such other times as the Parties may agree. The first meeting of the JSC shall be held as soon as reasonably practicable, but in no event later than sixty (60) days after the Effective Date. Meetings shall be held at such place or places as are mutually agreed or by

teleconference or videoconference, provided that at least the quorum members of each Party are present at any JSC meeting. Each Party may from time to time invite a reasonable number of participants in addition to its representatives on the JSC (such as Patent Working Committee members) to attend any JSC meeting, which additional participants shall not be members and shall attend the JSC meeting on an ad hoc basis in a non-voting capacity. The JSC meetings shall be chaired by Janssen. The chairperson shall set and circulate to all JSC members agendas for JSC meetings in advance. The agendas shall include any matter within the authority of the JSC hereunder reasonably requested by Arrowhead to be addressed. The Parties shall rotate the responsibility for recording, preparing and, within a reasonable time, issuing draft minutes of each JSC meeting to each Party's members for review, and the chairperson shall issue to the Parties final minutes signed or otherwise approved in writing (such as via an electronic signature) by a Janssen JSC representative and an Arrowhead JSC representative.

3.5 **Meeting Expenses**. Each Party shall bear its own costs, including travel expenses, incurred by its JSC members, any additional non-member JSC participants of such Party and Patent Working Group members in connection with their attendance at JSC meetings or Patent Working Group meetings and other activities related to the JSC or Patent Working Group.

3.6 **Decision-making**. Decisions of the JSC within its scope of authority hereunder shall be made by unanimous vote, with Janssen's representatives to the JSC collectively having one (1) vote and Arrowhead's representatives to the JSC collectively having one (1) vote. Decisions of the JSC shall be memorialized in its meeting minutes. If the JSC fails to reach unanimous decision on a matter within its authority that has been pending in excess of thirty (30) days (or such other period as the Parties may agree in writing), the matter shall be referred to applicable Executive Officers of the Parties, who shall attempt to reach a mutual decision. In the event that the Executive Officers cannot reach a mutual decision with regard to such matter, then Janssen shall have the deciding vote, subject to Arrowhead's right to reject a proposed target under 4.1.2, and of good faith negotiations under 4.1.3 and 4.1.4.

3.7 **Prosecution of Patent Rights Governed by Article X.** For clarity and notwithstanding any other provision of this Agreement to the contrary, decisions regarding the Prosecution of any Patent Rights shall not be within the JSC's authority, and the provisions of Article X of this Agreement shall govern Prosecution of certain Patent Rights.

3.8 **No Authority to Modify Agreement**. For clarity and notwithstanding anything to the contrary herein, neither the JSC nor the Patent Working Group shall have any authority to: (a) modify any provision set forth in the body of this Agreement, including any payment conditions or terms or obligations of the Parties, which provisions may be modified only by written agreement of the Parties; or (b) resolve any Disputes.

3.9 **Alliance Managers**. Each Party shall designate a single alliance manager for coordinating interactions between the Parties regarding any activities contemplated under this Agreement ("Alliance Manager"). Such Alliance Managers will be responsible for the day-to-day worldwide coordination of the Parties' activities under this Agreement and will serve to facilitate routine communication between the Parties. Such Alliance Managers shall have

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experience and knowledge appropriate for managers with such project management responsibilities. Each Party may change its designated Alliance Manager from time to time upon written notice to the other Party.

3.10 JSC dissolution. [**] from expiration of the last to expire Research Period, the JSC shall be dissolved. For clarity, after JSC dissolution, matters of coordination between the Parties will be handled by the Alliance Managers.

ARTICLE IV: RESEARCH PROGRAM

4.1 Selection of Targets

4.1.1 Janssen shall have the right to select up to three (3) targets as Targets under this Agreement at any time up to the [**] anniversary of the Effective Date. Such targets shall be RNA targets through which an existing or proposed RNAi therapeutic mediates or is intended to mediate its therapeutic activity. At least one of the selected Targets will be a hepatocyte target.

4.1.2 Within [**] from the Effective Date, Janssen will send a written notice to Arrowhead identifying a first proposed target (a "Target Proposal"). Arrowhead shall have [**] after receiving a Target Proposal to provide written notice to Janssen of whether Arrowhead accepts or rejects the proposed target (a "Target Reply"). Arrowhead may reject a proposed target only if: (i) Arrowhead is subject to a legally binding agreement that would prevent or prohibit Arrowhead from performing its obligations under the Agreement with respect to such proposed target (including, but not limited to, obligations of confidentiality and interest in any intellectual property rights as contemplated by this Agreement) or has, before the date of the Target Proposal, agreed to non-binding terms with a Third Party to develop a compound directed to such proposed target; (ii) subject to Section 8.6.2, Arrowhead's rights in the exploitation of such target and products directed thereto is subject to a substantial future royalty and/or milestone obligation under any Pre-Existing Licenses from Third Parties or other Pre-Existing Third Party Agreements; (iii) Arrowhead has an ongoing internal program directed to such proposed target for which Arrowhead has identified active compounds and has conducted higher mammal (i.e., non-rodent) animal studies with respect to such compounds before the date of receipt of the Target Proposal; or (iv) Arrowhead reasonably concludes, based on the advice of its patent counsel, that Arrowhead would not have freedom to operate with the proposed target due to the existence of any Third Party Patent Rights, provided, however, that Arrowhead shall have first consulted the JSC, in the presence of the Parties' Patent Representatives, to determine if there are any acceptable alternative forms of the proposed target. If Arrowhead provides Janssen a Target Reply rejecting a proposed target with sufficient basis, then such Target Proposal will be voided and Janssen may provide Arrowhead a substitute Target Proposal identifying an alternate proposed target in due course. If Arrowhead provides Janssen a Target Reply accepting a proposed target, then such proposed target will become a "**Target**". For clarity, Janssen may send Target Proposals to Arrowhead in the permitted time period until three (3) Targets have been selected.

4.1.3 Promptly, upon selection of a Target, the JSC will negotiate in good faith Target specific definitions of Assay and Threshold Activity.

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4.1.4 Promptly, upon selection of a Target, the JSC will negotiate in good faith Target specific details of the Research Plan and the Phase I Ready Data. The Research Plan shall include discovery research and pre-clinical activities to be undertaken by Arrowhead (and Janssen as applicable) designed to identify Licensed Constructs and Licensed Products, and to provide Phase I Ready Data for Licensed Products. Arrowhead may, in good faith, reject a Research Plan that is unreasonable, provided that once a Research Plan is agreed to, Arrowhead cannot thereafter reject such Research Plan. If the Parties, acting in good faith, are unable to agree to a reasonable Research Plan then the target will no longer be treated as a Target under this Agreement and will not be counted as one of Janssen's three (3) Targets. A general outline of an example of activities to be undertaken by each Party under the Research Plan is attached as Exhibit C.

4.1.5 Promptly upon the selection of a Target, the Parties will amend Exhibit E if applicable.

4.2 Research Obligations

4.2.1 Arrowhead agrees to follow the Research Plan. Consistent with the Research Plan, Arrowhead will use Commercially Reasonable Efforts to identify Licensed Constructs and Licensed Products and develop a License Product suitable to enter Phase I clinical development.

4.2.2 On a quarterly basis, during the Research Period, Arrowhead agrees to provide to the JSC a report of the significant results of activities conducted under the Research Plan, including a listing of RNAi Triggers and Constructs made and tested along with their key activity data. For clarity, the RNAi Triggers and Constructs will be identified by an Arrowhead numbering system and will not disclose specific chemistry or sequences.

4.2.3 Arrowhead shall conduct all research and Development activities under the Research Plan in accordance with good scientific standards and practices and in compliance with all Applicable Laws, including those pertaining to the use of laboratory animals, GLP, GMP or GCP as appropriate under the Research Plan. Arrowhead shall, and shall cause its Affiliates and subcontractors to, maintain complete and accurate records of all work conducted in the performance of the Research Plan and all results, data, inventions and developments made in the performance of the Research Plan.

4.2.4 Janssen may assist in the conduct of activities under the Research Plan, including performing certain assays to confirm RNAi Triggers and Constructs for activity against the applicable Target, and conducting preclinical animal model studies. Arrowhead shall provide Janssen with reasonable quantities of materials to enable Jansen's activities described in the Research Plan.

4.2.5 On a Program-by-Program basis and after [**] of the initiation of a Research Period, Janssen may, in its sole discretion, terminate all of the Parties' rights and obligations applicable to such Program under the Agreement upon [**] prior written notice. The Parties will cooperate to wind down the activities under the Program.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

4.3 Research Plan Budget

4.3.1 On a Program-by-Program basis, within [**] of selection of the Target, the JSC will establish the Research Plan Budget for the Target that will comprise an estimation of all of the applicable Research Plan Costs that can be reasonably estimated. This Research Plan Budget will be reviewed and updated semi-annually.

4.3.2 If any Research Plan Costs exceed the Research Plan Budget by greater than [**], these expenses will be covered by Arrowhead unless the JSC agrees to the overage.

4.4 Phase I Ready Package

4.4.1 **Delivery of Phase I Ready Package.** On a Program-by-Program basis, upon completion of Phase I Ready Data for a Licensed Construct or a Licensed Product, Arrowhead will provide Janssen with a Phase I Ready Package. Upon receipt of the Phase I Ready Package, Janssen shall have the longer of [**] to conduct further diligence relating to such Licensed Construct or Licensed Product. Arrowhead will promptly respond to any diligence requests by Janssen and provide any materials and data required by Janssen to conduct its diligence.

4.4.2 **Expiration of Research Period with No Phase I Ready Package.** On a Program-by Program basis, in the event that a Phase I Ready Package has not been provided to Janssen [**] prior to the end of the Research Period, then upon Janssen's request Arrowhead shall provide a summary of key data relating to significant Licensed Constructs and Licensed Products for the applicable Program, including the chemical structures and sequences. Janssen shall have a one time right, in its sole discretion to extend the initial Research Period for [**]. By mutual agreement, the Parties may extend the initial Research Period further than [**].

4.5 Option

4.5.1 **Arrowhead grant of Janssen Option Right.** On a Program-by-Program basis, Arrowhead grants to Janssen an option ("**Option Right**"), in [**], to assume all rights, including licenses, and obligations, including obligations of payment, as set forth under this Agreement as to such Program. Such Option Right may be exercised by Janssen at any time prior to the longer of [**], by delivering to Arrowhead the Option Notice, provided, that Janssen shall have until the end of the extended Research Period (if extended) to exercise the Option Right if Arrowhead has not delivered a Phase I Ready Package [**] prior to the end of the initial Research Period.

4.5.2 **Option Notice.** The option notice ("**Option Notice**") shall be a written notice stating Janssen's intent to exercise its Option Right. For clarity, after receipt of the Option Notice, Arrowhead will invoice Janssen for the Option Exercise Fee of Section 8.3.1 in accordance with Article VIII.

4.5.3 **Failure to Exercise.** If Janssen fails to provide the Option Notice to Arrowhead within the allowed period, then this Option Right will terminate with respect to the applicable Program, the Target will no longer be a Target under the Agreement, Janssen will

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have no further rights under this Agreement in the Program, and the Parties will work together to dissolve the Patent Working Group.

4.6 Effect of Option Exercise.

4.6.1 Upon delivery of the Option Notice to Arrowhead, the Parties will cooperate to ensure orderly transition of the Program to Janssen to provide uninterrupted development of the applicable Licensed Construct or Licensed Product. Arrowhead will make available to Janssen, at Janssen's reasonable request, any material information related to the Program. Notwithstanding any term of this Agreement to the contrary, Arrowhead shall not be obligated to disclose to Janssen its trade secrets. including information from which such trade secrets are likely to be elucidated, related solely to trigger selection or construct design.

ARTICLE V: DEVELOPMENT

5.1 Development Plan. Within [**] after payment of the Option Exercise Fee for a Program, Janssen shall submit to Arrowhead an initial annual Development Plan for Licensed Products and shall update such Development Plan at least once each year for such Program.

5.2 Diligence. On a Program-by-Program basis, Janssen shall have sole responsibility for the Development and registration (including clinical activities and submissions to Regulatory Authorities), of Licensed Constructs and Licensed Products, and for the costs associated therewith. Janssen shall use Commercially Reasonable Efforts to conduct pre-clinical and clinical development and registration necessary for approval of a first Licensed Product for a first indication in the US and the European Union.

5.3 Regulatory Activities. Janssen will be responsible for the submission of Regulatory Filings and hold the INDs relating to the Licensed Constructs and Licensed Products in the Territory. Janssen will be responsible for maintaining all Regulatory Filings including all INDs, for each Licensed Construct and/or Licensed Product in the Territory.

5.4 Assistance of Arrowhead. Arrowhead agrees to provide Janssen with all reasonable assistance and take all actions reasonably requested by Janssen that are necessary or desirable to enable Janssen to comply with any Law applicable to Licensed Construct or Licensed Products, including meeting, reporting and other obligations to file and maintain the INDs for Licensed Constructs or Licensed Products.

5.5 Use of Third Parties. Janssen may retain Third Parties to perform Development, subject to the terms provided in this Section. Janssen will remain liable for the performance of its obligations hereunder which it delegates to such Third Parties. [**].

5.6 Auditing.

5.6.1 Compliance Inspections. With respect to any facility or site at which Arrowhead, any of its Affiliates or its Third Party (sub)contractors conducts any Manufacturing, clinical or regulated (e.g., under GLP, GCP, or GMP) Development activities, including

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Manufacturing clinical supply for use in humans, pursuant to this Agreement, Janssen shall have the right, as permitted by and subject to the terms and conditions of any possible applicable agreement with a Third Party (sub)contractor or as otherwise expressly permitted by the applicable Third Party (sub)contractor, at its expense, upon reasonable written notice to Arrowhead (and if applicable, such Affiliate or Third Party (sub)contractor), and during normal business hours, to inspect such facility or site and any records relating thereto, once per year or more often with cause, to verify Arrowhead's compliance with the terms of this Agreement and with all Applicable Laws, including GLP, GCP, and GMP, and current standards for pharmacovigilance practice. Such inspection shall be subject to the confidentiality provisions set forth in Article XI. In the event that such inspection would result in the disclosure of confidential information which is not protected by the confidentiality provisions set forth in Article XI, an appropriate confidentiality agreement shall be entered into. After any such inspection, Janssen shall provide written observations to Arrowhead. In the event that non-compliance with the terms of this Agreement or with Applicable Laws were observed, Arrowhead shall promptly take or, as the case may be, use Commercially Reasonable Efforts to cause the applicable Third Party to promptly take the necessary actions to remediate such non-compliance and shall keep Janssen informed of such actions through the JSC. Arrowhead agrees to use Commercially Reasonable Efforts to include in any contract or other written arrangement with Third Party (sub)contractors Arrowhead determines are reasonably likely to conduct Manufacturing or Development activities related to this Agreement, a clause permitting Janssen to exercise its rights under this Section 5.6.1.

5.6.2 Regulatory Audits. Arrowhead shall cooperate in good faith in the event any Regulatory Authority inspects any site where clinical studies or Manufacturing of clinical supplies of Licensed Products are conducted by or on behalf of Arrowhead pursuant to this Agreement, whether such Audited Site is Arrowhead's or its Affiliate's or contractor's or subcontractor's hereunder, as permitted by and subject to the terms and conditions of any applicable agreement with a Third Party or as otherwise expressly permitted by the applicable Third Party. Arrowhead shall notify Janssen within [**] after receiving notification of any Regulatory Authority inspection, which relates to or reasonably could relate to the Licensed Product or clinical studies for the Licensed Product, at any site where clinical studies or Manufacturing of clinical supplies of Licensed Products are conducted. Taking into account the timing and notice provided by the applicable Regulatory Authority, and the terms of any applicable agreements with Third Parties and Applicable Law, Janssen shall be given a reasonable opportunity to assist in the preparation of the Audited Site for inspection, where appropriate, and to attend any inspection by any Regulatory Authority of the Audited Site, and the summary, or wrap-up, meeting with a Regulatory Authority at the conclusion of such inspection. If such attendance would result in the disclosure of Arrowhead's, its Affiliate's or a Third Party's confidential information unrelated to the subject matter of this Agreement, an appropriate confidentiality agreement covering such unrelated subject matter shall be entered into. In the event that any Audited Site is found to be non-compliant with one or more Applicable Laws, Good Laboratory Practice, Good Clinical Practice, Good Manufacturing Practice, or current standards for pharmacovigilance practice, Arrowhead shall, promptly and in any event within [**] after receiving notification of such non-compliance, submit to Janssen a CAPA plan and shall use Commercially Reasonable Efforts to cause such non-compliant Audited Site to implement such CAPA plan promptly after submission. Arrowhead agrees to use Commercially Reasonable Efforts to include in any agreement or other written arrangement entered into after the Effective

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Date with Third Party contractors or subcontractors (as the case may be) Arrowhead determines are reasonably likely to be applicable to this Agreement, a clause permitting Janssen to exercise its rights under this Section 5.6.2.

5.7Rights of Reference and Access to Data. Arrowhead hereby grants to Janssen, and Janssen shall have (directly and through its Affiliates), a Right of Reference with respect to INDs, drug master files, if any, and any other Regulatory Filings (whether made before or during the Term hereof) Controlled by Arrowhead related to any Licensed Products, for use by Janssen in Exploitation of its Development and Commercialization rights pursuant to this Agreement. Accordingly, Regulatory Authorities considering any Regulatory Filing relating to a Licensed Product being Developed hereunder shall be permitted to rely on and otherwise use the applicable information in such INDs or other Regulatory Filings. Arrowhead or its Affiliate shall provide a signed statement to this effect, if requested by Janssen, in accordance with 21 C.F.R. § 314.50(g)(3) or the equivalent as required in any other country or region of the world, or otherwise provide appropriate notification of such right of Janssen to the applicable Regulatory Authority. Janssen shall also have a right to review, access and request copies of such Regulatory Filings and any Know-How (including data) therein and use such Know-How in connection with the performance of Janssen's obligations and exercise of its rights under this Agreement, including inclusion of such Know-How in its own Regulatory Filings for Licensed Products.

5.8 Suspension of Clinical Study for Safety Reason. Notwithstanding anything to the contrary herein, if an independent safety board determines that any clinical study of a Licensed Product under the Development Plan would pose an unacceptable safety risk for any subjects or patients participating in such study, neither Party shall be obligated to continue such clinical study. Either Party may delay or suspend any Development activities with respect to an ongoing clinical study of a Licensed Product if such Party reasonably believes that such clinical study would pose an unacceptable safety risk.

5.9 Records.

5.9.1 Maintenance of Research Records. Each of the Parties shall maintain, or cause to be maintained, records of its respective Collaboration Activities in material compliance with Applicable Law (including the requirements of GCP, GLP and GMP, in each case to the extent applicable), and the requirements of its corporate records retention policies consistent therewith. Such records shall be complete and accurate and shall fully and properly reflect all work done and results achieved in the performance of the Collaboration Activities in a manner appropriate for any regulatory purpose and, when applicable and permitted under this Agreement, for use in connection with the Prosecution of Patent Rights. Such records shall be retained for the longer of either: (a) such period as is required by such retaining Party's corporate record retention policies; (b) such period as may be required by Applicable Law; or (c) the Term of this Agreement, unless a Party first offers to deliver such records to the other Party for its keeping, and delivers to such Party any records it may reasonably request, before destroying or disposing of such records.

5.9.2 Access to Records. Each Party shall have the right, at mutually agreed times during normal business hours on Business Days and upon reasonable notice, to obtain from the other Party access to and copies (at its own cost) of the records maintained by the other Party pursuant to Section 5.9.1 solely to the extent relating to any Licensed Product or any Development,

Manufacturing, or Commercialization activities hereunder or any intellectual property or associated rights licensed or obtained hereunder, to the extent useful or required to (a) enable the requesting Party to conduct reasonable diligence on matters potentially giving rise to liability on the part of the requesting Party according to Applicable Law or the requirements of this Agreement, or to conduct a defense of itself with respect to any such liability, if and to the extent that a fact, circumstance or event has arisen that gives the requesting Party a reasonable basis to believe that it has or may incur such liability; (b) to meet its obligations to Regulatory Authorities or to comply with Applicable Laws with respect to a Licensed Product; (c) to Prosecute or enforce any Patent Rights hereunder; or (d) to otherwise Exploit any rights hereunder.

5.10 Conditional Subcontracting. A Party may subcontract any of its research and Development activities hereunder to any Third Party, provided that such Party executes a written agreement with such Third Party subcontractor that contains, in all material respects, the applicable obligations and covenants hereunder. A Party engaging any subcontractor shall be responsible for the performance of the subcontractor, and hereby warrants its compliance with the material terms hereof.

ARTICLE VI: COMMERCIALIZATION

6.1 Diligence; Reports. Janssen shall have the sole responsibility for the Commercialization of Licensed Products, and for the costs associated with the Commercialization of the License Products. Janssen shall use Commercially Reasonable Efforts to Commercialize the first approved Licensed Product in the US and the G5 for the first approved indication. With respect to any Licensed Products for which marketing approval is granted, Janssen shall, to the extent permitted by Applicable Law, provide to Arrowhead a report on an annual basis summarizing, on a high level, its marketing plans for the Licensed Products in countries where approved, including medical affairs and marketing activities.

6.2 Trademarks and International Nonproprietary Names. Janssen (directly or through its Affiliates and sublicensees) shall select its own trademarks under which it will Commercialize Licensed Products hereunder and will own the Trademark Rights associated therewith. Janssen (directly or through its Affiliates and sublicensees) shall be solely responsible for the application for an international nonproprietary name in relation to any Licensed Product and for the resulting communication with the World Health Organization.

6.3 Conditional Subcontracting. Janssen may subcontract any of its Commercialization activities hereunder to any Third Party, provided that Janssen executes a written agreement with such Third-Party subcontractor that contains, in all material respects, the applicable obligations and covenants hereunder. Janssen shall be responsible for the performance of the subcontractor, and hereby warrants its compliance with the material terms hereof.

ARTICLE VII: RESEARCH PROGRAM REIMBURSEMENT

7.1 Research Costs. On a Program-by-Program basis, [**] in the performance of the Research Plan.

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(a) After the end of each quarter during the Research Period and no later than [**] of the following quarter, Arrowhead shall provide Janssen with a written report for the just-completed quarter (the "**Quarterly Program Report**"), which shall include: the start and end dates of the reporting period; identification of the FTEs who performed any work on behalf of Arrowhead (directly or through any subcontractors) in the Program for the just-completed quarter, the total number of hours expended by such FTEs toward Program activities under the Research Plan for the just-completed quarter, and identification of the laboratory notebook records documenting the work performed by such FTEs for the just-completed quarter; Out-of-Pocket Costs for the just-completed-quarter; and a description of the research and Development performed and results obtained.

(b) Payment by Janssen shall be due upon Janssen's receipt of a Quarterly Program Report for the just-completed quarter and payable within [**] of Janssen's receipt of an Invoice.

ARTICLE VIII: FINANCIAL PROVISIONS

8.1 US Dollars. For clarity, all references to "dollars", "$" or "USD" mean United States dollars.

8.2 Upfront Fee. [**]

8.3 Janssen Option Payment on exercise of Option Right.

8.3.1 Option Payment. For and in consideration of the rights granted by Arrowhead to Janssen, Janssen shall make a payment of the following fee ("Option Exercise Fee") after Janssen provides the Option Notice to Arrowhead:

	U.S. Dollars
[**]	$[**]
[**]	$[**]

8.3.2 One Option Exercise Fee. Only one Option Exercise Fee per Program shall be due and payable upon Janssen providing the Option Notice regardless of the number of Constructs and Products Developed under the Program.

8.4 Milestone Payments.

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8.4.1 **One-Time-Only Development and Approval Milestone Payments**. After exercise of the Option Right, in consideration for the exclusive license and other rights granted by Arrowhead to Janssen pursuant to this Agreement, on a Program-by-Program basis, the below Licensed Product milestone amounts shall be payable by Janssen to Arrowhead one time only, in total, upon the first achievement of the corresponding milestone event for all Licensed Products.

Milestone Event	Licensed Product Milestone Amount (USD)
[**]	$[**]
[**]	$[**]
[**]	$[**]
[**]	$[**]
[**]	$[**]
[**]	$[**]

8.4.2 **One-Time-Only Sales Milestones.** On a Program-by-Program basis, solely upon the first occurrence (if any) of aggregate annual (total in a single Janssen Calendar Year) reported Net Sales of any Licensed Product sold worldwide by or on behalf of Janssen (directly and through its Affiliates and Third Party sublicensees) hereunder in any Janssen Calendar Year during the Term first attaining the sales threshold as specified in a below sales milestone event, Janssen shall pay the corresponding Licensed Product milestone amount to Arrowhead within [**] following the end of the Janssen Calendar Quarter in which such sales milestone event was attained. In the event multiple sales milestone events are first achieved in a single Janssen Calendar Quarter, the amounts specified below for each such sales milestone event shall be payable at the same time.

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Licensed Product Sales Milestone Event	**Licensed Product Milestone Amount (USD)**
Net Sales greater than $[**]	$[**]
Net Sales greater than $[**]	$[**]
Net Sales greater than $[**]	$[**]
Net Sales greater than $[**]	$[**]

8.4.3 **Each Milestone Amount Paid Once.** On a Program-by-Program basis, in the event a milestone set forth in this Section 8.4 is achieved, Janssen shall pay to Arrowhead the milestone amount corresponding to each such milestone only once regardless of whether other Licensed Products achieve such milestone.

8.4.4 **Notice and Invoice for Milestone Events.** Janssen shall inform Arrowhead in writing [**] after the achievement of any milestone hereunder, and, upon such notice, Arrowhead may submit to Janssen an invoice for the applicable milestone amount due.

8.5 **Royalty Payments**.

8.5.1 **Royalty Term**. The royalties for Licensed Products set forth in this Section 8.5 shall, unless the Agreement has been terminated earlier, be paid on a Licensed-Product-by-Licensed-Product basis and country-by-country basis for the Royalty Term for that Licensed Product in that country-of-sale. Upon expiration of the Royalty Term in respect of a Licensed Product in a particular country-of-sale of the Territory, Janssen shall have a fully paid up non-revocable non-exclusive license in such country to Commercialize such Licensed Product.

8.5.2 **Licensed Product Royalty Rate**. Subject to Section 8.5.3 and subject to any adjustments expressly permitted under Section 8.5.5 below, Janssen shall pay to Arrowhead royalties at the following incremental royalty rates on the incremental tiers of aggregate reported Net Sales of Licensed Products in the Territory, excluding aggregate reported Net Sales of Licensed Products in the Access Territory if any reductions for the Access Territory have then been agreed to, during a particular Janssen Calendar Year during the Royalty Term as set forth in the table below.

Net Sales	Licensed Product Royalty Rate (percentage)
Net Sales up to and including $[**]	[**]%
Net Sales greater than $[**] up to and including $[**]	[**]%
Net Sales greater than $[**] up to and including $[**]	[**]%
Net Sales greater than $[**] up to and including $[**]	[**]%
Net Sales greater than $[**]	[**]%

8.5.3 Royalty Rate in Access Territory. In the event that Janssen intends to Commercialize a Licensed Product in one or more countries in the Access Territory, the Parties shall timely enter into good faith negotiations to determine any equitable reduction in the royalty rate applicable to the aggregate reported Net Sales of such Licensed Product in such country or countries. Accordingly, and subject to any adjustments expressly permitted under Section 8.5.5, Janssen shall have the right to use the agreed upon royalty rate for the applicable aggregate reported Net Sales of Licensed Products in the Access Territory on a country-by-country basis.

8.5.4 Royalties Due Only Once. The obligation to pay royalties under this Agreement is imposed only once with respect to the same unit of a Licensed Product.

8.5.5 Adjustments to Royalties.

(a) Compulsory License. If at any time in any country a Third Party shall, under a Government Order by a competent Governmental Authority granting or compelling the granting of a license under a Valid Claim of any Arrowhead Patent Rights Covering any Licensed Product sold by or on behalf of Janssen in such country, offer for sale or sell any product in competition with the Licensed Product marketed by or on behalf of Janssen with respect to which royalties become payable by Janssen pursuant to Sections 8.5.2 to 8.5.3, the Parties will confer and in good faith negotiate an equitable reduction in the royalty rate for calculating royalties payable to Arrowhead based on Janssen's and its Affiliates' and Third Party sublicensees' Net Sales of Licensed Product in such country under Sections 8.5.2 to 8.5.3 taking into account the royalty rate payable by the Third Party to Arrowhead under the compulsory license granting the Third Party the right to market the competing product.

(b) Generic Competition. In the event that, in a country, a Generic Version of the Licensed Product has been approved for commercialization in such country, Janssen may reduce the royalty rate for calculating royalties payable to Arrowhead based on Janssen's and

its Affiliates' and Third Party sublicensees' Net Sales of such Licensed Product in such country under Sections 8.5.2 to 8.5.3 by [**].

(c) Combination Products. In the event that a Licensed Product is a Combination Product, Net Sales for the purposes of determining royalties to be paid for the Net Sales of such Combination Products pursuant to Sections 8.5.2 to 8.5.3 shall be calculated by multiplying the actual Net Sales of such Combination Product by the fraction [**]; and (b) for which no payment is owed to a Third Party.

(d) Off-Set for Third-Party Patents. In the event that, at Janssen's discretion, a license under a Third Party's Patent Rights or an agreement is required to resolve or prevent possible allegations that the Development or Commercialization of a Licensed Product infringes such Patent Rights, Janssen shall have the right to deduct from the royalties payable to Arrowhead under this Agreement for the Licensed Product concerned [**] of any royalties, milestone payments, license fees or other payments payable by Janssen for such license or such agreement to such Third Party. In no event shall the royalty adjustment under this Section 8.5.5(d) reduce the applicable royalty rates by more than [**] as compared to the rates set forth in or determined in accordance with Sections 8.5.2 to 8.5.3.

8.6 Third Party Obligations.

8.6.1 Subcontractors. A Party or its designated Affiliate, in entering into any subcontract with a Third Party for the performance of any subcontracted Collaboration Activities hereunder (including in any jurisdiction in which employees or agents of such Third Party have rights to compensation, remuneration or payments for their inventions under Applicable Laws), shall use Commercially Reasonable Efforts to obligate the Third Party subcontractor in a written subcontract agreement to be solely responsible for any compensation, remuneration or payments due to any of the Third Party's employees or agents on account of their performance of any such activities under the subcontract agreement, including any payment obligations that may arise by operation of Applicable Law in a particular country on account of either Party's exercise of any rights hereunder with respect to any Licensed Products that were invented, in whole or in part, by any such Third Party employees or agents in the performance of such activities. If a Party fails to include such an obligation in any of its subcontract agreements with any Third Parties, such Party shall be bear any expense incurred in connection with any such payment obligations that may so arise.

8.6.2 Payments due under Pre-Existing Third-Party Agreements. [**].

ARTICLE IX: GENERAL PAYMENT TERMS

9.1 Invoices. Any payment for an amount due to Arrowhead under this Agreement shall be payable, except as otherwise expressly provided herein, within [**] after Janssen's receipt of an invoice from Arrowhead for such amount due. Each invoice shall specifically refer to (a) this Agreement, (b) Janssen's purchase order number if Janssen has provided a purchase order number to Arrowhead in advance of the invoice, and (c) Janssen's tax ID. Invoices shall be dated and

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printed on official Arrowhead letterhead. No invoice from Arrowhead shall be required for payment of royalties under Section 8.5 or sales milestones under Sections 8.3.2.

9.2 Royalty Reporting and Payments. Royalty payments due shall be payable in United States dollars [**] after the end of each Janssen Calendar Quarter during the Term. Each payment of royalties due under this Agreement will be accompanied with a royalty report setting forth, on a Licensed Product-by-Licensed Product and country-by-country basis: (a) the amount of Net Sales of Licensed Product by Janssen, its Affiliates and sublicensees; (b) the conversion of such Net Sales from the currency of sale into US dollars in accordance with Section 9.4, as applicable; and (c) a calculation of the aggregate amount of royalties owed based on such Net Sales, including the application of the reductions or credits, if any, made in accordance with the terms of Section 8.5.5.

9.3 Remittance. All payments due to Arrowhead hereunder shall be made in immediately available funds by electronic transfer, by Janssen (or an Affiliate on its behalf) to the bank account identified below or such other bank account as Arrowhead may designate in writing to Janssen. Any payments due and payable under this Agreement on a date that is not a Business Day may be made on the next Business Day. If, at any time, legal restrictions prevent the prompt remittance of part of or all of the royalties due hereunder with respect to any country where Licensed Products are sold, Janssen shall have the right and option to make such payments by depositing the amount thereof in local currency to Arrowhead's accounts in a bank or depository in such country as directed by Arrowhead or by using such lawful means or methods for remitting payment as Janssen may reasonably determine.

[**]

9.4 Currency. All payments under this Agreement shall be payable in United States dollars. With respect to sales of a Licensed Product invoiced in a currency other than US dollars, such amounts and the amounts payable hereunder shall be expressed in their United States dollars equivalent calculated using the method described in the remainder of this Section 9.4. For each Janssen Calendar Year during which royalties become due hereunder, Janssen shall provide: (a) the Currency Hedge Rate to be used for the local currency of each country of the Territory and (b) the detail of each such Currency Hedge Rate in writing to Arrowhead not later than ten (10) Business Days after the Currency Hedge Rates (for countries other than the U.S. where any royalty-bearing sales of Licensed Products hereunder occur) are available from Janssen or its applicable Affiliates, which is customarily at the beginning of December. Each Currency Hedge Rate for a given country will remain constant throughout the entire Janssen Calendar Year. Janssen shall use the Currency Hedge Rates to convert Net Sales to United States dollars for the purpose of calculating royalties.

9.5 Taxes.

9.5.1 Each Party shall be solely responsible for the payment of all Taxes imposed on its share of income arising directly or indirectly from the collaborative efforts of the Parties under this Agreement.

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9.5.2 Each Party shall make all payments due to the other Party under this Agreement without deduction or withholding for Taxes except to the extent that any such deduction or withholding is required by Applicable Law in effect at the time of payment. The Parties agree to use Commercially Reasonable Efforts to minimize any withholding or similar Tax imposed upon payments payable under this Agreement and to consult in good faith before taking any action that is reasonably expected to result in the application of a withholding or similar Tax imposed upon payments payable under this Agreement.

9.5.3 Any Tax required to be withheld on amounts payable by the payor Party under this Agreement will be paid by the payor on behalf of the payee Party to the appropriate Governmental Authority, and the payor will furnish the payee with proof of payment of such Tax. Any such Tax required to be withheld will be an expense of and borne by the payee. If any such Tax is assessed against and paid by the payor, then the payee shall indemnify and hold harmless the payor from such Tax.

9.5.4 The Parties will cooperate with respect to all documentation required by any taxing Governmental Authority or reasonably requested by either Party to secure a reduction in the rate of applicable withholding Taxes. Within five (5) Business Days following the Execution Date of this Agreement, Arrowhead will deliver to Janssen an accurate and complete Internal Revenue Service Form W-9 and such form shall be updated and renewed as required by Applicable Law.

9.6 Records and Audit Rights.

9.6.1 **Maintenance of Records**. Arrowhead shall keep (and shall cause its Affiliates and applicable Third Party (sub)contractors to keep) complete, true and accurate books and records in accordance with Accounting Standards in sufficient detail for Janssen to determine the payments due and costs incurred under this Agreement. Janssen shall keep (and shall cause its Affiliates and applicable Third Party subcontractors and sublicensees to keep) complete, true and accurate books and records in accordance with Accounting Standards in sufficient detail to permit Arrowhead to confirm the accuracy of Janssen's financial records related to the royalty calculations and calculations of Net Sales hereunder. Each Party will keep such books and records in accordance with Applicable Law and for at least [**] following the date of the payment to which they pertain. In the event that Janssen is requested to reimburse Out-of-Pocket Costs or other costs to Arrowhead, Arrowhead shall provide Janssen with proof of such costs upon Janssen's request.

9.6.2 **Audit Right**. Upon the written request of a Party (as applicable, the **"Auditing Party"**), not more than once every [**], the other Party (the **"Audited Party"**) shall permit an independent certified public accounting firm of internationally recognized standing selected by the Auditing Party and reasonably acceptable to the Audited Party to have confidential access during normal business hours to such of the records of the Audited Party and its applicable Affiliates or Third Party sublicensees or subcontractors as may be reasonably necessary for the sole purpose of verifying the accuracy of any payments made under this Agreement for any period ending not more than [**] prior to the date of such request. For clarity, in the event that Janssen is the Audited Party, access shall be limited to records reasonably necessary for the sole purpose of verifying the royalty and Net Sales calculations hereunder. An audit of the records relating to a

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particular calendar year may be conducted not more than once. The accounting firm shall provide the Audited Party a copy of its report prior to sharing it with the Auditing Party in order to allow the Audited Party to provide the accounting firm with justifying remarks for inclusion, at the accounting firm's sole discretion, in the report prior to sharing the report with the Auditing Party. The accounting firm shall provide each Party, at the same time, a correct and complete copy of the final report summarizing the final results of such audit, which shall be treated as the Audited Party's Confidential Information. The Auditing Party shall obligate its accounting firm to keep the Audited Party's information confidential and shall, at the request of the Audited Party, cause the Auditing Party's accounting firm to execute a reasonable confidentiality agreement prior to commencing any such audit.

9.6.3 Audit Fees. The fees charged by an accounting firm engaged by a Party in accordance with Section 9.6.2 shall be paid by the Auditing Party, provided, however, that if the audit uncovers an underpayment or overpayment in favor of the Audited Party exceeding [**] of the total amount due in accordance with this Agreement for the audited period, then the fees of such accounting firm shall be paid by the Audited Party. Any underpayments or overpayments discovered by such audit or otherwise will be paid or refunded promptly by the applicable Party within [**] of the date the Auditing Party delivers to the Audited Party such accounting firm's written report, or as otherwise agreed upon by the Parties, plus interest calculated in accordance with Section 9.8.

9.7 Party Making Payment. Arrowhead acknowledges and agrees that, as may be delegated by Janssen from time to time, an Affiliate of Janssen acting as a paying agent for Janssen may make certain payments due to Arrowhead under this Agreement on behalf of Janssen, provided that Janssen shall remain primarily responsible for any such payments due to Arrowhead under this Agreement.

9.8 Interest on Late Payments. Interest may be assessed by a payee Party on any amounts payable to it under this Agreement which are not paid by the payor Party on or before the due date for payment hereunder. Such interest shall accrue and be calculated on a daily basis at the rate of [**] per annum above the then-current prime rate quoted by Citibank in New York City (but in no event in excess of the maximum rate permissible under Applicable Laws), for the period from the due date for payment until the date of actual payment. The payment of such interest shall not limit the payee Party from exercising any other rights it may have as a consequence of the lateness of any payment from the payor Party.

ARTICLE X: INTELLECTUAL PROPERTY MATTERS

10.1 Reporting of Invention. Arrowhead shall promptly report to the JSC, as well as Janssen's Patent Representative, any material invention made by any of its employees or agents or its Affiliates' or Third-Party subcontractors' employees or agents that Covers the composition of matter of a Licensed Product or any component thereof ("**Arrowhead Invention**"). Concurrently, Arrowhead will disclose to Janssen's Patent Representative necessary chemistry and sequence information, which unless and until such information is disclosed to Janssen in a Phase 1 Ready Package will not be disclosed further within Janssen or used for any purpose other than fulfilling Janssen's rights and obligations in Section 10.3. For clarity, if Janssen is permitted or required to

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publicly disclose such chemistry and sequence information while fulfilling its rights and obligations under Section 10.3 it may do so and upon such publication may disclose such chemistry and sequence information within Janssen.

10.2 Ownership of Inventions.

10.2.1 Inventions. Ownership of any invention arising from any activities hereunder (each an "**Invention**") and any patent rights therein shall follow inventorship as determined pursuant to principles of United States patent law. Accordingly, (a) all Inventions invented solely by one or more employees or agents of a Party (or its Affiliates or Third Party subcontractors or sublicensees) shall be owned solely by such Party, and (b) all Inventions invented jointly by one or more employees or agents of one Party (or its Affiliates or Third Party subcontractors or sublicensees) and by one or more employees or agents of the other Party (or its Affiliates or Third Party subcontractors or sublicensees) shall be owned jointly by the Parties.

10.2.2 Assignment of Arrowhead Platform Technology Invention. In the event an Invention solely made in the course of developing a Licensed Product by one or more employees or agents of Janssen (or its Affiliates or Third-Party subcontractors or sublicensees) is (a) an improvement to Arrowhead Platform Technology, and (b) derived from the use of Arrowhead Know-How, Janssen hereby assigns to Arrowhead all right, title and interest in that Invention.

10.2.3 Inventor Compensation. Each Party (directly or through its applicable Affiliate or Third Party subcontractor or sublicensees) shall be solely responsible for any compensation due to it and its Affiliates' and Third Party subcontractors' or sublicensees' employees and agents in connection with the assignment of their respective rights to any Inventions and associated Patent Rights pursuant to this Agreement or the Exploitation of any Party or its Affiliates or Third Party sublicensees hereunder of any such Inventions or associated Patent Rights, including any required by operation of Applicable Law on account of any Commercialization of any such Arrowhead Inventions by or on behalf of Janssen hereunder.

10.3 Prosecution of Patent Rights.

10.3.1 Communications. Each Party shall use reasonable efforts to handle all communications between the Parties under this Section 10.3 through their Prosecution Contacts and keep such communications in strict confidence to protect their attorney-client privileged status.

10.3.2 Reporting of Filings. A Party planning on filing any priority-establishing or original (in each case, with respect to any claims or new matter described in the patent specification) patent application within the Arrowhead Patent Rights hereunder shall use reasonable efforts to provide to the other Party, with reasonable advance time such as at least thirty (30) days prior to proposed Prosecution filing in a Patent Office (such as a draft application or response to an official action), and provide the other Party an opportunity to comment thereon through its Prosecution Contact. Each Party shall provide to the other, promptly after filing, a copy of each priority-establishing or original (whether provisional or nonprovisional) patent application within the Arrowhead Patent Rights as filed in the Patent Office and each other substantive Prosecution filing (including any other patent application filed within the Arrowhead Patent Rights).

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10.3.3 Prosecution Responsibility and Coordination.

(a) Arrowhead Patent Rights Covering Licensed Product. With respect to the Arrowhead Patent Rights Covering (a) features of a Licensed Product in Development or Commercialization but excluding Arrowhead Patent Rights Covering Arrowhead Platform Technology, or (b) Arrowhead Platform Technology as applied specifically to a Licensed Product in Development or Commercialization ("**Specific Arrowhead Patent Rights**"), Janssen shall be primarily responsible for Prosecuting Specific Arrowhead Patent Rights, provided that for so long as the Agreement remains in effect, Janssen shall follow any reasonable directions by Arrowhead as provided by its designated Prosecution Contact in Prosecuting such Specific Arrowhead Patent Rights, including with respect to the filing of any continuation, divisional, or other continuing applications. The Specific Arrowhead Patent Rights as of the Execution Date are identified in Exhibits B-1, B-3 and B-5 hereto. During the Term, Arrowhead shall provide Janssen prompt written notice of any changes to the Specific Arrowhead Patent Rights.

(b) Arrowhead Patent Rights Covering Arrowhead Platform Technology. With respect to Arrowhead Patent Rights Covering Arrowhead Platform Technology that is incorporated in a Licensed Product but is not applied specifically to a Licensed Product in Development or Commercialization ("**General Arrowhead Patent Rights**"), Arrowhead shall be primarily responsible, which may include the use of outside patent counsel mutually acceptable to the Parties and engaged by Arrowhead, to Prosecute (or, if a Third Party has the right to control Prosecution of any General Arrowhead Patent Right under any Pre-Existing Third Party Agreements, to be represented by such Third Party in the Prosecution of) the General Arrowhead Patent Rights, provided that for so long as the Agreement remains in effect, Arrowhead shall, and shall cause the applicable Third Party, if any, and subject to any restrictions or obligations in any Pre-Existing Third Party Agreements, to, follow any reasonable directions by Janssen as provided by its designated Prosecution Contact in Prosecuting such General Arrowhead Patent Rights, including with respect to the filing of any continuation, divisional, or other continuing applications. Notwithstanding the foregoing, Arrowhead shall, upon reasonable request by, and in consultation with, Janssen, use Commercially Reasonable Efforts to file patent applications directed to Licensed Products with the objective of optimizing overall patent protection for Licensed Products. For clarity, the General Arrowhead Patent Rights as of the Effective Date are identified in Exhibits B-2, B-4 and B-5 hereto. During the Term, Arrowhead shall provide Janssen prompt written notice of any changes to the General Arrowhead Patent Rights.

(c) Joint Patent Rights. For any Joint Patent Rights, both Parties shall share primary responsibility, through outside patent counsel mutually selected and engaged by the Parties for Prosecuting such Joint Patent Rights.

(d) Coordination with JSC and Patent Working Group. In Prosecuting Arrowhead Patent Rights, each Party shall: (a) subject to any restrictions or obligations in any Pre-Existing Third Party Agreements, follow the reasonable direction of the JSC (under advice of the Patent Working Group) as to selection of country Patent Offices in the Territory for filing or validating applications to form a family of related Arrowhead Patent Rights; and (b) in the case of Joint Patent Rights, escalate any Prosecution decision on which the Parties cannot agree to the JSC for its decision, under advice of the Patent Working Group in consultation

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with the Prosecution Contacts, as to how to direct outside counsel with respect to such Prosecution matter involving the Joint Patent Rights.

(e) **Prosecution Cooperation**. Each Party shall provide all reasonable assistance requested by the other Party for Prosecuting any Arrowhead Patent Rights consistent with the terms hereof, including with respect to the timely completion of Prosecution papers to be filed in any Patent Office (including draft responses to office actions), compliance with Applicable Laws, and recording of assignments to reflect ownership consistent with the terms hereof. A Party Prosecuting any Patent Rights hereunder shall use reasonable efforts to provide the other Party with copies of all material Prosecution papers as filed in or received from any Patent Offices. The Party Prosecuting any Patent Rights hereunder shall, on an annual basis during the Term, provide the other Party with a report identifying the status of any Arrowhead Patent Rights for which it is primarily responsible for Prosecution, provided, however, that for Joint Patent Rights, the Parties shall cooperate to jointly prepare such status report.

(f) **Prosecution Costs for Arrowhead Patent Rights.** Each Party responsible to Prosecute Arrowhead Patent Rights shall be solely responsible for all Patent Costs incurred in Prosecuting such Arrowhead Patent Rights (including those payable to any Third Parties under the Pre-Existing Licenses from Third Parties). Each Party shall bear fifty percent (50%) of the Patent Costs incurred in Prosecuting any Joint Patent Rights. Notwithstanding the foregoing, if either Party intends to permit any particular Arrowhead Patent Right that is pending in any Patent Office to lapse or become abandoned (including by failure to validate an allowed multi-jurisdictional patent application, such as may be pending in the European Patent Office, in any possible country), such Party shall notify the other Party of such intention at least sixty (60) days in advance, or within such other practicable time before the date upon which such Patent Right will lapse or become abandoned, and to the extent not prohibited in any Pre-Existing Third Party Agreements, such other Party shall thereupon have the right, but not the obligation, to assume responsibility for the further Prosecution of such Patent Right (and any continuing application based thereon) and all Patent Costs associated therewith, and in such event: (a) the transferring Party shall reasonably cooperate to promptly effect transfer of Prosecution of such Patent Right to the other Party and assign all of its interest in such Arrowhead Patent Right to the other Party; and (b) if such Patent Right is transferred to Janssen, such transferred Patent Right shall no longer be deemed to be an Arrowhead Patent Right for the purpose of determining the duration of Royalty Term and any royalty obligation of Janssen hereunder.

10.4 Patent Enforcement.

10.4.1 Notice.

(a) Each Party shall provide prompt notice to the other Party of any apparent, threatened, or actual infringement by a Third Party of any Arrowhead Patent Rights, or misappropriation of any Arrowhead Know-How, of which the Party becomes aware. The notifying Party shall promptly furnish the other Party with all known details or evidence of such infringement or misappropriation.

(b) Each Party shall provide prompt notice to the other Party of any Third Party communications pertaining to any Arrowhead Patent Rights that the Party receives

pursuant to the Drug Price Competition and Patent Term Restoration Act of 1984, including notices pursuant to §§ 101 and 103 of such act from Persons who have filed an abbreviated NDA (ANDA) or a paper NDA, or pursuant to similar such laws in the Territory.

10.4.2 **Enforcement Actions**. For as long as Janssen has license rights to Commercialize Licensed Products, Janssen shall have the initial right, at its expense and in its own name (or in the name of Arrowhead as may be required under Applicable Law), for bringing any infringement suit or other enforcement Action on account of any Third Party infringement of any Specific Arrowhead Patent Rights based on any alleged making, using, selling, offering for sale, importing, or other Exploitation of any such Licensed Product in infringement of any such Patent Rights, or misappropriation of any Arrowhead Know-How providing any Regulatory Exclusivity Rights for any such Licensed Product, (each a "**Product Infringement**"), by counsel of its own choice, and Arrowhead will cooperate with Janssen as Janssen may reasonably request in connection with any such Action, including by becoming a party to such action at Janssen's cost, provided that Janssen shall reimburse Arrowhead for its Out-of-Pocket Costs reasonably incurred in connection with rendering such assistance. If Janssen declines to initiate such an enforcement Action against any unabated Product Infringement it shall notify Arrowhead, who shall thereafter have the right (but not the obligation) at Arrowhead's expense and in its own name, to initiate such Action by counsel of its choice, and Janssen shall cooperate with Arrowhead as Arrowhead may reasonably request, including by becoming a party to such action at Arrowhead's cost, and Arrowhead shall reimburse Janssen for its Out-of-Pocket Costs reasonably incurred in connection with rendering such assistance. A settlement or consent judgment or other voluntary final disposition of an Action brought by a Party under this Section may be entered into without the consent of the other Party, provided that such settlement, consent judgment, or other disposition does not admit the invalidity or unenforceability of any Patent Rights owned or Controlled by the other Party, and provided further that any rights granted to a Third Party to continue any activity upon which such Action was based in such settlement, consent judgment, or other disposition shall be limited to the Third Party's product or activity that was the subject of the Action. Damages recovered and any other amounts awarded in any Actions for Product Infringement under this Section shall be allocated to the Party who brought the Action, after reimbursement of each Party's actual expenses incurred in such Actions as provided hereunder, provided that in the event damage amounts are recovered by Janssen due to the Product Infringement (such as in the form of lost profits or reasonable royalties assessed on account of the Third Party's sales of infringing product), Janssen shall owe Arrowhead royalties as determined in accordance with Section 8.4 as if such damage amounts were Net Sales, after reimbursement of costs incurred in such Action.

10.4.3 Arrowhead shall have the initial right, at its expense and in its own name, for bringing any infringement suit or other enforcement Action on account of any Third Party infringement of any General Arrowhead Patent Rights by counsel of its own choice, and Janssen will cooperate with Arrowhead as Arrowhead may reasonably request in connection with any such Action, including by becoming a party to such action at Arrowhead's cost, provided that Arrowhead shall reimburse Janssen for its Out-of-Pocket Costs reasonably incurred in connection with rendering such assistance. If Arrowhead declines to initiate such an enforcement Action against any unabated Product Infringement and Janssen has license rights to Commercialize Licensed Products, Arrowhead shall notify Janssen, who shall thereafter have the right (but not the obligation) at Janssen's expense and in its own name, to initiate such Action by counsel of its

choice, and Arrowhead shall cooperate with Janssen as Janssen may reasonably request, including by becoming a party to such action at Janssen's cost, and Janssen shall reimburse Arrowhead for its Out-of-Pocket Costs reasonably incurred in connection with rendering such assistance. A settlement or consent judgment or other voluntary final disposition of an Action brought by a Party under this Section may be entered into without the consent of the other Party, provided that such settlement, consent judgment, or other disposition does not admit the invalidity or unenforceability of any Patent Rights owned or Controlled by the other Party, and provided further that any rights granted to a Third Party to continue any activity upon which such Action was based in such settlement, consent judgment, or other disposition shall be limited to the Third Party's product or activity that was the subject of the Action. Damages recovered and any other amounts awarded in any Actions for Product Infringement under this Section shall be allocated to the Party who brought the Action, after reimbursement of each Party's actual expenses incurred in such Actions as provided hereunder, provided that in the event damage amounts are recovered by Arrowhead due to the Product Infringement (such as in the form of lost profits or reasonable royalties assessed on account of the Third Party's sales of infringing product), Arrowhead shall deduct royalties as determined in accordance with Section 8.5 as if such damage amounts were Net Sales and shall pay Janssen any remaining damage amounts, after reimbursement of costs incurred in such Action.

10.4.4 Other Enforcement Actions. Arrowhead acknowledges that the outcome of any infringement suit or other enforcement Action on account of any Third-Party infringement, other than a Product Infringement, of any Arrowhead Patent Right licensed to Janssen under Section 2.1 may detrimentally impact the scope, validity, or enforceability of such Patent Right with respect to potential Product Infringements. Accordingly, the Parties shall reasonably cooperate with each other with respect to any infringement suit or other enforcement Action on account of any Third-Party infringement of any Arrowhead Patent Right other than the Product Infringements. For clarity, Arrowhead will not be required to enforce any Arrowhead Patent Right against any Third Party infringement other than a Product Infringement, provided that if Arrowhead declines to initiate an enforcement Action reasonably requested by Janssen to abate any Third Party's infringing activities (other than Product Infringement) within the scope of Janssen's exclusive rights under any Arrowhead Patent Rights granted hereunder, then (to the extent permitted by any Pre-Existing Third Party Agreements concerning such Arrowhead Patent Rights, if applicable) upon Janssen's request Arrowhead shall reasonably cooperate with Janssen so that Janssen may initiate at its own expense such an enforcement Action in the same manner described under Section 10.4.2 above (with respect to Product Infringements).

10.5 Maintenance of Freedom to Operate. The Parties shall use Commercially Reasonable Efforts to avoid infringing any Third Party's Patent Rights in conducting any research and Development activities under the Research Plan and Development Plan. Each Party shall promptly notify the JSC, through the Patent Representatives, in the event such Party becomes aware of any Third Party's Patent Rights that may pertain to any research or Development activities of the Parties.

10.6 Patent Term Extensions. As long as Janssen retains Commercialization rights for any Licensed Product, upon Janssen's written request (which shall be by a notice identifying the date of the applicable Regulatory Approval of a Licensed Product and the deadline for filing a Patent Term Extension), the Prosecuting Party shall use reasonable efforts, in each country or

jurisdiction where Regulatory Approval for any such Licensed Product has been obtained, and if the Applicable Law of such country or jurisdiction permits application for a Patent Term Extension, to apply, at the reasonable direction of Janssen's designated patent counsel, for a Patent Term Extension for a patent within the Arrowhead Patent Rights including a Valid Claim Covering such Licensed Product, which patent (if any) shall be selected at Janssen's reasonable judgment after considering the opinion of Janssen's patent counsel regarding its eligibility for a Patent Term Extension. Janssen shall have the right to: (a) identify in any list of patents in a Drug Application the applicable Arrowhead Patent Right(s) as Janssen reasonably believes is appropriate; (b) commence suit for any Product Infringement of any such Arrowhead Patent Right(s) under Applicable Law as permitted under Section 10.4.2 and 10.4.3; and (c) exercise any rights that may be exercisable by a patent owner, including applying for a Patent Term Extension, of any Arrowhead Patent Right(s) pertaining to an approved Licensed Product Commercialized by Janssen hereunder. Arrowhead agrees to cooperate with Janssen and its Affiliate and Third Party sublicensees of Licensed Products, as applicable, upon Janssen's reasonable request in the exercise of the authorizations granted under this Section, and Arrowhead shall execute such documents and take such additional action as Janssen may reasonably request in connection therewith, including, if requested by Janssen, permitting Arrowhead to be joined as a party in any suit for Product Infringement brought by Janssen hereunder on the terms and conditions set forth in Section 10.4.2 and 10.4.3, provided that Janssen shall reimburse Arrowhead all reasonable Out-of-Pocket Costs incurred by Arrowhead in taking such action.

10.7 Patent Working Group. The Parties shall establish a patent working group comprising an equal number of up to three representatives of each Party ("**Patent Working Group**"), including a patent attorney or agent designated by such Party as its lead contact (**"Patent Representative"**), for the sole purposes of alignment of activities under this Article X governing responsibilities for Prosecuting and enforcing Arrowhead Patent Rights or any other patent matters pertaining to the Development, Manufacture, or Commercialization of any Licensed Products hereunder. The Patent Working Group may hold meetings separate from, or in connection with, the meetings of the JSC as appropriate to discuss such patent matters. The Patent Working Group shall advise as appropriate the JSC on such patent matters.

10.8 Product Trademarks. Arrowhead represents and warrants that, as of the Effective Date, it does not own or otherwise control any Product Trademark Rights relating to Primary RNAi Triggers or Licensed Constructs, including any trademark applications or registrations or domain names. Janssen shall have (directly and through its Affiliates and Third Party sublicensees Commercializing Licensed Products) the right to brand, at its discretion, the Licensed Products using trademarks and trade names selected at its discretion and to file for, obtain, and maintain at its discretion and cost Product Trademark Rights in its own name.

ARTICLE XI: CONFIDENTIALITY AND PUBLICITY

11.1 Confidential Information.

11.1.1 To facilitate any activities hereunder, a Party (a "disclosing Party") may provide to the other Party (a "receiving Party"), or a Party (in this case a "receiving Party") may otherwise through activities contemplated by this Agreement come into possession of, Know-How

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Controlled, licensed, developed, or possessed by the other Party (in this case, a "disclosing Party"), any such items of Know-How, individually or collectively, constituting "**Confidential Information**". Information identified as being confidential that was disclosed by one Party to the other under the Prior CDA shall be considered the disclosing Party's Confidential Information under this Agreement and may be used for the purposes permitted hereunder. The receiving Party shall keep all such Confidential Information of the disclosing Party confidential, and other than as expressly permitted herein, shall not use or disclose, directly or indirectly, any such Confidential Information, whether in tangible or intangible form for any purpose, except pursuant to, and in order to carry out, the terms and objectives of this Agreement, including the exercise of such Party's rights and the performance of such Party's obligations under this Agreement. A disclosing Party shall take reasonable measures, consistent with its ordinary practices, to identify confidential information and material provided by it to the other Party with a "CONFIDENTIAL" or "TRADE SECRET" marking or similar notation. A receiving Party shall use similar efforts to that which it uses to protect its own confidential information, but in no event less than reasonable efforts, to keep the disclosing Party's Confidential Information confidential.

11.1.2 A receiving Party's obligation of confidentiality and restriction on use as to a disclosing Party's Confidential Information shall last during the Term and for a period of [**] thereafter.

11.1.3 The restrictions on a receiving Party's disclosure and use of the disclosing Party's Confidential Information set forth above in this Section 11.1 shall not apply to any particular Confidential Information to the extent that such Confidential Information:

(a) was known by the receiving Party or its Affiliate prior to disclosure by the disclosing Party or its Affiliate hereunder (as evidenced by the receiving Party's or such Affiliate's written records or other competent evidence);

(b) is or becomes part of the public domain through no fault of the receiving Party or its Affiliates in violation of this Agreement;

(c) is disclosed without restriction to the receiving Party or its Affiliate by a Third Party having a legal right to make such disclosure without violating any confidentiality or non-use obligation that such Third Party has to the disclosing Party or an Affiliate thereof; or

(d) is independently developed by personnel of the receiving Party or its Affiliate without reliance on or access to the Confidential Information (as evidenced by the receiving Party's or such Affiliate's written records or other competent evidence).

11.1.4 For the avoidance of doubt, each receiving Party may use and disclose the other Party's Confidential Information under appropriate confidentiality and non-use obligations substantially equivalent to those in this Agreement, to the receiving Party's Affiliates and, as set forth in written subcontracts as otherwise provided herein, to its Third Party licensees, sublicensees, subcontractors and any other Third Parties to the extent such use and/or disclosure is reasonably necessary to perform its obligations or to exercise the rights granted to it, or reserved by it, under this Agreement. Regardless of the foregoing, the Parties agree that in case of a Third-Party licensee that is a CRO engaged by a Party to conduct clinical studies, the obligations of

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confidentiality and non-use set forth in such subcontracts may be those customarily entered into with such Third Party licensee by such Party.

11.2 Permitted Use and Disclosures.

11.2.1 A receiving Party may disclose the disclosing Party's Confidential Information as reasonably necessary for purposes expressly provided hereunder, including for: performing its obligations and Clinical Plan or Development Plan work hereunder; Prosecuting and defending any Patent Rights Covering Licensed Product or a component thereof; and making submissions and other disclosures to Regulatory Authorities (and health technology assessment bodies), including in connection with the performance of its obligations or exercise of rights granted hereunder.

11.2.2 A receiving Party may disclose Confidential Information of the disclosing Party to the extent required to be disclosed by the receiving Party to comply with Applicable Laws or to defend or prosecute litigation or comply with an order of a court or Government Authority, provided that the receiving Party notifies the disclosing Party of such court order insofar as possible to enable the disclosing Party to take reasonable actions to avoid or minimize the degree of such disclosure and seek protective treatment.

11.2.3 Each Party acknowledges that certain state or federal laws require pharmaceutical companies to disclose information on compensation, gifts, or other remuneration provided to Persons who are health care professionals or providers. Accordingly, a Party may report as it reasonably determines is required by Applicable Law or may voluntarily disclose or make public as it reasonably determines is in accordance with its internal policies or guidelines relating to open payments, Confidential Information about remuneration provided to any such Persons under this Agreement.

11.3 Confidentiality of Agreement Terms. Each Party agrees not to, and to cause its Affiliates not to, disclose to any Third Party any terms of this Agreement without the prior written consent of the other Party hereto, except each Party and its Affiliates may disclose the terms of this Agreement: (a) to advisors (including financial advisors, attorneys and accountants), actual or potential acquisition partners or private investors, and others on a need to know basis, in each case under appropriate confidentiality provisions substantially equivalent to those in this Agreement; (b) to the extent necessary to comply with Applicable Laws and court orders (including securities laws or regulations and the applicable rules of any public stock exchange); or (c) as otherwise expressly permitted hereunder.

11.4 Publicity.

11.4.1 Initial Press Releases. Each Party may issue its respective press release announcing this Agreement (including certain terms thereof) attached in Exhibit G hereto following the Execution Date. Upon issuance of such initial press release, either Party shall thereafter be free to disclose, without the other Party's prior written consent, the existence of this Agreement, the identity of the other Party and those terms of the Agreement which have already been publicly disclosed in accordance herewith.

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11.4.2 Further Publicity. Neither Party shall originate any publicity, news release or public announcements, written or oral, whether to the public or press, stockholders or otherwise, relating to this Agreement, including its existence, the subject matter to which it relates, performance under it, or any of its terms, or to any amendment hereto, without the prior written consent of the other Party, save only such announcements or filings that are required by Applicable Laws (including under the rules of any relevant stock exchange or government agency regulating trading in securities of a Party or its parent Affiliate), to be made or that are otherwise agreed by the Parties, which announcements shall be brief and factual. If a Party desires to make any such public announcement not required by Applicable Law, either directly or indirectly (such as through an Affiliate), such Party shall provide the other Party with a draft of the proposed announcement and provide the other Party a reasonable opportunity to comment on the nature, text, and timing of such announcement, which shall be brief and factual.

11.5 Publications. Arrowhead acknowledges and agrees that nothing herein shall prohibit Janssen and its Affiliates from publishing the results of a study involving a Licensed Product, including any Confidential Information as reasonably required for Janssen's compliance with its then-current policy on the registration and reporting of results of pharmaceutical company-sponsored clinical studies policy including disclosures made by Janssen on clinicaltrials.gov, and Arrowhead further agrees to provide, and to cause its applicable subcontractors to provide, to Janssen such assistance as reasonably requested in connection with fulfilling the requirements of such policy.

ARTICLE XII: REPRESENTATIONS AND WARRANTIES

12.1 Representations of Authority. Arrowhead and Janssen each represents and warrants to the other Party that, as of the Execution Date it has, and through the Effective Date shall retain, full right, power and authority to enter into this Agreement and to perform its respective obligations under this Agreement and that it has the right to grant to the other the licenses and sublicenses granted pursuant to this Agreement.

12.2 Consents. Each Party represents and warrants to the other Party that, except as provided in Section 17.11 (regarding HSR Clearance) and except for any approvals from Regulatory Authorities (including pricing or reimbursement approvals, Manufacturing approvals or similar approvals necessary for the Development, Manufacture or Commercialization of the Licensed Products therein), all necessary consents, approvals and authorizations of all Government Authorities and other Persons required to be obtained by it as of the Effective Date in connection with the execution, delivery and performance of this Agreement have been obtained by the Effective Date.

12.3 No Conflict. Each Party represents and warrants to the other Party that, notwithstanding anything to the contrary in this Agreement, the execution and delivery of this Agreement by such warranting Party, the performance of such Party's obligations hereunder (as contemplated as of the Effective Date), and the licenses and sublicenses to be granted by such Party pursuant to this Agreement (a) do not conflict with or violate any requirement of Applicable Laws existing as of the Effective Date and applicable to such Party, and (b) do not conflict with, violate, breach or constitute a default under any contractual obligations of such Party or any of its Affiliates existing as of the Effective Date. Each Party shall, and shall cause its Affiliates to,

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comply with all Applicable Laws pertaining to the Development, Manufacture and Commercialization of the Licensed Products, including applicable Drug Regulation Laws, Clinical Investigation Laws and Health Care Laws.

12.4 Enforceability. Each Party represents and warrants to the other Party that, as of the Effective Date, this Agreement is a legal and valid obligation binding upon the warranting Party and is enforceable against it in accordance with its terms.

12.5 Covenants by Arrowhead to Make Representations and Warranties Regarding IP. On a Program-by-Program basis, Arrowhead agrees that it will make the following representations and warranties to Janssen in a timely manner at or before the date of Target acceptance under Section 4.1.2:

12.5.1 Except as otherwise disclosed to Janssen with respect to a Target, Arrowhead is not aware of (a) any claim made against it asserting the invalidity, misuse, unregisterability, unenforceability or non-infringement of any of the Arrowhead Patent Rights or (b) any claim made against it challenging Arrowhead's ownership of or license rights in any of the Arrowhead Patent Rights.

12.5.2 Except as otherwise disclosed to Janssen with respect to an identified Target, the Arrowhead Patent Rights are free and clear of any liens, charges and encumbrances (other than non-exclusive licenses under General Arrowhead Patent Rights granted by Arrowhead to Third Parties, which grants do not preclude Janssen from exploiting the full scope of the licenses granted to Janssen as contemplated hereunder). Neither Arrowhead nor any of its Affiliates or their respective current or former employees, to the best of Arrowhead's knowledge, has misappropriated any of the Arrowhead Know-How from any Third Party, and Arrowhead is not aware of any claim by a Third Party that such misappropriation has occurred.

12.5.3 To the best of Arrowhead's knowledge, Exhibit B-1 and any updates provided thereto, lists all Specific Arrowhead Patent Rights owned solely or jointly by Arrowhead as of the Execution Date (collectively, the "Owned Specific Arrowhead Patent Rights"). To the best of Arrowhead's knowledge, Exhibit B-2 and any updates provided thereto, lists all General Arrowhead Patent Rights owned solely or jointly by Arrowhead as of the Execution Date (collectively, the "Owned General Arrowhead Patent Rights"). To the best of Arrowhead's knowledge, Exhibit B-3 and any updates provided thereto, lists all Specific Arrowhead Patent Rights acquired by Arrowhead from Third Parties, as of the Execution Date (collectively, the "Acquired Specific Arrowhead Patent Rights"). No Third Party has an equal, undivided interest in the Acquired Specific Arrowhead Patent Rights. To the best of Arrowhead's knowledge, Exhibit B-4 and any updates provided thereto, lists all General Arrowhead Patent Rights acquired by Arrowhead from Third Parties, as of the Execution Date (collectively, the "Acquired General Arrowhead Patent Rights"). No Third Party has an equal, undivided interest in the Acquired General Arrowhead Patent Rights. To the best of Arrowhead's knowledge, Exhibit B-5 and any updates provided thereto, lists all Specific and General Arrowhead Patent Rights licensed by Arrowhead from Third Parties (collectively, the "In-Licensed Arrowhead Patent Rights"). To the best of Arrowhead's knowledge (based on all records that Arrowhead possessed and/or were reasonably available to Arrowhead at any time on

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or before the Execution Date), the inventorship named as of the Execution Date in each issued Arrowhead Patent Right is correct.

12.5.4 Except as otherwise disclosed to Janssen with respect to a Target, neither Arrowhead nor, to Arrowhead's knowledge, any of its Third Party licensors of any Arrowhead Intellectual Property, is or has been a party to any agreement with the U.S. federal government or an agency thereof pursuant to which the U.S. federal government or such agency provided funding (such as under a grant or contract) for any research or Development work relating to any currently contemplated Licensed Construct, Primary RNAi Triggers or Licensed Product.

12.5.5 Except as otherwise disclosed to Janssen with respect to a Target, there are no judgments or settlements against or owed by Arrowhead or its Affiliates or to which Arrowhead or its Affiliate is a party or, to the best of Arrowhead's knowledge, pending litigation or litigation threatened in writing, in each case relating to any currently contemplated Licensed Construct, Primary RNAi Triggers or Licensed Product.

12.6 Covenant by Arrowhead to Make Representations and Warranties Regarding Pre-Existing Third Party Agreements. On a Program-by-Program basis, Arrowhead agrees that it will make the following representations and warranties to Janssen in a timely manner at or before the date of Target acceptance under Section 4.1.2:

12.6.1 Arrowhead has provided Janssen with complete, correct and true, reasonably redacted copies of all Pre-Existing Third-Party Agreements (including any amendments thereof) and set them forth in Exhibit E.

12.6.2 Exhibit E lists all the Pre-Existing Third-Party Agreements, including any amendments thereto.

12.6.3 Except as otherwise disclosed to Janssen with respect to the Target, to the best of Arrowhead's knowledge, none of the terms of any Pre-Existing Third Party Agreement would have a material adverse effect on the Development or Commercialization of any Licensed Product or any other product containing a Primary RNAi Trigger as contemplated hereunder. All Pre-Existing Third Party Agreements listed in Exhibit E will remain in full force and effect, except where noted otherwise in Exhibit E, and to its knowledge, Arrowhead and each Third-Party counterparty has been, and is, in compliance in all material respects with the terms thereof. Arrowhead covenants that it shall use Commercially Reasonable Efforts not to take or omit to take any actions that would constitute a breach of any Pre-Existing Third Party Agreement after the acceptance of the Target and during the Term hereof, and Arrowhead agrees not to enter into any amendment to any Pre-Existing Third Party Agreement after the acceptance of the Target or during the Term hereof, in each case which breach or amendment would have a material adverse effect on the Development or Commercialization of any Licensed Product as contemplated hereunder. During the Term Arrowhead shall provide Janssen with prompt notice of the occurrence of any such breach (or receipt of notice of an allegation of any such breach).

12.6.4 Except as otherwise disclosed to Janssen with respect to the Target, the licenses and rights granted by Arrowhead to Janssen under Sections 2.1.2 of this Agreement are not subject to the terms of any Pre-Existing Third Party Agreements.

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12.6.5 Except as otherwise disclosed to Janssen with respect to the Target, to the best of Arrowhead's knowledge, Arrowhead has not entered into, and Arrowhead agrees that, from the date of Target acceptance under Section 4.1.2 and during the Term, it shall not enter into, any agreements with any Third Party by virtue of which any royalty or milestone payment or other payment would be owed by Janssen to such Third Party as a result of Commercialization of any Licensed Product by or on behalf of Janssen as contemplated hereunder.

12.6.6 Except as otherwise disclosed to Janssen with respect to a Target, Arrowhead has not granted any licenses or rights to Third Parties under any Arrowhead Patent Rights or Arrowhead Know-How (a) that conflict with any of the licenses or rights granted by Arrowhead to Janssen under Sections 2.1.2 of this Agreement, or (b) to offer for sale, sell, or otherwise Commercialize any Licensed Constructs, Primary RNAi Triggers or Licensed Products in any field, which license has not expired or been terminated prior to the date of Target acceptance under Section 4.1.2.

12.7 No Warranties. EXCEPT AS OTHERWISE EXPRESSLY SET FORTH IN THIS AGREEMENT, NEITHER PARTY MAKES ANY REPRESENTATION OR EXTENDS ANY WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, TO THE OTHER PARTY, AND EACH PARTY HEREBY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. EACH PARTY HEREBY DISCLAIMS ANY REPRESENTATION OR WARRANTY THAT THE DEVELOPMENT, MANUFACTURE AND COMMERCIALIZATION OF LICENSED PRODUCTS PURSUANT TO THIS AGREEMENT WILL BE SUCCESSFUL OR THAT ANY PARTICULAR SALES LEVEL WITH RESPECT TO LICENSED PRODUCTS WILL BE ACHIEVED.

12.8 No Debarment. Each Party represents and warrants that, as of the Effective Date, neither it nor any of its Affiliates has been debarred or is subject to debarment, and neither Party nor any of its Affiliates will use in any capacity, in connection with the Development, Manufacture or Commercialization of any products, any person who has been debarred pursuant to Section 306 of the United States Federal Food, Drug, and Cosmetic Act, or who is the subject of a conviction described in such section. Each Party agrees to inform the other Party in writing immediately if it or any person who is performing activities hereunder is debarred or is the subject of a conviction described in Section 306 of the United States Federal Food, Drug, and Cosmetic Act, or if any action, suit, claim, investigation or legal or administrative proceeding is pending or, to the best of such Party's knowledge, is threatened, relating to the debarment or conviction of such Party or any person used in any capacity by such Party or any of its Affiliates in connection with the Development, Manufacture or Commercialization of any Licensed Construct or Licensed Products.

12.9 Compliance with Anti-Corruption Applicable Laws. Each Party shall, and shall cause each of its Affiliates and Third Party subcontractors and sublicensees conducting activities hereunder to, comply with Anti-Corruption Laws.

ARTICLE XIII: INDEMNIFICATION AND INSURANCE

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

13.1 Indemnification Obligation. Each Party (the "**Indemnifying Party**") shall indemnify and hold harmless the other Party and its Indemnified Persons (collectively, the "**Indemnified Party**") from and against any and all Losses resulting from any Action brought by a Third Party against any Indemnified Party, to the extent such Losses arise from or are based on a claim ("**Claim**") of: (a) the negligence or wilful misconduct of the Indemnifying Party or any of its Indemnified Persons or Third Party sublicensees or subcontractors, in each case in connection with the exercise of such Indemnifying Party's rights, or performance of such Party's obligations, under this Agreement; (b) the Indemnifying Party's or any of its Indemnified Persons' or Third Party sublicensees' or subcontractors' failure to comply with or perform one or more of such Party's or its Indemnified Persons', as applicable, obligations in this Agreement, or the breach or inaccuracy of one or more of such Indemnifying Party's or its Indemnified Persons', as applicable, warranties in this Agreement; (c) the violation of Applicable Law by the Indemnifying Party or any of its Indemnified Persons or Third Party sublicensees or subcontractors in connection with the exercise of such Indemnifying Party's rights, or performance of such Party's obligations, under this Agreement; (d) the performance of any Development or Manufacturing activities by the Indemnifying Party or any of its Indemnified Persons or Third Party sublicensees or subcontractors hereunder; or (e) in the case of Janssen as the Indemnifying Party, its Commercialization, sales, and distribution of any Licensed Products by any of its Indemnified Persons or any of its Third Party sublicensees hereunder; except in each case (with respect to any such Claims) to the extent such Losses arise directly from the negligence, illegal conduct or wilful misconduct of the Indemnified Party or any of its Indemnified Persons, Third Party subcontractors or Third Party sublicensees.

13.2 Claims for Indemnification.

13.2.1 Notice. In the case of any Action for which an Indemnifying Party may be liable to an Indemnified Person under Section 13.1, the Indemnified Party shall as soon as practicable notify the Indemnifying Party in writing of such Action (a **"Notice of Claim"**). Failure or delay in notifying the Indemnifying Party shall not relieve the Indemnifying Party of any liability it may have to the Indemnified Party, except and only to the extent that such failure or delay causes actual harm to the Indemnifying Party with respect to such Action. The Notice of Claim shall specify in reasonable detail the Action with respect to which such Indemnified Party or any of its Indemnified Persons intends to base a request for indemnification or reimbursement under Section 13.1. Failure to provide such reasonable detail will not relieve the Indemnifying Party of any liability it may have to the Indemnified Party, except and only to the extent that such failure causes actual harm to the Indemnifying Party with respect to such Action. The Indemnified Party shall enclose with the Notice of Claim a copy of all papers served with respect to such Action, if any. The Indemnified Party shall assume the defense, settlement or other disposal of such Action, unless it provides notice within thirty (30) days from the date on which the Indemnifying Party received the Notice of Claim that it waives it right to assume the defense of such Action and any litigation resulting therefrom with counsel of its choice. Provided that the Indemnified Party has waived its right to assume the defense of an Action pursuant to this Section, then, subject to Section 13.2.3, the Indemnifying Party shall have the obligation to defend, settle and otherwise dispose of such Action.

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13.2.2 **Cooperation**. The Parties shall act in good faith in responding to, defending against, settling or otherwise dealing with such Action pursuant to the terms hereof; provided that (a) an Indemnified Party shall not be obligated to enter into or consent to the entry of any judgment or settlement in relation to any Action as provided in Section 13.2.3, and (b) in any event, an Indemnifying Party shall not be relieved of its obligations under this Section 13.2.2 as a result of any failure of the Indemnified Party to cooperate as provided in this Section 13.2.2, except to the extent that the Indemnifying Party is actually prejudiced by such breach. The Parties shall also cooperate in any such defense by giving each other reasonable access to all non-privileged information relevant thereto to the extent permitted by Applicable Law.

13.2.3 **Control by the Indemnifying Party**. If the Indemnifying Party assumes control of an Action in accordance with Section 13.2.1, (a) the Indemnified Party may retain separate co-counsel at its sole cost and expense and participate in the defense of the Action, but the Indemnifying Party shall continue to control the investigation, defense and settlement thereof, and (b) the Indemnifying Party will not, without the prior written consent of the Indemnified Party, which shall not be unreasonably withheld, conditioned or delayed, consent to the entry of any judgment or enter into any settlement with respect to the Action to the extent such judgment or settlement (i) provides for equitable relief (or any other relief other than solely for money damages) against the Indemnified Party or any of its Indemnified Persons, or liability or obligation that cannot be assumed and performed by the Indemnifying Party in full (without any recourse to the Indemnified Party and its Indemnified Persons), (ii) provides for any monetary relief that will not be fully discharged by the Indemnifying Party (without any recourse to the Indemnified Party and its Indemnified Persons) concurrently with the effectiveness of such judgment or settlement, (iii) does not effect a full and unconditional release of the Indemnified Party and its Indemnified Persons with respect to all claims in such Action (or the portion thereof to which the judgment or settlement relates), or (iv) that contains an admission of wrongdoing on the part of the Indemnified Party or its Indemnified Persons.

13.2.4 **Interim Control**. Unless and until the Indemnifying Party (if any) is determined with respect to any particular Action, the Party subject to such Action shall have the right to defend and control such Action, but shall not have the right to consent to the entry of any judgment or enter into any settlement with respect to the Action for which it would be seeking indemnification or reimbursement hereunder without the prior written consent of the other Party (which consent shall not be unreasonably withheld, conditioned or delayed).

13.2.5 **Unauthorized Settlements**. The Indemnified Party will not consent to the entry of any judgment or enter into any settlement with respect to any Action for which it is seeking indemnification hereunder without the prior written consent of the Indemnifying Party (which consent shall not be unreasonably withheld, conditioned or delayed), and such Indemnifying Party shall not be obligated to indemnify or reimburse the Indemnified Party hereunder for any settlement entered into, or any judgment that was consented to, by the Indemnified Party without the Indemnifying Party's prior written consent.

13.2.6 **Allocation**. If, in any Action under this Article XIII, the Indemnified Party incurs an amount consisting of both Losses for which the Indemnifying Party is obliged to indemnify the Indemnified Party and Losses not covered by such indemnification, then, to the extent not otherwise determined in a court of competent jurisdiction, the Parties agree to act in

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good faith and use their reasonable endeavours to determine a fair and reasonable allocation of such Losses. The allocation between the Parties of any such Losses, if not otherwise determined in a court of competent jurisdiction, shall, if the Parties do not reach agreement in writing on such allocation, be determined by arbitration pursuant to Section 16.3. The Parties or the arbitrator, as the case may be, shall make such allocation based on the indemnification and reimbursement principles set forth in this Article XIII. Notwithstanding the foregoing, the Parties shall not be entitled to refer any Dispute with respect to Losses arising under an Action pursuant to this Section 13.2.6 to arbitration to the extent that the liability of either Party for such Losses is being contested in such Action (or any other Action that would be binding with respect to such first Action).

13.3 Mitigation. The Indemnified Party shall, and shall procure that its Indemnified Persons shall, in each instance, take reasonable steps to mitigate any Losses they suffer arising in connection with any Action in respect of which they seek an indemnity from the other Party under this Agreement.

13.4 Conduct of Product Liability Claims. The provisions of this Section 13.4 shall govern with respect to any Third-Party Product Liability Action for which a Party seeks indemnification pursuant to Section 13.1, and the provisions of this Section 13.4 shall control in the event of any conflict between such provisions and those of Section 13.2 above.

13.4.1 Product Liability Actions. A Party becoming aware of any Third Party asserting or filing any product liability Claim or Action based thereon relating to the human use (whether in clinical studies or through Commercialization by Janssen hereunder) of a Licensed Product with alleged defects (whether design defects, manufacturing defects, or defects in sales or promoting) (**"Third-Party Product Liability Action"**) against a Party, shall promptly notify the other Party. In the event a Third-Party Product Liability Action is initiated against a single Party for which it seeks or shall seek indemnification from the other as an Indemnifying Party under Section 13.1, the Indemnifying Party shall have control over such Action. In such case, the Indemnifying Party shall have the right to control the defense of such Action, but shall notify and keep the Indemnified Party apprised in writing of such Action and shall consider and take into account the Indemnified Party's reasonable interests and requests and suggestions regarding the defense of such Action. In the event that a Third-Party Product Liability Action is initiated against both Parties, Janssen shall have control over the response to such Third-Party Product Liability Action.

13.4.2 Cooperation. The non-controlling Party of a Third-Party Product Liability Action shall reasonably cooperate with the controlling Party in the preparation and formulation of a defense to such Third-Party Product Liability Action, and in taking other steps reasonably necessary to respond to such Third-Party Product Liability Action. The controlling Party shall have the sole and exclusive right to select its counsel for the defense of such Third-Party Product Liability Action. If required under Applicable Law in order for the controlling Party to maintain a suit in response to such Third-Party Product Liability Action, the non-controlling Party shall join as a party to the suit. The controlling Party shall assume and pay all of its own Out-of-Pocket Costs incurred in connection with any litigation or proceedings related to such Third-Party Product Liability Action, including the fees and expenses of the counsel selected by it, as well as the reasonable Out-of-Pocket Costs of the non-controlling Party associated with providing assistance requested by the controlling Party or joining the suit if requested by the controlling Party or

required to maintain the suit. Subject to the foregoing, (a) each Party shall be responsible for its legal expenses incurred in such Action, and (b) the non-controlling Party shall have the right, in its discretion and at its expense, to participate and be represented in any such suit by legal counsel selected by the non-controlling Party and reasonably acceptable to the controlling Party. The controlling Party shall not settle or compromise any Third-Party Product Liability Action without the consent of the other Party, which consent shall not be unreasonably withheld.

13.5 Insurance.

13.5.1 Each Party shall procure and maintain in full force and effect insurance (or self-insure sufficiently to provide materially the same level and type of protection) adequate to cover its obligations and liabilities hereunder during the Term and for a period of five years thereafter, consistent with normal business practices of companies similarly situated. It is understood that such insurance shall not be construed to create a limit of either Party's liability with respect to its indemnification obligations under this Agreement.

13.5.2 Prior to the initiation of any clinical study or related Development activities under this Agreement, the Party responsible for the applicable activity shall secure and maintain in full force and effect clinical study insurance (including any self-insured arrangements) in compliance with Applicable Law in those territories where clinical studies are conducted.

13.5.3 The Parties have the right to elect to self-insure all or part of the limits described above. Upon written request, each Party shall provide the other with a certificate of insurance evidencing the required coverage hereunder. Notwithstanding the foregoing, either Party's failure to maintain adequate insurance shall not relieve that Party of its obligations set forth in this Agreement.

13.6 Limitation of Liability. NOTWITHSTANDING THE PROVISIONS OF SECTION 16.3.12, NOTHING HEREIN IS INTENDED TO OR SHALL LIMIT OR RESTRICT THE INDEMNIFICATION RIGHTS OR OBLIGATIONS OF ANY PARTY UNDER THIS ARTICLE XIII.

ARTICLE XIV: SCOPE OF RELATIONSHIP

14.1 Commencing, on a Program-by-Program basis, when Arrowhead provides Janssen with a Target Reply accepting a Target, and continuing until the [**] anniversary of the Effective Date, neither Party shall conduct or participate in, or advise, assist or enable any Third Party to conduct or participate in, the research, Development or Commercialization of any double-stranded RNAi oligonucleotide intended by direct action, on a Program-by-Program basis, on the Target to inhibit the expression of the Target other than the Licensed Product(s).

14.2 Commencing, on a Program-by-Program basis, when Arrowhead provides Janssen with a Target Reply accepting a Target, and continuing [**], neither Party or its Affiliates shall conduct or participate in, or advise, assist or enable any Third Party to conduct or participate in, or fund any work with respect to, on a Program-by-Program basis, any Primary RNAi Trigger for any purpose other than the exploitation of Licensed Constructs or Licensed Products in accordance with the terms of this Agreement.

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14.3 Except for the restrictions expressly set forth in this Agreement, nothing in this Agreement shall be construed to restrict the right of either Party or any of its Affiliates to engage in any business activity, investment or other opportunity anywhere in the world, including the right of Janssen or Arrowhead or any of their Affiliates to research, Develop and Commercialize any product that directly or indirectly competes with a Licensed Product in any field.

ARTICLE XV: TERM AND TERMINATION

15.1 Agreement Term. Unless terminated earlier in accordance with this Article XV, on a Program-by-Program basis, the term of this Agreement (the **"Term"**) shall commence on the Effective Date and shall expire upon the expiration of the Royalty Term for any Licensed Product sold hereunder.

15.2 Early Termination for Breach.

15.2.1 Notice of Default and Cure Period. Upon any material breach of this Agreement by a Party (the **"Breaching Party"**), the other Party (the **"Non-Breaching Party"**) shall have the right to give the Breaching Party notice specifying the nature of such material breach. If the breach of this Agreement is curable, then the Breaching Party shall have a period of [**] from the date of receipt of the notice (the **"Cure Period"**) to cure such material breach in a manner that effectively remedies the harm to the Non-Breaching Party caused by the material breach. Notwithstanding the foregoing, if such breach, by its nature, is curable, but is not reasonably curable within the Cure Period, then provided that such breach is not of a payment obligation hereunder, such Cure Period shall be extended if the Breaching Party provides a written plan for curing such breach to the Non-Breaching Party and uses Commercially Reasonable Efforts to cure such breach in accordance with such written plan, provided that no such extension shall exceed [**] (for an extended Cure Period totaling [**]) without the consent of the Non-Breaching Party. For clarity, this provision shall not restrict in any way either Party's right to notify the other Party of any other breach or to demand the cure of any other breach.

15.2.2 Termination Right for Default. The Non-Breaching Party shall have the right to terminate this Agreement on a Program-by-Program basis with immediate effect by written notice to the Breaching Party: (a) in the event the Breaching Party does not notify the Non-Breaching Party within [**] of its notice under Section 15.2.1 that the Breaching Party disputes that it has committed a material breach or that it intends to cure such breach in accordance with Section 15.2.1; (b) in the event that the Breaching Party has not cured the material breach within the Cure Period; and (c) in the event that the material breach is not curable. Notwithstanding the foregoing, if a Party in good faith raises a Dispute regarding any such termination (including with respect to the existence or materiality of a breach or the sufficiency of a cure) pursuant to the Dispute resolution procedures under Sections 16.1 to 16.3, such termination shall be effective only upon a conclusion of the Dispute resolution procedures in Sections 16.1 to 16.3 resulting in a determination that there has been an uncured material breach (or, if earlier, abandonment of the Dispute by the Breaching Party). For the avoidance of doubt, the exercise of a termination right under this Section 15.2 by a Non-Breaching Party shall be without prejudice to its right to seek damages or any other remedy on account of the Breaching Party's material breach that may be available at law or in equity, subject to the terms hereof.

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15.3 Early Termination for Bankruptcy.

15.3.1 In the event of the Bankruptcy of a Party (or its successor in interest in the event this Agreement is assigned as permitted hereunder), the other Party may terminate this Agreement with immediate effect by written notice to the bankrupt Party.

15.3.2 All licenses and other rights granted pursuant to this Agreement by one Party to the other are, and will otherwise be deemed to be, for purposes of Section 365(n) of the U.S. Bankruptcy Code (or comparable provisions of laws of other jurisdictions), licenses of right to "intellectual property" as defined under Section 101 of the U.S. Bankruptcy Code (or comparable provisions of Applicable Laws of other jurisdictions). Notwithstanding anything to the contrary herein, the Parties agree that, in lieu of a Party who is licensed (or sublicensed) any rights from a Party in Bankruptcy terminating this Agreement in its entirety as provided in Section 15.3.1 above: (a) the Party who is a licensee of such rights from the other Party under this Agreement shall, upon such other Party's Bankruptcy, retain and may fully exercise all of the rights and elections under the U.S. Bankruptcy Code (or comparable Applicable Laws of other jurisdictions); and (b) in the event of the commencement of a bankruptcy proceeding by or against a Party under the U.S. Bankruptcy Code (or comparable provisions of Applicable Laws of other jurisdictions), the Party that is not a party to such Bankruptcy proceeding shall be entitled to a complete duplicate of (or complete access to, as appropriate) any such intellectual property and all embodiments of such intellectual property to which it is granted license or other rights hereunder, and the same, if not already in its possession, will be promptly delivered to it (i) upon any such commencement of a bankruptcy proceeding upon its written request therefor, unless the Party subject to such proceeding elects to continue to perform all of its obligations under this Agreement, or (ii) if not delivered under subsection (i) above, following the rejection of this Agreement by or on behalf of the Party subject to such proceeding upon written request therefor by the non-subject Party. All rights, powers and remedies granted hereunder to a Party as a licensee of any intellectual property rights as provided in this Section are in addition to and not in substitution for any and all other rights, powers and remedies now or hereafter existing at law or in equity, in the event of the commencement of a bankruptcy proceeding by or against the granting Party under Applicable Law, and the licensee Party, in addition to the rights, powers and remedies expressly provided herein, shall be entitled to exercise all other such rights and powers and resort to all other such remedies as may now or hereafter exist at law or in equity in such event.

15.4 Termination by Janssen for Safety Concern. Janssen may terminate this Agreement on a Program-by-Program basis with immediate effect by written notice to Arrowhead in the event that Janssen determines, in its good-faith judgment, that continued Development or Commercialization of a Licensed Product would be unethical or unreasonable due to a safety-related reason, such as if Janssen believes, based on its good-faith assessment of relevant data, that continuation of human use of a Licensed Product has resulted in, or has a significant risk of resulting in, the occurrence of a safety or tolerability finding that would raise material concerns regarding the clinical benefit of the Licensed Product for its target population (for example, harm significantly in excess of an acceptable side-effect profile). Such termination shall be effective immediately upon Janssen's written notice to Arrowhead.

15.5 Discretionary Termination by Janssen. Janssen shall have the right to terminate this Agreement in its entirety, or on a Program-by-Program basis, for convenience at any time by

written notice, which termination shall be effective (a) [**] from the date of such notice in the event that notice is given prior to the First Commercial Sale of any Licensed Product; and (b) [**] from the date of such notice in the event that notice is given following the First Commercial Sale of any Licensed Product.

15.6 Consequences of Early Termination. Upon the effective date of early termination of this Agreement, the following shall apply:

15.6.1 Licenses.

(a) With the exception of the licenses granted in Section 2.1.3, the licenses and other rights granted by one Party to the other in Article II shall terminate and revert to the granting Party with respect to the Agreement or a Program, as applicable, except to the extent necessary to enable the grantee Party (or its Affiliates) to perform any obligations or exercise any rights that survive such termination of this Agreement as may be expressly provided in this Agreement or in any written agreement of the Parties;

(b) In the event of an early termination of this Agreement in its entirety or with respect to a Program by Janssen pursuant to Sections 15.4 or 15.5, Janssen shall, subject to Section 2.3, on a Program-by-Program basis grant Arrowhead, upon Arrowhead's request, a worldwide, royalty-free, perpetual, exclusive (even as to Janssen, except to the extent Janssen expressly retains rights under this Agreement) license under Patent Rights and Know-How Controlled by Janssen to Develop or Commercialize Licensed Products which are actively in clinical Development or Commercialized at the time of termination. Such Patent Rights and Know-How shall be limited to those reasonably necessary or useful to continue the Development or Commercialization of such Licensed Products. In the event of such license grant, Janssen and its Affiliates shall retain a non-exclusive license to such licensed rights for research purposes.

15.6.2 Patent Matters. On a Program-by-Program basis, Arrowhead shall assume from Janssen the sole responsibility for the Prosecution, defense and enforcement of any Arrowhead Patent Rights for which Janssen was the Party responsible for Prosecution. Upon Arrowhead's request, Janssen shall reasonably cooperate in transferring to Arrowhead responsibility for the Prosecution, defense and enforcement of such Arrowhead Patent Rights, and shall provide Arrowhead with copies, at Arrowhead's expense, of any requested documents in its possession relating thereto.

15.6.3 Transfer of Know-How. In the event of an early termination of this Agreement in its entirety or with respect to a Program by Janssen pursuant to Sections 15.4 or 15.5, Janssen shall, on a Program-by-Program basis, provide to Arrowhead all Know-How generated by Janssen under this Agreement, that is reasonably necessary or useful to continue the Development or Commercialization of Licensed Products which are actively in clinical Development or Commercialized at the time of termination, except that Janssen shall not provide to Arrowhead Know-How in relation to (a) an Active Ingredient of any Combination Product, whether in Development or Commercialized, where the Active Ingredient is not a Licensed Construct, (b) a product of such Combination Product that is not a Licensed Product, or (c) an Active Ingredient, other than a Licensed Construct, that is otherwise used in combination with a

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Licensed Product in pre-clinical research, clinical studies or in accordance with an approved product label.

15.6.3 Remaining Inventory. Janssen (and its Affiliates and sublicensees), with Arrowhead's consent, which will not be unreasonably withheld, shall have the right to sell or have sold any remaining inventory of Licensed Products following the effective date of termination of the Agreement.

15.6.4 Clinical Studies. Where any clinical study of any Licensed Product is ongoing upon termination, each Party shall continue, at its cost, the clinical study for which it, its Affiliate, (sub)contractor or sublicensee is the regulatory sponsor, solely as deemed necessary by such Party based on reasonable medical judgment to protect the safety, health or welfare of subjects participating in the relevant clinical study, until such point as the study is completed or, if earlier, such Party determines that it is ethical to terminate such study or otherwise cease supporting it.

15.6.5 Orderly Wind-Down. Upon early termination, the Parties shall coordinate in good faith to wind down Development, Manufacturing, and Commercialization activities under this Agreement relating to any Licensed Products ongoing at the effective date of such termination, including the withdrawal of any Licensed Products from the market, the withdrawal of any Regulatory Approvals pertaining to any Licensed Products and a final reconciliation of all payments due under this Agreement. For clarity, following any early termination neither Party may submit or resubmit any Drug Application for a Licensed Product, following such termination, except if, and to the extent, this Agreement or any other written agreement between the Parties expressly provides that a Party may otherwise do so.

15.6.6 No Waiver for Termination Due to Breach. For the avoidance of doubt, an aggrieved Party that terminates this Agreement, for material breach may also seek damages and other relief for such material breach and (for the avoidance of doubt) for any other breach of this Agreement.

15.7 Return of Confidential Information. Upon expiration or early termination of this Agreement in its entirety or on a Program-by-Program, as applicable, a receiving Party shall, on a Program-by-Program basis, at the other Party's request (and to the extent and when permitted by Applicable Law), destroy, redact, or return, and cause its Affiliates and Third Party subcontractors and sublicensees to destroy, redact, or return all records to the extent containing, and all materials constituting, the other Party's Confidential Information in its possession and control, and, upon request, provide written certification of such destruction, redaction, or return, except that: (a) the receiving Party may retain in strict confidence one copy of the other Party's Confidential Information for the receiving Party's legal archival purposes; and (b) the foregoing requirement to destroy, redact, or return the other Party's Confidential Information shall not apply with respect to any such Confidential Information of the disclosing Party to the extent that this Agreement or any other written agreement between the Parties (or their respective Affiliates) expressly provides that a Party retains the right to use such Confidential Information (such as by virtue of being a joint owner, or by survival of Janssen's license rights on a paid-up basis following expiration (without early termination) of this Agreement).

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15.8 Survival. In the event of expiration or termination of this Agreement in its entirety or on a Program-by-Program basis for any reason, the provisions of Articles I, IX (with respect to accrued payment obligations), XI, XII, XIII, XV, XVI, and XVII and Sections 2.1.3, 2.3, 2.4, 5.7, 10.2, and 10.3.3(c) shall survive, as well as any other provisions that, as apparent from their nature and context are intended to continue or to remain (such as for interpretation purposes). For clarity, Article XIV shall not survive the termination of this Agreement. Further for the avoidance of doubt, upon such expiration or termination of this Agreement, for any reason, neither Party shall be released from any obligation that accrued prior to the end of the Term hereof. Accordingly, termination or expiration of the Agreement, in whole or in part (including relinquishment of any license right granted hereunder) for any reason, shall be without prejudice to any obligations that accrued prior to such termination or expiration, including any payments due hereunder (regardless of when payable) and any and all damages arising from any breach. In addition, any payments accrued prior to such termination or expiration shall become payable upon the effective date of such termination or expiration or at such earlier time as otherwise provided hereunder.

ARTICLE XVI: DISPUTE RESOLUTION

16.1 Referral to Executive Officers. In the event of a Dispute, except for a Patent Controversy, either Party may refer the matter to the Parties' Executive Officers for attempted resolution. The Executive Officers, in the presence of their legal advisors, shall attempt in good faith to resolve any Dispute through negotiations. If the Executive Officers are unable to resolve a Dispute referred to them within ten (10) Business Days (or such other period as may be agreed by the Parties in writing) after such referral, and subject to any other provisions of this Agreement, such Dispute shall be resolved as provided below in this Article.

16.2 Mediation. If the Executive Officers are unable to resolve a Dispute referred to them pursuant to Section 16.1 within ten (10) Business Days (or such other period as may be agreed by the Parties in writing) after such referral, the Parties shall first attempt in good faith to resolve any Dispute by confidential mediation in accordance with the then-current Mediation Procedure of the International Institute for Conflict Prevention and Resolution ("**CPR Mediation Procedure**") (www.cpradr.org) before initiating arbitration. The CPR Mediation Procedure shall control, except where it conflicts with these provisions, in which case these provisions control. The mediator shall be chosen pursuant to CPR Mediation Procedure. The mediation shall be held in New York, New York. Either Party may initiate mediation by written notice to the other Party. The Parties agree to select a mediator within twenty (20) days of the notice and the mediation will begin promptly after the selection. The mediation will continue until the mediator, or either Party, declares in writing, no sooner than after the conclusion of one full day of a substantive mediation conference attended on behalf of each Party by a senior business person with authority to resolve the Dispute, that the Dispute cannot be resolved by mediation. In no event, however, shall mediation continue more than sixty (60) days from the initial notice by a Party to initiate meditation unless the Parties agree in writing to extend that period. Any period of limitations that would otherwise expire between the initiation of mediation and its conclusion shall be extended until twenty (20) days after the conclusion of the mediation. No discussions between the Parties attempting to resolve a Dispute under Section 16.1 or this Section 16.2 shall be admissible in arbitration of the Dispute.

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16.3 Arbitration. If the Parties fail to reach resolution pursuant to mediation in accordance with Section 16.2 above, and a Party desires to pursue resolution of a Dispute, then the Dispute shall be submitted by either Party for resolution in arbitration pursuant to the then current CPR Non-Administered Arbitration Rules ("**CPR Rules**") (www.cpradr.org), except where they conflict with these provisions, in which case these provisions control.

16.3.1 The arbitration will be held in New York, New York. All aspects of the arbitration shall be treated as confidential.

16.3.2 The arbitrators will be chosen from the CPR Panel of Distinguished Neutrals, unless a candidate not on such panel is approved by both Parties. Each arbitrator shall be a lawyer with at least 15 years' experience with a law firm or corporate law department of over 25 lawyers or who was a judge of a court of general jurisdiction. To the extent that the Dispute requires special expertise, the Parties will so inform CPR prior to the beginning of the selection process.

16.3.3 The arbitration tribunal shall consist of three arbitrators, of whom each Party shall designate one in accordance with the "screened" appointment procedure provided in CPR Rule 5.4. The chair will be chosen in accordance with CPR Rule 6.4. If, however, the aggregate award sought by the Parties is less than $5 million and equitable relief is not sought, a single arbitrator shall be chosen in accordance with the CPR Rules.

16.3.4 Candidates for the arbitrator position(s) may be interviewed by representatives of the Parties in advance of their selection, provided that all Parties are represented.

16.3.5 The Parties agree to select the arbitrator(s) within 45 days of initiation of the arbitration. The hearing will be concluded within nine (9) months after selection of the arbitrator(s) and the award will be rendered within sixty (60) days of the conclusion of the hearing, or of any post hearing briefing, which briefing will be completed by both sides within forty-five (45) days after the conclusion of the hearing. In the event the Parties cannot agree upon a schedule, then the arbitrator(s) shall set the schedule following the time limits set forth above as closely as practical.

16.3.6 The Parties shall have the right to conduct and enforce pre-hearing discovery in accordance with the then current Federal Rules of Civil Procedure, unless otherwise agreed by the Parties in writing. All discovery conducted pursuant to the arbitration proceedings will be subject to the then current Federal Rules of Civil Procedure, unless otherwise agreed by the Parties in writing.

16.3.7 The hearing will be concluded in ten (10) hearing days or less. Multiple hearing days will be scheduled consecutively to the greatest extent possible. A transcript of the testimony adduced at the hearing shall be made and shall be made available to each Party.

16.3.8 The arbitrator(s) shall decide the merits of any Dispute in accordance with the law governing this Agreement, without application of any principle of conflict of laws that would result in reference to a different law. The arbitrator(s) may not apply principles such as "amiable compositeur" or "natural justice and equity."

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16.3.9 The arbitrator(s) are expressly empowered to decide dispositive motions in advance of any hearing and shall endeavor to decide such motions as would a United States District Court Judge sitting in the jurisdiction whose substantive law governs.

16.3.10 The arbitrator(s) shall render a written opinion stating the reasons upon which the award is based. The Parties consent to the jurisdiction of the United States District Court for the district in which the arbitration is held for the enforcement of these provisions and the entry of judgment on any award rendered hereunder. Should such court for any reason lack jurisdiction, any court with jurisdiction may act in the same fashion.

16.3.11 Each Party has the right to seek from the appropriate court provisional remedies such as attachment, preliminary injunction, replevin, etc. to avoid irreparable harm, maintain the status quo, or preserve the subject matter of the Dispute. Rule 14 of the CPR Rules does not apply to this Agreement.

16.3.12 EACH PARTY HERETO WAIVES: ITS RIGHT TO TRIAL BY JURY OF ANY ISSUE UNDERLYING A DISPUTE WITHIN THE SCOPE OF THE SECTIONS 16.2 or 16.3; AND, WITH THE EXCEPTION OF RELIEF MANDATED BY STATUTE, ANY CLAIM FOR PUNITIVE, EXEMPLARY, MULTIPLIED, INDIRECT, OR CONSEQUENTIAL DAMAGES OR ATTORNEY FEES.

16.4 Interim or Provisional Relief. Nothing in this Agreement, including Section 16.5, shall preclude either Party from seeking interim or provisional relief in any court of competent jurisdiction, including a temporary restraining order, preliminary injunction or other interim equitable relief concerning a Dispute with the other Party, either prior to or during the dispute resolution procedures set forth in this Article XVI, to protect the interests of such Party.

16.5 Consent to Jurisdiction. Each Party, for the purpose of enforcing an award under Section 16.3 or for seeking interim or provisional relief as contemplated in Section 16.4 with respect to any Disputed breach of this Agreement, agrees not to raise any objection at any time to the laying or maintaining of the venue of any action, suit or proceeding for such purpose in any state or federal Court sitting in New York, irrevocably waives any claim that such action, suit or other proceeding has been brought in an inconvenient forum, and further irrevocably waives the right to object, with respect to such action, suit or other proceeding, that such Court does not have any jurisdiction over such Party. Each Party further agrees that service of any process, summons, notice or document by registered mail to such Party's notice address provided for in this Agreement shall be effective service of process for any action, suit or proceeding in the Court with respect to any matters to which it has submitted to jurisdiction in this Section 16.5.

16.6 No Claims against Employees. Each Party undertakes to make no claim and bring no proceedings in connection with this Agreement or its subject matter against any director, officer, employee or agent of the other Party (apart from claims based on fraud or willful misconduct). This undertaking is intended to give protection to individuals: it does not prejudice any right which a Party might have to claim against another Party.

ARTICLE XVII: MISCELLANEOUS

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17.1 Assignment; Successors.

17.1.1 Assignment; Successors. The terms and provisions hereof shall inure to the benefit of, and be binding upon, the Parties and their respective successors and permitted assigns. Except as expressly permitted in this Agreement, neither Party may, without the prior written consent of the other Party, assign or otherwise transfer this Agreement. Notwithstanding the foregoing, (a) either Party, without such consent, may assign or otherwise transfer this Agreement and its rights and obligations hereunder in whole or in part to an Affiliate; provided, that, except as set forth in clause (b) below, such assignment or transfer to an Affiliate shall terminate automatically at such time, if any, as such Affiliate ceases to be wholly-owned, directly or indirectly, by Arrowhead or Johnson & Johnson (the New Jersey corporation), as the case may be, unless such Affiliate owns (i) more than fifty percent (50%) of the voting equity of Arrowhead or Janssen, or (ii) substantially all the assets of Arrowhead and its Affiliates or Janssen and its Affiliates, as the case may be, relating to the Licensed Product, and (b) either Party, without such consent, may assign its rights under this Agreement, whether by contract or operation of law, to any Third Party that acquires all or substantially all of the business or assets of such Party (whether by merger, reorganization, acquisition, sale or otherwise) relating to the Licensed Product. No assignment of this Agreement to a Third Party shall be valid and effective unless and until the assignee agrees in writing to be bound by all of the terms and conditions of this Agreement and all Ancillary Agreements surviving such assignment. Any assignment of this Agreement not in accordance with this Section 17.1 shall be null and void.

17.1.2 Rights Not Diminished. Subject to the terms and conditions hereof, no right of a Party shall be diminished and no obligation of a Party increased during the Term as a result of a permitted assignment by the other Party to a Third Party hereunder, including as a result of a Change of Control of the other Party.

17.2 Waiver. The failure of any Party to assert a right hereunder or to insist upon compliance with any term or condition of this Agreement shall not constitute a waiver of that right or excuse a similar subsequent failure to perform any such term or condition by the other Party. No waiver shall be effective unless it has been given in writing and signed by the Party giving such waiver. The exercise of any right hereunder by a Party in the event of the other's default does not constitute an election of remedies or prevent the exercise of any or all other rights (all rights and remedies being cumulative).

17.3 Choice of Law. This Agreement, its interpretation, construction and performance and the rights granted and obligations arising hereunder, shall be governed by, and construed in accordance with, the laws of the State of New York of the United States of America, exclusive of its conflicts of law rules.

17.4 Notices. All notices given under this Agreement by either Party to the other Party shall be in the English language, in writing (which shall exclude e-mail),and shall refer specifically to this Agreement and shall be delivered personally, sent by nationally-recognized overnight courier or sent by registered or certified mail, postage prepaid, return receipt requested, to the following respective addresses (or to such other address as may be specified by notice from time to time by the relevant Party):

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If to Arrowhead:	Arrowhead Pharmaceuticals, Inc. 225 S. Lake Ave, Suite 1050 Pasadena, CA 91101 Attention: General Counsel
With a copy to:	Gibson Dunn & Crutcher 555 Mission Street, Suite 3000 San Francisco, CA 94105 Attention: Ryan Murr
If to Janssen:	Janssen Pharmaceuticals, Inc. 1125 Trenton-Harbourton Road Titusville, NJ 08560
With a copy to:	Office of the General Counsel Johnson & Johnson One Johnson & Johnson Plaza New Brunswick, NJ 08933 Attention: General Counsel, Pharmaceuticals

17.4.1 Without prejudice to any earlier time at which a notice may be actually given and received, a properly addressed notice shall in any event be deemed to have been received: (a) when delivered, if personally delivered during the recipient's normal business hours; (b) on the Business Day after dispatch, if sent by nationally-recognized overnight courier and proof of delivery is obtained; and (c) on the third (3rd) Business Day following the date of mailing, if sent by mail.

17.4.2 Where proceedings have been commenced in any arbitration hereunder or court of competent jurisdiction, any documents issued in the course of those proceedings will be served in accordance with the procedural rules governing the service of documents in those proceedings.

17.4.3 This Section 17.4 shall apply to notices required to be given by one Party to the other under this Agreement. Other communications between the Parties that are routine in nature, such as communications between Alliance Managers or the Parties' members of the JSC regarding their ongoing activities performed in the ordinary course of their work under this Agreement, may be made via e-mail. All notices and communications between the Parties hereunder shall be in the English language.

17.5 Severability. If the whole or any provision of this Agreement is held to be invalid, illegal or unenforceable in any jurisdiction for any reason, then, to the fullest extent permitted by Applicable Law, (a) in the case of the illegality, invalidity or unenforceability of the whole of this Agreement, it shall terminate in relation to the jurisdiction in question; and (b) in the case of illegality, invalidity or unenforceability of any provision of this Agreement, that part shall be severed from this Agreement in the jurisdiction in question (but shall remain in full force and effect

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in all other jurisdictions) and (i) all other provisions hereof shall remain in full force and effect in the relevant jurisdiction and shall be liberally construed in order to carry out the intent of the Parties as nearly as may be possible, and (ii) the Parties agree to use reasonable efforts to negotiate a provision, in replacement of the provision held invalid, illegal or unenforceable, that is consistent with Applicable Law in the relevant jurisdiction and accomplishes, as nearly as possible, the original intention of the Parties with respect thereto.

17.6 Integration. This Agreement constitutes the entire agreement between the Parties hereto with respect to the subject matter of this Agreement and supersedes all previous agreements (executed before the Execution Date hereof), whether written or oral. The terms of this Agreement may be amended only in writing signed by duly authorized representatives of each of the Parties. In the event of a conflict between any terms of any exhibit or other appendix to this Agreement and the body of this Agreement, the body of this Agreement shall control.

17.7 Independent Contractors; No Agency. Neither Party shall have any responsibility for the hiring, firing or compensating the other Party's employees or agents for any employee benefits. No employee or representative of a Party, including any of its (or its Affiliates') JSC members, shall have any authority to bind or obligate the other Party to this Agreement to pay any sum or in any manner whatsoever, or to create or impose any contractual or other liability on the other Party. For all purposes and notwithstanding any other provision of this Agreement to the contrary, nothing in this Agreement shall be construed as establishing a partnership or joint venture relationship between the Parties.

17.8 Performance by Affiliates. Except as expressly prohibited hereunder, either Party may use one or more of its Affiliates to perform its obligations and duties hereunder, provided that such Party shall remain liable hereunder for the timely payment and performance of all of its obligations and duties hereunder.

17.9 Force Majeure. No Party shall be deemed to have defaulted under or breached this Agreement for failure or delay in fulfilling or performing any term of this Agreement, except for the payment of any amounts under this Agreement, when such failure or delay is caused by or results from causes beyond the reasonable control of the non-performing Party, including fires, floods, embargoes, shortages, epidemics, quarantines, war, acts of war (whether war be declared or not), terrorism, insurrections, riots, civil commotion, acts of God or acts, omissions or delays in acting by any Governmental Authority. The non-performing Party shall notify the other Party of such force majeure within five (5) Business Days after such occurrence by giving written notice to the other Party stating the nature of the event, its anticipated duration, and any action being taken to avoid or minimize its effect. The suspension of performance shall be of no greater scope and no longer duration than is necessary and the non-performing Party shall use, throughout the period of suspension of performance, Commercially Reasonable Efforts to remedy its inability to perform; provided, however, that in the event the suspension of performance continues for ninety (90) days after the date such force majeure commences, the Parties shall meet to discuss in good faith how to proceed in order to accomplish the objectives of this Agreement; and provided, further, however, that if the suspension of performance continues for more than one (1) year after the date such force majeure commences, either (a) Janssen in the event that Arrowhead is the non-performing Party, or (b) Arrowhead in the event that Janssen is the non-performing Party, shall have the right to terminate this Agreement upon notice to non-performing Party. For purposes of

this Agreement a force majeure shall not include a failure to commit sufficient resources, financial or otherwise, to the activities to be conducted pursuant to this Agreement or general market or economic conditions.

17.10 Construction. The headings used herein are for reference and convenience only, and will not enter into the interpretation of this Agreement. References to Sections include subsections, which are part of the related Section. Except as otherwise explicitly specified to the contrary, (a) references to a Section, Article, or Exhibit means a Section or Article of, or Exhibit to, this Agreement and all subsections thereof, unless another agreement is specified; (b) references to a particular statute or regulation include all rules and regulations thereunder and any successor statute, rules or regulations then in effect, in each case, including any then-current amendments thereto; (c) words in the singular or plural form include the plural and singular form, respectively; (d) capitalized terms not expressly defined herein that are corollaries (such as pluralizations and changes in tense) to capitalized terms defined herein shall have the corresponding meanings (e) unless the context requires a different interpretation, the word “or” has the inclusive meaning that is typically associated with the phrase “and/or”; (f) terms “including,” “include(s),” “such as,” and “for example” as used in this Agreement mean including the generality of any description preceding such term and will be deemed to be followed by “without limitation”; (g) whenever this Agreement refers to a number of days, such number will refer to calendar days unless Business Days are specified; (h) “herein”, “hereunder”, “hereof”, and the like shall be understood to refer to this Agreement in its entirety, and not the particular provision or Section in which they appear; (i) references to a particular Party include such Party's successors and assigns to the extent not prohibited by this Agreement; (j) all words used in this Agreement will be construed to be of such gender or number as the circumstances require; (k) references to "persons" includes individuals, bodies corporate (wherever incorporated), unincorporated associations and partnerships; (l) the words "comprise", "comprising", "contain", "containing", "include" and "including" are used in their open, non-limiting form, and shall be understood to include the words "without limitation" even if not expressly stated; (m) all references to "dollars" or "$" shall mean United States dollars.

17.11 HSR Clearance; Termination Upon HSR Denial. If either or each of the Parties reasonably determines that an HSR Filing is required by Applicable Law to consummate the transactions contemplated hereunder, each Party shall, within ten (10) Business Days of the Execution Date (or such later time as may be agreed to in writing by the Parties), file with the United States Federal Trade Commission and the Antitrust Division of the United States Department of Justice, and/or with any equivalent Governmental Authority in any other country, as the case may be, any HSR Filing under the HSR Act with respect to the transactions contemplated hereunder. Each Party shall use reasonable efforts to do, or cause to be done, all things necessary, proper and advisable to, as promptly as practicable, take all actions necessary to make the HSR Filings required of any of the Parties or their respective Affiliates under the HSR Act. The Parties shall cooperate with one another to the extent reasonably necessary in the preparation of any such HSR Filing. Each Party shall be responsible for its own Out-of-Pocket Costs and expenses, including filing fees, associated with any HSR Filing. If the Parties make an HSR Filing hereunder, then this Agreement shall terminate (a) at the election of either Party, immediately upon notice to the other Party, if the U.S. Federal Trade Commission or the U.S. Department of Justice, or an equivalent Governmental Authority outside of the United States, seeks a preliminary injunction under the antitrust or competition laws against any Party to enjoin the

transactions contemplated by this Agreement or takes a final decision by which it refuses to provide its approval to the transactions contemplated by this Agreement where such approval is required by Applicable Law; (b) at the election of either Party, immediately upon notice to the other Party, in the event that the United States Federal Trade Commission or the United States Department of Justice, or an equivalent Governmental Authority outside of the United States, obtains a preliminary injunction under the antitrust or competition laws against any Party to enjoin the transactions contemplated by this Agreement; or (c) at the election of either Party, immediately upon notice to the other Party, in the event that the date of HSR Clearance shall not have occurred on or prior to ninety (90) days after the effective date of the HSR Filing.

17.12 Execution in Counterparts; Facsimile Signatures. This Agreement may be executed in counterparts, each of which counterparts, when so executed and delivered, shall be deemed to be an original, and all of which counterparts, taken together, shall constitute one and the same instrument even if both Parties have not executed the same counterpart. Facsimile or portable document format (i.e., .pdf), execution and delivery of this Agreement by a Party constitutes a legal, valid and binding execution and delivery of this Agreement by such Party.

[Remainder of this page intentionally blank.]

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IN WITNESS WHEREOF, each Party has caused this Agreement to be duly executed by its authorized representative on the respective date written herein below.

Arrowhead Pharmaceuticals, Inc.

By:/s/ Christopher Anzalone
Name: Christopher Anzalone, Ph.D.
Title: President and CEO
Date: October 3, 2018

Janssen Pharmaceuticals, Inc.

By:/s/ Flavia Pearse
Name: Flavia Pearse
Title: Treasurer
Date: October 3, 2018

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Exhibit A

Access Territory

[**]

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Exhibit B

Arrowhead Patent Rights

[To be amended upon selection of a Target]

Exhibit B-1

Owned Specific Arrowhead Patent Rights

[To be amended upon selection of a Target]

Exhibit B-2

Owned General Arrowhead Patent Rights

[To be amended upon selection of a Target]

Exhibit B-3

Acquired Specific Arrowhead Patent Rights

[To be amended upon selection of a Target]

Exhibit B-4

Acquired General Arrowhead Patent Rights

[To be amended upon selection of a Target]

Exhibit B-5

In-Licensed Arrowhead Patent Rights

Specific	General
[To be amended upon selection of a Target]	[To be amended upon selection of a Target]

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Exhibit C

General Outline of Research Plan

[**]

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Exhibit D

[Intentionally Left Blank]

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Exhibit E

Pre-Existing Third Party Agreements

Section 1. Pre-Existing Licenses to Third Parties

[To be amended upon selection of a Target]

Section 2. Pre-Existing Licenses from Third Parties

[To be amended upon selection of a Target]

Section 3. Pre-Existing Acquired Rights from Third Parties

[To be amended upon selection of a Target]

Section 4. Additional Pre-Existing Third Party Agreements

[To be amended upon selection of a Target]

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Exhibit F

Janssen Universal Calendar for 2018

	M	T	W	T	F	S	S
	1	2	3	4	5	6	7
JAN	8	9	10	11	12	13	14
(4 Weeks)	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				
FEB				1	2	3	4
(4 Weeks)	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28				
				1	2	3	4
MAR	5	6	7	8	9	10	11
(5 Weeks)	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	
							1
	2	3	4	5	6	7	8
APR	9	10	11	12	13	14	15
(4 Weeks)	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30						
MAY		1	2	3	4	5	6
(4 Weeks)	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31			
					1	2	3
JUN	4	5	6	7	8	9	10
(5 Weeks)	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	
							1

	M	T	W	T	F	S	S
	2	3	4	5	6	7	8
JUL	9	10	11	12	13	14	15
(4 Weeks)	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					
AUG			1	2	3	4	5
(4 Weeks)	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31		
						1	2
SEP	3	4	5	6	7	8	9
(5 Weeks)	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	1	2	3	4	5	6	7
OCT	8	9	10	11	12	13	14
(4 Weeks)	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				
NOV				1	2	3	4
(4 Weeks)	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30		
						1	2
DEC	3	4	5	6	7	8	9
(5 Weeks)	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30

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Exhibit G

Initial Press Releases

Arrowhead's press release

PRESS RELEASE
Oct. 4, 2018

Arrowhead Enters $3.7 Billion License and Collaboration Agreements with Janssen

- Upon closing, Arrowhead to receive $250 million, consisting of $175 million upfront payment from Janssen and $75 million equity investment from Johnson & Johnson Innovation – JJDC, Inc.
- Arrowhead eligible to receive additional $3.5 billion in potential milestone payments, and potential further royalties on commercial sales
- Janssen to receive a worldwide exclusive license for ARO-HBV and an option to collaborate on up to three new targets
- Arrowhead will hold a conference call and webcast today, Oct. 4, at 8:30 a.m. ET

PASADENA, Calif., Oct. 4, 2018 — Arrowhead Pharmaceuticals Inc. (NASDAQ: ARWR) today announced that it entered into a license and collaboration agreement with Janssen Pharmaceuticals, Inc., part of the Janssen Pharmaceutical Companies of Johnson & Johnson, to develop and commercialize ARO-HBV. In addition, Arrowhead entered into a research collaboration and option agreement with Janssen to potentially collaborate for up to three additional RNA interference (RNAi) therapeutics against new targets to be selected by Janssen. The transactions have a combined potential value of over $3.7 billion for Arrowhead.

Under the terms of the agreement, Arrowhead will receive $175 million as an upfront payment. Separately, Johnson & Johnson Innovation – JJDC, Inc. (JJDC) will make a $75 million equity investment in Arrowhead at a price of $23.00 per share of Arrowhead common stock.

Arrowhead is eligible to receive up to approximately $1.6 billion in milestone payments for the HBV license agreement, including a $50 million milestone payment linked to a Phase 2 study. Arrowhead is also eligible to receive approximately $1.9 billion in option and milestone payments

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for the collaboration agreement related to up to three additional targets. Arrowhead is further eligible to receive tiered royalties up to mid teens on product sales.

“This agreement represents an important next step for ARO-HBV. Arrowhead has established a leadership position in the field over the past several years, and Janssen’s proven development capabilities, global commercial reach, and commitment to HBV make it the ideal partner to potentially accelerate our goal of bringing a functional cure to patients with chronic HBV,” said Christopher Anzalone, Ph.D., Arrowhead’s president and CEO. “The collaboration also represents further validation of the TRiM™ platform and provides an important opportunity to create up to three additional novel medicines by leveraging Arrowhead’s speed and expertise in RNAi drug discovery and Janssen’s clinical development and commercial capabilities.”

Under the agreement, Janssen receives a worldwide exclusive license to the ARO-HBV program, Arrowhead’s third-generation subcutaneously administered RNAi therapeutic candidate being developed as a potentially curative therapy for patients with chronic hepatitis B virus infection. Beyond AROHBV1001, Arrowhead’s ongoing Phase 1/2 study of ARO-HBV, Janssen will be wholly responsible for clinical development and commercialization.

Janssen can also select up to three new targets, against which Arrowhead will develop clinical candidates. These potential new candidates will leverage Arrowhead’s proprietary TRiM™ platform, and do not include Arrowhead’s current pipeline. Arrowhead will perform discovery, optimization, and preclinical development, entirely funded by Janssen, sufficient to allow the filing of a U.S. Investigational New Drug application or equivalent, at which time Janssen will have the option to take an exclusive license. If the option is exercised, Janssen will be wholly responsible for clinical development and commercialization

The closing of the transactions is subject to clearance under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, and is expected to close during the fourth quarter of 2018.

Conference Call and Webcast Details

Investors may access a live audio webcast on the Company's website at http://ir.arrowheadpharma.com/events.cfm. For analysts that wish to participate in the conference call, please dial 855-215-6159 or 315-625-6887 and provide Conference ID 2649806.

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A replay of the webcast will be available on the company's website approximately two hours after the conclusion of the call and will remain available for 90 days. An audio replay will also be available approximately two hours after the conclusion of the call and will be available for 3 days. To access the audio replay, dial 855-859-2056 or 404-537-3406 and provide Conference ID 2649806.

About AROHBV1001

AROHBV1001 (NCT03365947) is evaluating the safety, tolerability, and pharmacokinetic effects of single-ascending doses (SAD) of ARO-HBV in healthy adult volunteers, as well as the safety, tolerability, and pharmacodynamic effects of multiple-ascending doses (MAD) of ARO-HBV in patients with chronic HBV. Dosing in the SAD portion of the study is complete and included five cohorts at dose levels of 35, 100, 200, 300, and 400 mg. Dosing in the MAD portion of the study is ongoing and includes cohorts receiving three doses of ARO-HBV either weekly, bi-weekly, or monthly. Arrowhead submitted a late-breaking abstract with clinical data to the Liver Meeting®, the Annual Meeting of the American Association for the Study of Liver Disease (AASLD), being held in November 2018.

About Arrowhead Pharmaceuticals

Arrowhead Pharmaceuticals develops medicines that treat intractable diseases by silencing the genes that cause them. Using a broad portfolio of RNA chemistries and efficient modes of delivery, Arrowhead therapies trigger the RNA interference mechanism to induce rapid, deep, and durable knockdown of target genes. RNA interference, or RNAi, is a mechanism present in living cells that inhibits the expression of a specific gene, thereby affecting the production of a specific protein. Arrowhead's RNAi-based therapeutics leverage this natural pathway of gene silencing.

For more information, please visit www.arrowheadpharma.com, or follow us on Twitter @ArrowheadPharma. To be added to the Company's email list and receive news directly, please visit http://ir.arrowheadpharma.com/email-alerts.

Safe Harbor Statement under the Private Securities Litigation Reform Act:

This news release contains forward-looking statements within the meaning of the "safe harbor" provisions of the Private Securities Litigation Reform Act of 1995. These statements are based upon our current expectations and speak only as of the date hereof. Our actual results may differ materially and adversely from those expressed in any forward-looking statements as a result of various factors and uncertainties, including the safety and efficacy of our product candidates, the duration and impact of regulatory delays in

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our clinical programs, our ability to finance our operations, the future success of our scientific studies, our ability to successfully develop drug candidates, the timing for starting and completing clinical trials, rapid technological change in our markets, and the enforcement of our intellectual property rights. Our most recent Annual Report on Form 10-K and subsequent Quarterly Reports on Form 10-Q discuss some of the important risk factors that may affect our business, results of operations and financial condition. We assume no obligation to update or revise forward-looking statements to reflect new events or circumstances.

Contacts:
Arrowhead Pharmaceuticals, Inc.
Vince Anzalone, CFA
626-304-3400
ir@arrowheadpharma.com

Investors and Media:
LifeSci Advisors, LLC
Brian Ritchie
212-915-2578
britchie@lifesciadvisors.com
www.lifesciadvisors.com

Source: Arrowhead Pharmaceuticals, Inc.

# # #

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

Janssen's press release

JANSSEN ANNOUNCES EXCLUSIVE, WORLDWIDE LICENSE AGREEMENT WITH ARROWHEAD PHARMACEUTICALS TO DEVELOP AND COMMERCIALIZE A NEW TREATMENT FOR CHRONIC HEPATITIS B VIRAL INFECTION

Agreement expands breadth of Janssen's hepatitis B virus development portfolio

TITUSVILLE, N.J., October 4, 2018 – The Janssen Pharmaceutical Companies of Johnson & Johnson today announced that Janssen Pharmaceuticals, Inc., (Janssen) has entered into an agreement with Arrowhead Pharmaceuticals, Inc., (Arrowhead) for an exclusive, worldwide license to develop and commercialize ARO-HBV, a Phase 1/2 subcutaneous, ribonucleic acid interference (RNAi) therapy candidate being investigated for the treatment of chronic hepatitis B viral infection.

Under the agreement, Arrowhead will complete the ongoing Phase 1/2 clinical trial for ARO-HBV, a next-generation RNAi therapy candidate which is designed to silence HBV gene products by specifically targeting two regions of the HBV genome. Janssen will lead the clinical development from Phase 2b onwards. Arrowhead will receive an initial upfront payment, potential development and commercial milestone payments and potential future royalties. Separately, Johnson & Johnson Innovation – JJDC, Inc., will make an equity investment in Arrowhead.

Janssen and Arrowhead also agreed to a research collaboration to develop RNAi therapeutics directed against additional targets using Arrowhead's proprietary Targeted RNAi Molecule (TRiM™) platform. If Janssen exercises its option for such RNAi therapeutics, Arrowhead will be eligible to receive additional payments.

Hepatitis B viral infection presents a major global health concern and places a significant burden on the 257 million people living with the disease worldwide.[1,2] While a prophylactic vaccine for hepatitis B exists, many people living with chronic hepatitis B remain uncured by current treatments and endure lifelong therapy.[1] RNAi therapy candidates such as ARO-HBV have been shown to have an effect on hepatitis B viral infection replication pathways and on the production of viral proteins, providing another avenue for investigation into treatments in this area.[3]

"An important objective within Janssen is to develop highly effective combination products that cure people living with chronic hepatitis B infections," said Mathai Mammen, M.D., Ph.D., Global Head, Janssen Research & Development, LLC. "Working with the talented Arrowhead team and their RNAi therapy candidate adds to the strength of our hepatitis B portfolio and substantially increases our confidence that we can achieve our objective."

The transactions are subject to clearance under the Hart-Scott-Rodino Antitrust Improvements Act and expected to close in Q4 2018.

About the Janssen Pharmaceutical Companies of Johnson & Johnson

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At the Janssen Pharmaceutical Companies of Johnson & Johnson, we are working to create a world without disease. Transforming lives by finding new and better ways to prevent, intercept, treat and cure disease inspires us. We bring together the best minds and pursue the most promising science. We are Janssen. We collaborate with the world for the health of everyone in it. Learn more at www.janssen.com and follow us at @JanssenGlobal. Janssen Pharmaceuticals, Inc. and Janssen Research & Development, LLC are part of the Janssen Pharmaceutical Companies of Johnson & Johnson.

About Johnson & Johnson Innovation – JJDC, Inc.

Johnson & Johnson Innovation – JJDC, Inc. (JJDC) is the strategic venture capital arm of Johnson & Johnson and a long-term investment partner to global healthcare entrepreneurs. Founded in 1973, JJDC continues a legacy of customizing deals for data-driven companies across the continuum of healthcare, with the goal of turning great ideas into transformative new pharmaceutical, medical device and consumer healthcare products. Visit our website at www.jjdc.com.

Cautions Concerning Forward-Looking Statements

This press release contains "forward-looking statements" as defined in the Private Securities Litigation Reform Act of 1995 regarding a new license and collaboration agreement and the continued development of potential treatment regimens for hepatitis B. The reader is cautioned not to rely on these forward-looking statements. These statements are based on current expectations of future events. If underlying assumptions prove inaccurate or known or unknown risks or uncertainties materialize, actual results could vary materially from the expectations and projections of Janssen Pharmaceuticals, Inc., Johnson & Johnson Innovation – JJDC, Inc., any of the other Janssen Pharmaceutical Companies and/or Johnson & Johnson. Risks and uncertainties include, but are not limited to: the potential that the expected benefits and opportunities related to the collaboration may not be realized or may take longer to realize than expected; challenges and uncertainties inherent in product development, including uncertainty of clinical success and obtaining regulatory approvals; uncertainty of commercial success for new indications and therapeutic combinations; competition, including technological advances, new products and patents attained by competitors; challenges to patents; product efficacy or safety concerns resulting in product recalls or regulatory action; changes in behaviour and spending patterns or financial distress of purchasers of health care products and services; changes to applicable laws and regulations, including global health care reforms and trends toward health care cost containment. A further list and description of these risks, uncertainties and other factors can be found in Johnson & Johnson's Annual Report on Form 10-K for the year ended December 31, 2017, including in the sections captioned "Cautionary Note Regarding Forward-Looking Statements" and "Item 1A Risk Factors," in the company's most recently filed Quarterly Report on Form 10-Q and the company's subsequent filings with the Securities and Exchange Commission. Copies of these filings are available online at www.sec.gov, www.jnj.com or on request from Johnson & Johnson. None of the Janssen Pharmaceutical Companies or Johnson & Johnson undertakes to update any forward-looking statement as a result of new information or future events or developments.

References

1. World Health Organization (WHO). Hepatitis B. July 2017. Available at: http://www.who.int/mediacentre/factsheets/fs204/en/ Last accessed September 2018.

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

2. World Health Organization (WHO). Draft global health sector strategy on viral hepatitis, 2016-2021 Sixty-ninth World Health Assembly provisional agenda item 15.1. Document A69/32. April 2016. Available at: http://apps.who.int/gb/ebwha/pdf_files/WHA69/A69_32-en.pdf?ua=1 Last accessed September 2018.
3. Yuen MF *et. al.*, RNA interference therapy with ARC-520 Injection results in long term off-therapy antigen reductions in treatment naïve, HBeAg positive and negative patients with chronic HBV. Poster FRI-362 presented at EASL 2018, April 13, 2018 [LINK].

[**] = Portions of this exhibit have been omitted pursuant to a confidential treatment request. An unredacted version of this exhibit has been filed separately with the Commission.

STOCK PURCHASE AGREEMENT

THIS STOCK PURCHASE AGREEMENT (this "**Agreement**"), dated as of October 3, 2018, (the "**Effective** Date") by and between Johnson & Johnson Innovation-JJDC, Inc. (the "**Investor**"), a New Jersey corporation with its principal place of business at 410 George Street, New Brunswick, New Jersey 08901, and Arrowhead Pharmaceuticals, Inc. (the "**Company**"), a Delaware corporation, with its principal place of business at 225 S. Lake Avenue, Suite 1050, Pasadena, California 91101.

WHEREAS, pursuant to the terms and subject to the conditions set forth in this Agreement, the Company desires to issue and sell to the Investor, and the Investor desires to subscribe for and purchase from the Company, certain shares of common stock, par value $0.001 per share, of the Company (the "**Common Stock**"); and

WHEREAS, simultaneously with the execution of this Agreement, the Company and Janssen Pharmaceuticals, Inc. ("**Janssen**"), an Affiliate of the Investor, are entering into the Collaboration Agreement.

NOW, THEREFORE, in consideration of the following mutual promises and obligations, and for good and valuable consideration, the adequacy and sufficiency of which are hereby acknowledged, the Investor and the Company agree as follows:

1. Definitions.

1.1 Defined Terms. When used in this Agreement, the following terms shall have the respective meanings specified therefor below:

"**Affiliate"** shall mean, with respect to any Person, another Person that controls, is controlled by or is under common control with such Person; provided, that with respect to the Investor, "Affiliate" shall mean the Investor's subsidiaries that are wholly-owned directly or indirectly, by the Investor and any Person that wholly-owns, directly or indirectly, the Investor. A Person shall be deemed to control another Person if such Person possesses, directly or indirectly, the power to direct or cause the direction of the management and policies of such Person, whether through the ownership of voting securities, by contract or otherwise. Without limiting the generality of the foregoing, a Person shall be deemed to control another Person if any of the following conditions is met: (i) in the case of corporate entities, direct or indirect ownership of more than fifty percent (50%) of the stock or shares having the right to vote for the election of directors, and (ii) in the case of non-corporate entities, direct or indirect ownership of more than fifty percent (50%) of the equity interest with the power to direct the management and policies of such non-corporate entities. For the purposes of this Agreement, in no event shall the Investor or any of its Affiliates be deemed Affiliates of the Company or any of its Affiliates, nor shall the Company or any of its Affiliates be deemed Affiliates of the Investor or any of its Affiliates.

"**Agreement"** shall have the meaning set forth in the Preamble, including all Exhibits attached hereto.

"**Business Day"** shall mean a weekday on which banking institutions in the United States are generally open for business.

"**Collaboration Agreement"** shall mean collectively, 1) the License Agreement, together with 2) the Research Collaboration and Option Agreement, each agreement of even date herewith, between Janssen and the Company.

"**Collaboration Assets"** shall mean Arrowhead Intellectual Property (as defined in the License Agreement) licensed by the Company to Janssen pursuant to Section 2.1.1 or 2.1.2 of the License Agreement.

"**Collaboration Material Adverse Effect"** shall mean any effect that, individually or when taken together with all other Effects, has had, or would reasonably be expected to have, (i) a material adverse effect on the Collaboration Assets, taken as a whole, or (ii) a material adverse effect on the Company's ability to perform its obligations under the Collaboration Agreement.

"**DOJ"** means the U.S. Department of Justice.

"**Effect"** shall have the meaning set forth in the definition of "Material Adverse Effect."

"**FTC"** means the U.S. Federal Trade Commission.

"**Governmental Authority"** shall mean any court, agency, authority, department, regulatory body or other instrumentality of any government or country or of any national, federal, state, provincial, regional, county, city or other political subdivision of any such government or country or any supranational organization of which any such country is a member.

"**Intellectual Property"** shall mean trademarks, trade names, trade dress, service marks, copyrights, and similar rights (including registrations and applications to register or renew the registration of any of the foregoing), patents and patent applications, trade secrets, and any other similar intellectual property rights.

"**Intellectual Property License"** shall mean any license, permit, authorization, approval, contract or consent granted, issued by or with any Person relating to the use of Intellectual Property.

"**Law"** or "**Laws"** shall mean all laws, statutes, rules, regulations, orders, judgments, injunctions and/or ordinances of any Governmental Authority.

"License Agreement" shall mean the License Agreement, of even date herewith, between Janssen and the Company.

"**Material Adverse Effect"** shall mean any change, event or occurrence (each, an "**Effect**") that, individually or when taken together with all other Effects, has had, or would reasonably be expected to have, (i) a material adverse effect on the business, financial condition, assets or results of operations of the Company and its Subsidiaries, taken as a whole, or (ii) a material adverse effect on the Company's ability to perform its obligations, or consummate the Transaction, in accordance with the terms of this Agreement, except in the case of (i) to the extent that any such Effect results from or arises out of: (A) changes in conditions in the United States or global economy or capital or financial markets generally, including changes in interest or exchange rates, (B) changes in general legal, regulatory, political, economic or business

conditions or changes in generally accepted accounting principles in the United States or interpretations thereof, (C) acts of war, sabotage or terrorism, or any escalation or worsening of any such acts of war, sabotage or terrorism, (D) earthquakes, hurricanes, floods or other natural disasters, (E) the announcement of this Agreement or the Transaction, (F) any change in the Company's stock price or trading volume or any failure to meet internal projections or forecasts or published revenue or earnings projections of industry analysts (provided that the underlying events giving rise to any such change shall not be excluded), (G) any breach, violation or non-performance by the Investor or any of its Affiliates under the Collaboration Agreement, provided, however, that the Effects excluded in clauses (A), (B), (C) and (D) shall only be excluded to the extent such Effects are not disproportionately adverse on the Company and its Subsidiaries as compared to other companies operating in the Company's industry.

"**Merger Control Authority**" shall mean any person, tribunal, court, governmental body, agency or authority competent to review mergers or conduct antitrust or competition assessments in any jurisdiction.

"**Organizational Documents"** shall mean (i) the Amended and Restated Certificate of Incorporation of the Company, as amended through the date of this Agreement and (ii) the Amended and Restated By-laws of the Company, as amended through the date of this Agreement.

"**Per Share Purchase Price"** shall mean $23.00; provided, however, that in the event of any stock dividend, stock split, combination of shares, recapitalization or other similar change in the capital structure of the Company after the date hereof and on or prior to the Closing which affects or relates to the Common Stock, the Per Share Purchase Price shall be appropriately adjusted.

"**Person"** shall mean any individual, partnership, limited liability company, firm, corporation, trust, unincorporated organization, government or any department or agency thereof or other entity, as well as any syndicate or group that would be deemed to be a Person under Section 13(d)(3) of the Exchange Act.

"**Registration Rights Agreement"** shall mean that certain Registration Rights Agreement between the Investor and the Company, to be dated as of the Closing Date, in substantially the form of Exhibit A attached hereto, as the same may be amended from time to time.

"**Third Party"** shall mean any Person (other than a Governmental Authority) other than the Investor, the Company or any Affiliate of the Investor or the Company.

"**Trading Market"** shall mean The Nasdaq Stock Market.

"**Transaction"** shall mean the issuance and sale of the Shares by the Company, and the purchase of the Shares by the Investor, in accordance with the terms hereof.

"**Transaction Agreements"** shall mean this Agreement and the Registration Rights Agreement.

1.2 Additional Defined Terms. In addition to the terms defined in Section 1.1, the following terms shall have the respective meanings assigned thereto in the sections indicated below:

Defined Term	Section
Aggregate Purchase Price	Section 2
Applicable Health Laws	Section 4.26
Authorizations	Section 4.26
Board of Directors	Section 4.4
Closing	Section 3.1
Closing Date	Section 3.1
Common Stock	Preamble
Company	Preamble
Company Product	Section 4.26
Company Rights	Section 4.23(b)
Company SEC Documents	Section 4.11(a)
Disqualification Event	Section 4.34
Environmental Laws	Section 4.33
Exchange Act	Section 4.11(a)
FCPA	Section 4.20
FDA	Section 4.26
GAAP	Section 4.11(c)
HSR Act	Section 4.7
Investor	Preamble
Issuer Covered Person	Section 4.34
Material Contracts	Section 4.24
Modified Clause	Section 11.7
Permits	Section 4.10
Preferred Stock	Section 4.2
Proprietary Rights	Section 4.23(b)
Rule 144	Section 5.9
SEC	Section 4.7
Securities Act	Section 4.11(a)
Shares	Section 2
Subsidiaries	Section 4.3
Termination Date	Section 9.1(b)
Transfer Agent	Section 10.5(c)
Voting Debt	Section 4.2

2. Purchase and Sale of Common Stock. Subject to the terms and conditions of this Agreement, at the Closing, the Company shall issue and sell to the Investor, free and clear of all liens, other than any liens arising as a result of any action by the Investor, and the Investor shall purchase from the Company, 3,260,869 shares of Common Stock (the "**Shares**") at the Per Share Purchase

Price, representing an aggregate purchase price of US $74,999,987 (the "**Aggregate Purchase Price**").

3. Closing Date; Deliveries.

3.1 Closing Date. Subject to the satisfaction or waiver of all the conditions to the Closing set forth in Sections 6, 7 and 8 hereof, the closing of the purchase and sale of the Shares hereunder (the "**Closing**") shall be held on the second (2nd) Business Day after the satisfaction of the conditions to Closing set forth in Sections 6, 7 and 8 (other than those conditions that by their nature are to be satisfied at the Closing, but subject to the satisfaction at such time of such conditions), at 9:00 a.m. New York time, at the offices of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., 666 Third Avenue, New York, NY 10017 or at such other time, date and location as the parties may agree. The date the Closing occurs is hereinafter referred to as the "**Closing Date**."

3.2 Deliveries.

(a) Deliveries by the Company. At the Closing, the Company shall deliver to the Investor the Shares, registered in book-entry form in the name of the Investor, and the Company shall instruct its transfer agent to register such issuance at the time of such issuance. The Company shall also deliver at the Closing: (i) a certificate in form and substance reasonably satisfactory to the Investor and duly executed on behalf of the Company by an authorized executive officer of the Company, certifying that the conditions to Closing set forth in Sections 6 and 8.2 of this Agreement have been fulfilled; (ii) the Registration Rights Agreement duly executed by the Company; (iii) a good standing certificate for the Company, issued by the Secretary of State of the State of Delaware, dated not less than three (3) Business Days prior to the Closing Date; (iv) a legal opinion from Gibson, Dunn & Crutcher, LLP, counsel to the Company, in a customary form and substance reasonably acceptable to the Investor; and (v) a certificate of the secretary of the Company dated as of the Closing Date certifying (A) that attached thereto is a true and complete copy of the Amended and Restated By-laws of the Company as in effect at the time of the actions by the Board of Directors of the Company referred to in clause (B) below, and on the Closing Date; (B) that attached thereto is a true and complete copy of all resolutions adopted by the Board of Directors of the Company authorizing the execution, delivery and performance of the Transaction Agreements and the Transaction and that all such resolutions are in full force and effect and are all the resolutions adopted in connection with the transactions contemplated hereby as of the Closing Date; (C) that attached thereto is a true and complete copy of the Company's Amended and Restated Certificate of Incorporation as in effect at the time of the actions by the Board of Directors of the Company referred to in clause (B) above, and on the Closing Date; and (D) as to the incumbency and specimen signature of any officer of the Company executing a Transaction Agreement on behalf of the Company.

(b) Deliveries by the Investor. At the Closing, the Investor shall deliver, or cause to be delivered, to the Company the Aggregate Purchase Price by wire transfer of immediately available United States funds to an account designated by the Company. The Company shall notify the Investor in writing of the wiring instructions for such account not less than five (5) Business Days before the Closing Date. The Investor shall also deliver, or cause to be delivered, at the Closing the Registration Rights Agreement duly executed by the Investor.

4. Representations and Warranties of the Company. Except as set forth in the Company SEC Documents or on the Disclosure Schedule delivered to the Investor concurrently with the execution of this Agreement (the "**Disclosure Schedule**"), which disclosures qualify these representations and warranties in their entirety, the Company hereby represents and warrants to the Investor that:

4.1 Organization, Good Standing and Qualification.

(a) The Company and each of the Subsidiaries is a corporation duly incorporated or otherwise organized, validly existing and in good standing under the Laws of the jurisdiction of its incorporation or organization, with the requisite power and authority to own and use its properties and assets and to carry on its business as currently conducted. The Company and each of the Subsidiaries has all requisite corporate power and corporate authority to own, lease and operate its properties and assets, to carry on its business as now conducted, and as proposed to be conducted as described in the Company SEC Documents, the Company has all requisite corporate power and corporate authority to enter into the Transaction Agreements and the Collaboration Agreement, to issue and sell the Shares and to perform its obligations under and to carry out the other transactions contemplated by the Transaction Agreements and the Collaboration Agreement.

(b) The Company and each of the Subsidiaries is duly qualified to transact business and is in good standing in each jurisdiction in which the character of the properties owned, leased or operated by the Company or Subsidiary, as applicable, or the nature of the business conducted by the Company or Subsidiary, as applicable, makes such qualification necessary, except where the failure to be so qualified would not have a Material Adverse Effect.

4.2 Capitalization and Voting Rights.

(a) The capitalization of the Company is as set forth in the Company SEC Documents. The authorized capital stock of the Company consists of 145,000,000 shares of Common Stock and 5,000,000 shares of undesignated preferred stock, par value $0.001 per share, of the Company ("**Preferred Stock**"). As of the date hereof, there are no shares of Preferred Stock issued and outstanding and there are 88,503,719 shares of Common Stock issued and outstanding, of which no shares are owned by the Company. There are no other shares of any other class or series of capital stock of the Company issued and outstanding. All of the issued and outstanding shares of Common Stock have been duly authorized and validly issued and are fully paid and non-assessable. The Company has no capital stock reserved for issuance, except that, as of the date hereof, (i) there are 8,730,152 shares of Common Stock reserved for issuance upon exercise of options and vesting of restricted stock units granted or available for grant under the Company's 2004 Equity Incentive Plan and 2013 Incentive Plan, as well as for inducement grants made to new employees, of which 5,521,982 shares are issuable upon the exercise of stock options outstanding on the date hereof, and (ii) there are no shares of Common Stock reserved for issuance upon exercise of warrants outstanding on the date hereof. There are no bonds, debentures, notes or other indebtedness having general voting rights (or convertible into securities having such rights) ("**Voting Debt**") of the Company issued and outstanding. Except as stated above or on Section 4.2 of the Disclosure Schedule, there are no existing options, warrants, calls, subscriptions or other rights, agreements, arrangements or commitments relating

to the issued or unissued capital stock of the Company, obligating the Company to issue, transfer, sell, redeem, purchase, repurchase or otherwise acquire or cause to be issued, transferred, sold, redeemed, purchased, repurchased or otherwise acquired any capital stock or Voting Debt of, or other equity interest in, the Company or securities or rights convertible into or exchangeable for such shares or equity interests or obligations of the Company to grant, extend or enter into any such option, warrant, call, subscription or other right, agreement, arrangement or commitment. The issuance of the Shares pursuant to this Agreement will not give rise to any preemptive rights or rights of first refusal on behalf of any third-party. Other than the agreements or arrangements listed in Section 4.2 of the Disclosure Schedule, and the Registration Rights Agreement, there are no agreements or arrangements under which the Company or any of its Subsidiaries is obligated to register the sale of any of their securities under the Securities Act.

(b) All of the authorized shares of Common Stock are entitled to one vote per share.

(c) As of the date hereof, there are not any restrictions on the transfer of capital stock of the Company other than pursuant to state and federal securities Laws.

(d) The Company is not a party to or subject to any agreement or understanding relating to the voting of shares of capital stock of the Company or the giving of written consents by a stockholder or director of the Company.

(e) The Common Stock is registered pursuant to Section 12(b) or 12(g) of the Exchange Act, and the Company has taken no action designed to, or which to its knowledge is likely to have the effect of, terminating the registration of the Common Stock under the Exchange Act nor has the Company received any notification that the SEC is contemplating terminating such registration.

4.3 Subsidiaries. The Company has disclosed all of its subsidiaries required to be disclosed pursuant to Item 601(b)(21) of Regulation S-K in an exhibit to its Annual Report on Form 10-K (the "**Subsidiaries**" and each, a "**Subsidiary**"). Each Subsidiary (i) has been duly organized and is validly existing in good standing under the laws of the jurisdiction of its incorporation or organization, has corporate or similar power and authority to own, lease and operate its properties and to conduct its business as presently conducted, and (ii) is duly qualified to transact business and is in good standing in each jurisdiction in which such qualification is required, whether by reason of the ownership or leasing of property or the conduct of business, except in the case of clause (ii) above, to the extent that the failure to be so qualified or be in good standing would not reasonably be expected to result in a Material Adverse Effect. All of the issued and outstanding capital stock of each Subsidiary has been duly authorized and validly issued, is fully paid and nonassessable and is owned by the Company, directly or through its Subsidiaries, free and clear of any security interest, mortgage, pledge, lien, encumbrance, claim or equity.

4.4 Authorization.

(a) All requisite corporate action on the part of the Company, its directors and stockholders required by applicable Law for the authorization, execution and delivery by the Company of the Transaction Agreements and the Collaboration Agreement, and the performance of all

obligations of the Company hereunder and thereunder, including the authorization, issuance and delivery of the Shares, has been taken.

(b) This Agreement and the Collaboration Agreement have been, and upon the execution and delivery of the Registration Rights Agreement by the Company at the Closing, the Registration Rights Agreement will be, duly executed and delivered by the Company, and upon the due execution and delivery of this Agreement by the Investor and the Collaboration Agreement by Janssen, this Agreement and the Collaboration Agreement will constitute, and upon the due execution and delivery of the Registration Rights Agreement by the Investor, the Registration Rights Agreement will constitute, valid and legally binding obligations of the Company, enforceable against the Company in accordance with their respective terms (except with respect to the Registration Rights Agreement and the Collaboration Agreement as such enforceability may be limited by (i) applicable bankruptcy, insolvency, reorganization, moratorium or other Laws of general application relating to or affecting enforcement of creditors' rights and (ii) rules of Law governing specific performance, injunctive relief or other equitable remedies and limitations of public policy).

(c) No stop order or suspension of trading of the Common Stock has been imposed by the Trading Market, the SEC or any other Governmental Authority and remains in effect.

4.5 No Defaults. The Company and each Subsidiary is not in default under or in violation of (a) its Organizational Documents, (b) any provision of applicable Law or any ruling, writ, injunction, order, Permit, judgment or decree of any Governmental Authority or (c) any agreement, arrangement or instrument, whether written or oral, by which the Company, any of its Subsidiaries, or any of their assets are bound, except, in the case of subsections (b) and (c), as would not have a Material Adverse Effect. As of the Effective Date, there exists no condition, event or act which after notice, lapse of time, or both, would constitute a default or violation by the Company or any of its Subsidiaries under any of the foregoing, except, in the case of subsections (b) and (c), as would not have a Material Adverse Effect.

4.6 No Conflicts. The execution, delivery and performance of the Transaction Agreements and the Collaboration Agreement, and compliance with the provisions hereof and thereof by the Company do not and shall not: (a) violate any provision of applicable Law or any ruling, writ, injunction, order, permit, judgment or decree of any Governmental Authority, (b) constitute a breach of, or default under (or an event which, with notice or lapse of time or both, would become a default under) or conflict with, or give rise to any right of termination, cancellation or acceleration of, any agreement, arrangement or instrument, whether written or oral, by which the Company or any of its assets are bound, (c) violate or conflict with any of the provisions of the Company's Organizational Documents or (d) result in any encumbrance upon any of the Shares, other than restrictions pursuant to the Registration Rights Agreement or securities Laws, or on any of the properties or assets of the Company or any of its Subsidiaries, except, in the case of subsections (a) and (b), as would not have a Material Adverse Effect with respect to this Agreement or the Registration Rights Agreement or a Collaboration Material Adverse Effect with respect to the Collaboration Agreement.

4.7 No Governmental Authority or Third Party Consents. No consent, approval, authorization or other order of, or filing with, or notice to, any Governmental Authority or other Third Party is

required to be obtained or made by the Company in connection with the authorization, execution and delivery by the Company of any of the Transaction Agreements or the Collaboration Agreement, or with the authorization, issue and sale by the Company of the Shares, except (i) such filings as may be required to be made with the Securities and Exchange Commission (the "**SEC**") and with any state blue sky or securities regulatory authority, which filings shall be made in a timely manner in accordance with all applicable Laws, and (ii) as required pursuant to the Hart-Scott-Rodino Antitrust Improvements Act, as amended (the "**HSR Act**").

4.8 Valid Issuance of Shares. The Shares have been duly authorized and, when issued and paid for in compliance with the provisions of this Agreement as of the Closing, will be duly authorized, validly issued, fully paid and nonassessable, free from any liens, encumbrances or restrictions on transfer, including preemptive rights, rights of first refusal or other similar rights, other than as arising pursuant to the Transaction Agreements, as a result of any action by the Investor or under federal or state securities Laws.

4.9 Litigation. Except as set forth in Section 4.9 of the Disclosure Schedule, no action, suit, investigation or proceeding by or before any court or governmental agency, authority or body or any arbitrator involving the Company or any of its Subsidiaries or any of its or their property or any officer or director of the Company in their capacity as such (collectively, "**Actions**"), is pending or, to the knowledge of the Company, threatened, which if adversely determined will have a Material Adverse Effect, whether or not arising from transactions in the ordinary course of business. There is no Action pending, or to the Company's best knowledge threatened, which if adversely determined could materially and adversely affect or challenge the legality, validity or enforceability of any of the Transactions Agreements or Collaboration Agreement or Shares or the Company's ability to consummate the transactions contemplated by the Transaction Agreements or Collaboration Agreement.

4.10 Licenses and Other Rights; Compliance with Laws. The Company and each Subsidiary has all franchises, permits, licenses and other rights and privileges ("**Permits**") necessary to permit it to own its properties and to conduct its business as presently conducted and is in compliance thereunder, except where the failure to be in compliance does not and would not have a Material Adverse Effect. The Company and each Subsidiary has not taken any action that would interfere with the Company's ability to renew all such Permit(s), except where the failure to renew such Permit(s) would not have a Material Adverse Effect. The Company and each Subsidiary is and has been in compliance with all Laws applicable to its business, properties and assets, and to the products and services sold by it, except where the failure to be in compliance does not and would not have a Material Adverse Effect.

4.11 Company SEC Documents; Financial Statements; Nasdaq Stock Market.

(a) Since October 1, 2015, the Company has timely filed all required reports, schedules, forms, statements and other documents (including exhibits and all other information incorporated therein), and any required amendments to any of the foregoing, with the SEC (the "**Company SEC Documents**"). As of their respective filing dates, each of the Company SEC Documents complied in all material respects with the requirements of the Securities Act of 1933, as amended (the "**Securities Act**"), and the Securities Exchange Act of 1934, as amended (the "**Exchange Act**"), and the rules and regulations of the SEC promulgated thereunder applicable to such

Company SEC Documents, and no Company SEC Documents when filed, declared effective or mailed, as applicable, contained any untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary in order to make the statements therein, in light of the circumstances under which they were made, not misleading.

(b) As of the date of this Agreement, there are no outstanding or unresolved comments in comment letters received from the SEC or its staff.

(c) The consolidated financial statements of the Company and its Subsidiaries included in its Annual Report on Form 10-K for the fiscal year ended September 30, 2017 and in its quarterly report on Form 10-Q for the quarterly period ended June 30, 2018 comply as to form in all material respects with applicable accounting requirements and the published rules and regulations of the SEC with respect thereto, have been prepared in accordance with United States generally accepted accounting principles ("**GAAP**") applied on a consistent basis during the periods involved (except as may be indicated in the notes thereto) and fairly present in all material respects the financial position of the Company as of the dates thereof and the results of its operations and cash flows for the periods then ended. Except (i) as set forth in the Company SEC Documents or (ii) for liabilities incurred in the ordinary course of business subsequent to the date of the most recent balance sheet contained in the Company SEC Documents, the Company has no liabilities, whether absolute or accrued, contingent or otherwise, other than those that would not, individually or in the aggregate, have a Material Adverse Effect.

(d) There are no material unconsolidated subsidiaries of the Company or any material off-balance sheet arrangements of any type (including any off balance sheet arrangements required to be disclosed pursuant to Item 303(a)(4) of Regulation S-K promulgated under the Securities Act) that have not been so described in the Company SEC Reports filed prior to the date hereof nor any obligations to enter into any such arrangements.

(e) The Common Stock is listed on The Nasdaq Global Select Market, and the Company has taken no action designed to, or which is likely to have the effect of, terminating the registration of the Common Stock under the Exchange Act or delisting the Common Stock from The Nasdaq Global Select Market. The Company has not received any notification that, and has no knowledge that, the SEC or The Nasdaq Stock Market LLC is contemplating terminating such listing or registration. No stop order or suspension of trading of the Common Stock has been imposed by The Nasdaq Stock Market LLC, the SEC or any other Governmental Authority and remains in effect.

4.12 Internal Control over Financial Reporting; Sarbanes-Oxley Matters. The Company has implemented and maintains a system of internal control over financial reporting (to the extent required by Rule 13a-15(a) under the Exchange Act) that is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of consolidated financial statements for external purposes, and, to the knowledge of the Company, such system of internal control over financial reporting is effective. The Company has implemented and maintains disclosure controls and procedures (to the extent required by Rule 13a-15(a) of the Exchange Act) that are designed to ensure that information required to be disclosed by the Company in the reports it files or submits under the Exchange Act is recorded, processed, summarized and reported within the timeframes specified by the SEC's rules and forms (and

such disclosure controls and procedures are effective), and has disclosed, based on its most recent evaluation of its system of internal control over financial reporting prior to the date of this Agreement, to the Company's outside auditors and the audit committee of the Company's Board of Directors (i) any significant deficiencies and material weaknesses known to it in the design or operation of its internal control over financial reporting (as defined in Rule 13a-15(f) of the Exchange Act) that would reasonably be expected to adversely affect the Company's ability to record, process, summarize and report financial information and (ii) any fraud known to it, that involves management or other employees who have a significant role in the Company's internal control over financial reporting. The Company determined that such disclosure controls and procedures were effective as of June 30, 2018.

4.13 Sarbanes-Oxley Act. To the knowledge of the Company, as of the date hereof, no employee of the Company has provided since October 1, 2015 or is providing information to any law enforcement agency regarding the violation of any applicable Law of the type described in Section 806 of the Sarbanes-Oxley Act by the Company. The Company has not discharged, demoted or suspended an employee of the Company in the terms and conditions of employment because of any lawful act of such employee described in Section 806 of the Sarbanes-Oxley Act.

4.14 Absence of Certain Changes.

(a) Since September 30, 2017: (i) there has been no event, occurrence or development that has had or that could reasonably be expected to have a Material Adverse Effect; (ii) there have not been any changes in the authorized capital, assets, liabilities, financial condition, business, Material Agreements or operations of the Company and its Subsidiaries, taken as a whole, from that reflected in the consolidated financial statements of the Company and its Subsidiaries, except for any such changes in the ordinary course of business which have not had or would not reasonably be expected to have, either individually or in the aggregate, materially adverse to the business, properties, financial condition or results of operations of the Company and its Subsidiaries, taken as a whole and (iii) the Company has not declared or made any dividend or distribution of cash or other property to its stockholders. No material event, liability, fact, circumstance, occurrence or development has occurred or exists, or is reasonably expected to occur or exist, with respect to the Company or its Subsidiaries or their respective businesses, properties, operations, assets or financial condition other than with respect to this Agreement and the Collaboration Agreement), that would be required to be disclosed by the Company under applicable Law as of the Effective Date that has not been publicly disclosed at least two Business Days prior to the Effective Date.

(b) Since September 30, 2017, the Company has not admitted in writing its inability to pay its debts generally as they become due, filed or consented to the filing against it of a petition in bankruptcy or a petition to take advantage of any insolvency act, made an assignment for the benefit of creditors, consented to the appointment of a receiver for itself or for the whole or any substantial part of its property, or had a petition in bankruptcy filed against it, been adjudicated a bankrupt, or filed a petition or answer seeking reorganization or arrangement under the federal bankruptcy laws or any other laws of the United States or any other jurisdiction.

4.15 Private Placement. Subject to the accuracy of the Investor's representations set forth in Sections 5.5, 5.6, 5.7, 5.9 and 5.10, the offer, sale and issuance of the Shares to be issued in

conformity with the terms of this Agreement constitute transactions which are exempt from the registration requirements of the Securities Act and from all applicable state registration or qualification requirements. The issuance and sale of the Shares hereunder does not contravene the rules and regulations of The Nasdaq Stock Market, LLC. Neither the Company nor any Person acting on its behalf will take any action that would cause the loss of such exemption.

4.16 No Integration. None of the Company, any of its Subsidiaries or any Person acting on its or their behalf has, directly or indirectly, made any offers or sales of any security or solicited any offers to buy any security of the Company or any of its Subsidiaries, under circumstances that would adversely affect reliance by the Company on Section 4(a)(2) of the Securities Act or require registration of any of the Shares under the Securities Act or cause this offering of the Shares to be integrated with prior offerings by the Company or any of its Subsidiaries for purposes of the Securities Act.

4.17 Brokers' or Finders' Fees. No brokerage or finder's fee or commissions are payable by the Company to any broker, financial advisor, consultant, finder, placement agent, investment banker or other Person or entity with respect to the transactions contemplated by the Transaction Agreements and the Collaboration Agreement.

4.18 Investment Company. The Company is not, and is not an Affiliate of, and immediately after receipt of payment for the Shares, will not be or be an Affiliate of, an "investment company" within the meaning of the Investment Company Act of 1940, as amended. The Company shall conduct its business in a manner so that it will not become an "investment company" subject to registration under the Investment Company Act of 1940, as amended.

4.19 No General Solicitation. None of the Company, any of its Subsidiaries or any Person acting on its or their behalf, has engaged in any form of general solicitation or general advertising (within the meaning of Regulation D promulgated under the Securities Act) in connection with the offer or sale of the Shares. The Company has offered the Shares for sale only to the Investor.

4.20 Foreign Corrupt Practices. None of the Company, its Subsidiaries or, to the knowledge of the Company, any director, officer, agent, or employee of the Company or any of its Subsidiaries has taken any action, directly or indirectly, that is in violation by such persons of the Foreign Corrupt Practices Act of 1977, as amended, and the rules and regulations promulgated thereunder (the "**FCPA**"), including, without limitation, making use of the mails or any means or instrumentality of interstate commerce corruptly in furtherance of an offer, payment, promise to pay or authorization of the payment of any money, or other property, gift, promise to give, or authorization of the giving of anything of value to any "foreign official" (as such term is defined in the FCPA) or any foreign political party or official thereof or any candidate for foreign political office, in contravention of the FCPA.

4.21 Regulation M Compliance. The Company has not, and to its knowledge no one acting on its behalf has, (i) taken, directly or indirectly, any action designed to cause or to result in the stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of any of the Shares, (ii) sold, bid for, purchased, or paid any compensation for soliciting purchases of, any of the Shares, or (iii) paid or agreed to pay to any Person any compensation for soliciting another to purchase any other securities of the Company.

4.22 Office of Foreign Assets Control. Neither the Company nor, to the Company's knowledge, any director, officer, agent, employee or Affiliate of the Company is currently subject to any U.S. sanctions administered by the Office of Foreign Assets Control of the U.S. Treasury Department.

4.23 Intellectual Property.

(a) The Intellectual Property that is owned by the Company or any Subsidiary is owned free from any liens or restrictions (other than any restrictions set forth in any Intellectual Property License relating to such Intellectual Property), and all of the Company's and its Subsidiaries material Intellectual Property Licenses are in full force and effect in accordance with their terms, are free of any liens or restrictions, and neither the Company nor to the Company's knowledge any other party thereto, is in material breach of any such material Intellectual Property License, and no event has occurred that with notice or lapse of time or both would constitute such a breach or default thereunder or would result in the termination thereof or would cause or permit the acceleration or other change of any right or obligation of the loss of any benefit thereunder by the Company except (i) for such failures to be in full force and effect, such liens or restrictions, and such material breaches that would not reasonably be expected to have a Material Adverse Effect, or (ii) as set forth in any such Intellectual Property License. There is no material legal claim or demand of any Person pertaining to, or any proceeding which is pending (of which the Company has received notice or otherwise has knowledge) or, to the knowledge of the Company, threatened, (i) challenging the right of the Company in respect of any Company Intellectual Property, or (ii) that claims that any default exists under any Intellectual Property License, except, in the case of (i) and (ii) above, where any such claim, demand or proceeding would not have or reasonably be expected to have a Material Adverse Effect.

(b) (i) The Company or one of its Subsidiaries owns, free and clear of any lien or encumbrance, or has a valid license to, or has an enforceable right to use, as it is used or held for use, all U.S. and non-U.S. patents, trade secrets, know-how, trademarks, service marks, copyrights, and other proprietary and intellectual property rights, and all grants and applications with respect to the foregoing (collectively, the "**Proprietary Rights**") known by the Company to be necessary for the conduct of the Company's business, the absence of which would not have or reasonably be expected to have a Material Adverse Effect (such Proprietary Rights owned by or licensed to the Company collectively, the "**Company Rights**"); and (ii) the Company and its Subsidiaries has taken reasonable measures to protect the Company Rights, consistent with prudent commercial practices in the biotechnology industry, except where failure to take such measures would not have or reasonably be expected to have a Material Adverse Effect.

4.24 Material Contracts. Each franchise, contract or other document of a character required to be described in the Company SEC Documents or to be filed as an exhibit to the Company SEC Documents under the Securities Act and the rules and regulations promulgated thereunder (collectively, the "**Material Contracts**") is so described in all material respects or filed. The Company is in compliance with and not in default of its obligations under the Material Contracts, except for such non-compliance or default that will not have a Material Adverse Effect.

4.25 Properties and Assets. The Company and its Subsidiaries own or lease all such properties as are necessary to the conduct of its and their operations as presently conducted. Such assets

which are owned by the Company are held free and clear of any security interest, mortgage, pledge, lien, encumbrance, claim or equity.

4.26 Health Laws and FDA Compliance. Except as would not, individually or in the aggregate, result in a Material Adverse Effect: (i) each of the Company and each of its Subsidiaries is and has been in compliance with statutes, laws, ordinances, rules and regulations applicable to the Company or its Subsidiaries for the ownership, testing, development, manufacture, packaging, processing, use, labeling, storage, or disposal of any product manufactured by or on behalf of the Company and its Subsidiaries or out-licensed by the Company and its Subsidiaries (each a "**Company Product**"), including without limitation, the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. § 301, et seq., the Public Health Service Act, 42 U.S.C. § 262, similar (collectively, "**Applicable Health Laws**"); (ii) the Company and its Subsidiaries possess all licenses, certificates, approvals, authorizations, permits and supplements or amendments thereto required by any such Applicable Health Laws and/or for the ownership of their properties or the conduct of their business as it relates to a Company Product and as described in the Company SEC Documents (collectively, "**Authorizations**") and such Authorizations are valid and in full force and effect and neither the Company nor any of its Subsidiaries is in violation of any term of any such Authorizations; (iii) neither the Company nor any of its Subsidiaries has received any written notice of adverse finding, warning letter or other written correspondence or notice from the U.S. Food and Drug Administration (the "**FDA**") or any other Governmental Authority alleging or asserting noncompliance with any Applicable Health Laws or Authorizations relating to a Company Product; (iv) neither the Company nor any of its Subsidiaries has received written notice of any ongoing claim, action, suit, proceeding, hearing, enforcement, investigation, arbitration or other action from any governmental entity or third party alleging that any Company Product, operation or activity related to a Company Product is in violation of any Applicable Health Laws or Authorizations; and (v) neither the Company nor any of its Subsidiaries has received written notice that any governmental entity has taken, is taking or intends to take action to limit, suspend, modify or revoke any Authorizations.

4.27 Tests and Preclinical and Clinical Trials. The studies, tests and preclinical and clinical trials conducted by or, to the Company's knowledge, on behalf of the Company that are described in the Company SEC Documents were and, if still pending, are being, conducted in all material respects in accordance with any applicable protocols submitted to the FDA or any Governmental Authority exercising comparable authority, procedures and controls pursuant to, where applicable, accepted professional and scientific standards, and all applicable Laws and regulations; the descriptions of the studies, tests and preclinical and clinical trials conducted by or, to the Company's knowledge, on behalf of the Company, and the results thereof, contained in the Company SEC Documents are accurate and complete in all material respects; to the Company's knowledge, there are no subsequent studies, tests or preclinical and clinical trials, the results of which call into question the results described in the Company SEC Documents; and the Company has not received any notices or correspondence from the FDA, any Governmental Authority exercising comparable authority or any Institutional Review Board requiring the termination, suspension, material modification or clinical hold of any studies, tests or preclinical or clinical trials conducted by or on behalf of the Company.

4.28 Taxes. (i) the Company and its Subsidiaries have filed all tax returns that are required to have been be filed by each of them or has requested extensions of the filing date thereof and (ii)

the Company and its Subsidiaries have paid all taxes required to be paid by any of them and any other assessment, fine or penalty levied against any of them, to the extent that any of the foregoing is due and payable, except in the case of clause (i) and (ii), for any such assessment, fine or penalty that is currently being contested in good faith or as would not have a Material Adverse Effect, whether or not arising from transactions in the ordinary course of business and (iii) there are no tax audits ongoing of which the Company has received written notice.

4.29 Transfer Taxes. There are no transfer taxes or other similar fees or charges under federal law or the laws of any state, or any political subdivision thereof, required to be paid in connection with the execution and delivery of this Agreement or the issuance by the Company or sale by the Company of the Shares.

4.30 Insurance. The Company and its Subsidiaries are insured by insurers of recognized financial responsibility against such losses and risks and in such amounts as are reasonable and customary in the business in which it is engaged; all policies of insurance and fidelity or surety bonds insuring the Company and its Subsidiaries or their businesses, assets, employees, officers and directors are in full force and effect; the Company and its Subsidiaries are in compliance with the terms of such policies and instruments in all material respects; and there are no claims by the Company or any of its Subsidiaries under any such policy or instrument as to which any insurance company is denying liability or defending under a reservation of rights clause; neither the Company nor any of its Subsidiaries has been refused any insurance coverage sought or applied for; and the Company has no reason to believe that it will not be able to renew its existing insurance coverage as and when such coverage expires or to obtain similar coverage from similar insurers as may be necessary to continue its business at a cost that would not have a Material Adverse Effect, whether or not arising from transactions in the ordinary course of business.

4.31 Related Party Transactions. No director or Affiliate of the Company, nor any family member of any officer, director or Affiliate of the Company has entered into any transaction with the Company or any of its Subsidiaries that would be required to be disclosed under Item 404 of Regulation S-K that has not been disclosed in the Company SEC Documents as required by the rules and regulations of the SEC.

4.32 Labor. Neither the Company nor any of its Subsidiaries is bound by or subject to any collective bargaining agreement or any similar agreement with any organization representing its employees. No labor problem or dispute with the employees of the Company and its Subsidiaries exists or, to the knowledge of the Company, is threatened, and the Company is not aware of any existing or imminent labor disturbance by the employees of any of its principal suppliers or contractors, that could have a Material Adverse Effect, whether or not arising from transactions in the ordinary course of business, except as contemplated in the Company SEC Documents.

4.33 Environmental Laws. The Company and each of its Subsidiaries (i) is in compliance with any and all applicable foreign, federal, state and local laws and regulations relating to the protection of human health and safety, the environment or hazardous or toxic substances or wastes, pollutants or contaminants ("**Environmental Laws**"), (ii) has received and is in compliance with all permits, licenses or other approvals required of them under applicable

Environmental Laws to conduct its business and (iii) has not received notice of any actual or potential liability under any environmental law, except where such non-compliance with Environmental Laws, failure to receive required permits, licenses or other approvals, or liability would not, individually or in the aggregate, have a Material Adverse Effect, whether or not arising from transactions in the ordinary course of business. The Company has not been named as a "potentially responsible party" under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended.

4.34 No Disqualification Events. With respect to the Shares to be offered and sold hereunder in reliance on Rule 506 under the Securities Act, none of the Company or any of its predecessors, and to the knowledge of the Company, any affiliated issuer, director, executive officer, other officer of the Company participating in the offering hereunder, beneficial owner of 20% or more of the Company's outstanding voting equity securities, calculated on the basis of voting power, nor any promoter (as that term is defined in Rule 405 under the Securities Act) connected with the Company in any capacity at the time of sale (each, an "**Issuer Covered Person**" and, together, "**Issuer Covered Persons**") is subject to any of the "Bad Actor" disqualifications described in Rule 506(d)(1)(i) to (viii) under the Securities Act (a "**Disqualification Event**"), except for a Disqualification Event covered by Rule 506(d)(2) or (d)(3). The Company has exercised reasonable care to determine whether any Issuer Covered Person is subject to a Disqualification Event. The Company has complied, to the extent applicable, with its disclosure obligations under Rule 506(e), and has furnished to the Investor a copy of any disclosures provided thereunder.

4.35 Other Covered Persons. Except to attorneys for legal services, the Company is not aware of any person that has been or will be paid (directly or indirectly) remuneration in connection with the sale of any Regulation D Shares pursuant to this Agreement.

4.36 Shell Company. As of the date hereof and the Closing Date, the Company is not a "shell company" nor a former "shell company" (as defined in Rule 405 of the Securities Act) and has never been a "shell company."

4.37 Application of Takeover Provisions. The Company and the Company's Board of Directors have taken all necessary action in order to render inapplicable any control share acquisition, business combination, poison pill (including any distribution under a rights agreement) or other similar anti-takeover provision under the Company's Organizational Documents or the Laws of its state of incorporation that is or could become applicable to the Investor as a result of the Investor and the Company fulfilling their obligations or exercising their rights under the Transaction Agreements, including without limitation as a result of the Company's issuance of the Shares and the Investors's ownership of the Shares.

4.38 Passive Foreign Investment Company; Controlled Foreign Company. Neither the Company nor its Subsidiaries will be deemed to constitute a "passive foreign investment company" within the meaning of 26 USC §1297(a) or a "controlled foreign company" within the meaning of 26 USC §957.

4.39 Full Disclosure. The Company understands that the Investor will rely on the foregoing representations in effecting the purchase of the Shares. The Transaction Agreements, the

Collaboration Agreement and the SEC Documents, when taken together with the Disclosure Schedule and the due diligence materials regarding the Company furnished by or on behalf of the Company to the Investors, are true and correct in all material respects and do not contain any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements made therein, in light of the circumstances under which they were made, not misleading.

5. Representations and Warranties of the Investor. The Investor hereby represents and warrants to the Company that:

5.1 Organization; Good Standing. The Investor is a corporation duly organized, validly existing and in good standing under the Laws of New Jersey. The Investor has or will have all requisite power and authority to enter into the Transaction Agreements, to purchase the Shares and to perform its obligations under and to carry out the other transactions contemplated by the Transaction Agreements.

5.2 Authorization. All requisite action on the part of the Investor and its directors and stockholders, required by applicable Law for the authorization, execution and delivery by the Investor of the Transaction Agreements, and the performance of all of its obligations thereunder, including the subscription for and purchase of the Shares, has been taken. This Agreement has been, and upon the execution and delivery of the Registration Rights Agreement at the Closing by the Investor, the Registration Rights Agreement will be, duly executed and delivered by the Investor and upon the due execution and delivery thereof by the Company, will constitute valid and legally binding obligations of the Investor, enforceable against the Investor in accordance with their respective terms (except as such enforceability may be limited by (a) applicable bankruptcy, insolvency, reorganization, moratorium or other Laws of general application relating to or affecting enforcement of creditors' rights and (b) rules of Law governing specific performance, injunctive relief or other equitable remedies and limitations of public policy)

5.3 No Conflicts. The execution, delivery and performance of the Transaction Agreements and compliance with the provisions thereof by the Investor do not and shall not: (a) violate any provision of applicable Law or any ruling, writ, injunction, order, permit, judgment or decree of any Governmental Authority, (b) constitute a breach of, or default under (or an event which, with notice or lapse of time or both, would become a default under) or conflict with, or give rise to any right of termination, cancellation or acceleration of, any agreement, arrangement or instrument, whether written or oral, by which the Investor or any of its assets, are bound, or (c) violate or conflict with any of the provisions of the Investor's organizational documents (including any articles or memoranda of organization or association, charter, bylaws or similar documents), except as would not impair or adversely affect the ability of the Investor to consummate the Transactions and perform its obligations under the Transaction Agreements and except, in the case of subsections (a) and (b) as would not have a material adverse effect on the Investor's ability to perform its obligations or consummate the Transaction in accordance with the terms of this Agreement.

5.4 No Governmental Authority or Third Party Consents. No consent, approval, authorization or other order of any Governmental Authority or other Third Party is required to be obtained by the Investor in connection with the authorization, execution and delivery of any of the Transaction

Agreements or with the subscription for and purchase of the Shares, except as required pursuant to the HSR Act.

5.5 Purchase Entirely for Own Account. The Shares shall be acquired for investment for the Investor's own account, not as a nominee or agent, and not with a view to the resale or distribution of any part thereof, and the Investor has no present intention of selling, granting any participation or otherwise distributing the Shares. The Investor does not have and will not have as of the Closing any contract, undertaking, agreement or arrangement with any Person to sell, transfer or grant participation to a Person any of the Shares.

5.6 Disclosure of Information. The Investor has received all the information from the Company and its management that the Investor considers necessary or appropriate for deciding whether to purchase the Shares hereunder. The Investor further represents that it has had an opportunity to ask questions and receive answers from the Company regarding the Company, its financial condition, results of operations and prospects and the terms and conditions of the offering of the Shares sufficient to enable it to evaluate its investment.

5.7 Investment Experience and Accredited Investor Status. The Investor is an "accredited investor" (as defined in Regulation D under the Securities Act). The Investor has such knowledge and experience in financial or business matters that it is capable of evaluating the merits and risks of the investment in the Shares to be purchased hereunder.

5.8 Acquiring Person. As of the date of this Agreement and immediately prior to the Closing, neither the Investor nor any of its Affiliates beneficially owns, or will beneficially own (as determined pursuant to Rule 13d-3 under the Exchange Act without regard for the number of days in which a Person has the right to acquire such beneficial ownership, and without regard to Investor's rights under this Agreement) any securities of the Company, except for securities that may be owned by employee benefit plans of the Investor or any of its Affiliates.

5.9 Restricted Securities. The Investor understands that the Shares, when issued, shall be "restricted securities" under the federal securities Laws inasmuch as they are being acquired from the Company in a transaction not involving a public offering and that under such Laws the Shares may be resold without registration under the Securities Act only in certain limited circumstances. The Investor represents that it is familiar with Rule 144 of the Securities Act ("**Rule 144**"), as presently in effect.

5.10 Legends. The Investor understands that any book-entry notations or certificates representing the Shares shall bear the following legends:

(a) "THESE SECURITIES HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "SECURITIES ACT"), OR APPLICABLE STATE SECURITIES LAWS. THE SECURITIES MAY NOT BE OFFERED FOR SALE, SOLD, TRANSFERRED OR ASSIGNED EXCEPT PURSUANT TO AN EFFECTIVE REGISTRATION STATEMENT UNDER THE SECURITIES ACT OR PURSUANT TO AN AVAILABLE EXEMPTION FROM, OR IN A TRANSACTION NOT SUBJECT TO, THE REGISTRATION REQUIREMENTS OF THE SECURITIES ACT AND IN ACCORDANCE WITH APPLICABLE STATE SECURITIES LAWS AS EVIDENCED BY A LEGAL

OPINION OF COUNSEL TO THE TRANSFEROR TO SUCH EFFECT, THE SUBSTANCE OF WHICH SHALL BE REASONABLY ACCEPTABLE TO THE COMPANY"; and

(b) any legend required by applicable state securities Laws.

5.11 Financial Assurances. As of the date hereof and as of the Closing Date, the Investor has and will have access to cash in an amount sufficient to pay to the Company the Aggregate Purchase Price.

6. Investor's Conditions to Closing. The Investor's obligation to purchase the Shares at the Closing is subject to the fulfillment as of the Closing of the following conditions (unless waived in writing by the Investor):

6.1 Representations and Warranties. The representations and warranties made by the Company in Section 4 hereof shall be true and correct as of the date of this Agreement and as of the Closing Date as though made on and as of such Closing Date, except to the extent such representations and warranties are specifically made as of a particular date, in which case such representations and warranties shall be true and correct as of such date; provided, however, that for purposes of this Section 6.1, all such representations and warranties of the Company (other than Sections 4.1(a), 4.2(a), 4.4, 4.5(a), 4.6(c) and 4.8, of this Agreement) shall be deemed to be true and correct for purposes of this Section 6.1 unless the failure or failures of such representations and warranties to be so true and correct, without regard to any "material," "materiality" or "Material Adverse Effect" qualifiers set forth therein, constitute a Material Adverse Effect.

6.2 Representations and Warranties in the Collaboration Agreement. The representations and warranties made by the Company in Article XII (Sections 12.1 through 12.9) of the License Agreement shall be true and correct as of the Closing Date as though made on and as of such Closing Date, except to the extent such representations and warranties are specifically made as of a particular date, in which case such representations and warranties shall be true and correct as of such date; provided, however, that for purposes of this Section 6.2, all such representations and warranties of the Company shall be deemed to be true and correct for purposes of this Section 6.2 unless the failure or failures of such representations and warranties to be so true and correct, without regard to any "material" or "materiality" qualifiers set forth therein, individually or in the aggregate, has had or would reasonably be expected to have a Collaboration Material Adverse Effect.

6.3 Covenants. All covenants and agreements contained in this Agreement to be performed or complied with by the Company on or prior to the Closing Date shall have been performed or complied with in all material respects.

6.4 Registration Rights Agreement. The Company shall have duly executed and delivered to the Investor, pursuant to Section 3.2(a) of this Agreement, the Registration Rights Agreement, and (subject to execution by the Investor) such agreement shall be in full force and effect.

6.5 Collaboration Agreement. The Company shall have duly executed and delivered to the Investor the Collaboration Agreement, and there shall have been no termination of the Collaboration Agreement that, as of the Closing, is effective.

6.6 No Material Adverse Effect. From and after the date of this Agreement until the Closing Date, there shall have occurred no event that has caused a Material Adverse Effect or a Collaboration Material Adverse Effect.

6.7 Legal Opinion. The Investor shall have received an opinion of Gibson, Dunn & Crutcher LLP, counsel to the Company, dated as of the Closing Date, in a customary form and substance reasonably acceptable to the Investor.

6.8 Listing. The Company's Common Stock shall be listed and trade on the Nasdaq Global Select Market.

7. Company's Conditions to Closing. The Company's obligation to issue and sell the Shares at the Closing is subject to the fulfillment as of the Closing of the following conditions (unless waived in writing by the Company):

7.1 Representations and Warranties. The representations and warranties made by the Investor in Section 5 hereof shall be true and correct as of the date of this Agreement and as of the Closing Date as though made on and as of such Closing Date, except to the extent such representations and warranties are specifically made as of a particular date, in which case such representations and warranties shall be true and correct as of such date, in the case of Sections 5.1-5.4, and 5.11, except where any failure to be true and correct would not have a material adverse effect on the Investor's ability to perform its obligations, or consummate the Transaction in accordance with the terms of this Agreement, in the case of Section 5.5, 5.6 and 5.7, except where any inaccuracy would not result in the issuance of the Shares hereunder failing to qualify as an offering of securities not involving any public offering under the federal securities Laws, and in the case of Section 5.8, except where any inaccuracy would not be material on the Investor's ability to perform its obligations, or consummate the Transaction in accordance with the terms of this Agreement.

7.2 Covenants. All covenants and agreements contained in this Agreement to be performed or complied with by the Investor on or prior to the Closing Date shall have been performed or complied with in all material respects.

7.3 Registration Rights Agreement. The Investor shall have duly executed and delivered to the Company, pursuant to Section 3.2(b) of this Agreement, the Registration Rights Agreement, and (subject to execution by the Company) such agreement shall be in full force and effect.

7.4 Collaboration Agreement. Janssen shall have duly executed and delivered to the Company the Collaboration Agreement, and there shall have been no termination of the Collaboration Agreement that, as of the Closing, is effective.

8. Mutual Conditions to Closing. The obligations of the Investor and the Company to consummate the Closing are subject to the fulfillment as of the Closing Date of the following conditions:

8.1 HSR Act Qualification. The filings required under the HSR Act in connection with this Agreement shall have been made and the required waiting period shall have expired or been terminated as of the Closing Date.

8.2 Absence of Litigation. There shall be no action, suit, proceeding or investigation by a Governmental Authority pending or currently threatened in writing against the Company or the Investor that questions the validity of any of the Transaction Agreements, the right of the Company or the Investor to enter into any Transaction Agreement or to consummate the transactions contemplated hereby or thereby or which, if determined adversely, would impose substantial monetary damages on the Company or the Investor as a result of the consummation of the transactions contemplated by any Transaction Agreement.

8.3 No Prohibition. No provision of any applicable Law and no judgment, injunction (preliminary or permanent), order or decree that prohibits, makes illegal or enjoins the consummation of the Transaction shall be in effect.

9. Termination.

9.1 Ability to Terminate. This Agreement may be terminated at any time prior to the Closing by:

(a) mutual written consent of the Company and the Investor;

(b) either the Company or the Investor, upon written notice to the other no earlier than January 3, 2019 (the "**Termination Date**"), if the Transaction shall not have been consummated by the Termination Date; (c) either the Company or the Investor, upon written notice to the other, if any of the mutual conditions to the Closing set forth in Section 8 shall have become incapable of fulfillment by the Termination Date and shall not have been waived in writing by the other party within ten (10) Business Days after receiving receipt of written notice of an intention to terminate pursuant to this clause (c) provided, however, that the right to terminate this Agreement under this Section 9.1(c) shall not be available to any party whose failure to fulfill any obligation under this Agreement has been the cause of, or resulted in, the failure to consummate the transactions contemplated hereby prior to the Termination Date;

(c) the Company, upon written notice to the Investor, so long as the Company is not then in breach of its representations, warranties, covenants or agreements under this Agreement such that any of the conditions set forth in Section 6.1, 6.2, 6.3 or 6.4, as applicable, could not be satisfied by the Termination Date, (i) upon a material breach of any covenant or agreement on the part of the Investor set forth in this Agreement, which breach is not cured within 10 Business Days after the Company provides the Investor with written notice thereof, or (ii) if any representation or warranty of the Investor shall have been or become untrue, in each case such that any of the conditions set forth in Section 7.1, 7.2, 7.3 or 7.4, as applicable, could not be satisfied by the Termination Date;

(d) the Investor, upon written notice to the Company, so long as the Investor is not then in breach of its representations, warranties, covenants or agreements under this Agreement such that any of the conditions set forth in Section 7.1, 7.2 or 7.3, as applicable, could not be satisfied by the Termination Date, (i) upon a breach of any covenant or agreement on the part of the Company set forth in this Agreement, which breach is not cured within 10 Business Days after the Investor provides the Company with written notice thereof, or (ii) if any representation or warranty of the Company shall have been or become untrue, in each case such that any of the conditions set forth in Section 6.1, 6.2, 6.3 or 6.4, as applicable, could not be satisfied by the Termination Date.

9.2 Effect of Termination. In the event of the termination of this Agreement pursuant to Section 9.1 hereof, (a) this Agreement (except for this Section 9.2 and Section 11 hereof (other than Section 11.13), and any definitions set forth in this Agreement and used in such sections) shall forthwith become void and have no effect, without any liability on the part of any party hereto or its Affiliates, and (b) all filings, applications and other submissions made pursuant to this Agreement, to the extent practicable, shall be withdrawn from the agency or other Person to which they were made or appropriately amended to reflect the termination of the transactions contemplated hereby; provided, however, that nothing contained in this Section 9.2 shall relieve any party from liability for fraud or any intentional or willful breach of this Agreement.

10. Additional Covenants and Agreements.

10.1 Market Listing. From the date hereof through the Closing Date, Company shall use all reasonable efforts to maintain the listing and trading of the Common Stock on The Nasdaq Global Select Market.

10.2 Notification under the HSR Act.

(a) As a result of the aggregate consideration being paid by the Investor under this Agreement and the Collaboration Agreement, which satisfies the size of transaction jurisdictional threshold under the HSR Act, the parties shall, as soon as practicable, and, in any event, no later than ten (10) Business Days after the date of this Agreement, file or cause to be filed with the Federal Trade Commission and the Department of Justice the notifications required to be filed under the HSR Act and the rules and regulations promulgated thereunder with respect to the transactions contemplated by this Agreement. The parties will use all reasonable efforts to respond on a timely basis to any requests for additional information made by either of such agencies.

(b) Each of Investor and Company shall: (i) reasonably cooperate with each other in connection with any investigation or other inquiry relating to the transactions contemplated by the Transaction Agreements and the Collaboration Agreement; (ii) reasonably keep the other party informed of any communication received by such party from, or given by such party to, the FTC, the DOJ or any other Merger Control Authority and of any communication received or given in connection with any proceeding by a private party, in each case regarding the transactions contemplated by the Transaction Agreements or the Collaboration Agreement; (iii) promptly respond to and certify substantial compliance with any inquiries or requests received from the FTC or the DOJ for additional information or documentation; (iv) reasonably consult with each other in advance of any meeting or conference with the FTC, the DOJ or any other Merger Control Authority, and to the extent permitted by the FTC, the DOJ or such other Merger Control Authority and reasonably determined by such party to be appropriate under the circumstances, give the other party or their counsel the opportunity to attend and participate in such meetings and conferences; and (v) permit the other party or their counsel to the extent reasonably practicable to review in advance, and in good faith consider the views of the other party or their counsel concerning, any submission, filing or communication (and documents submitted therewith) intended to be given by it to the FTC, the DOJ or any other Merger Control Authority; provided, however, such party shall be under no obligation to reschedule any meetings or conferences with the FTC, the DOJ or any other Merger Control Authority to enable the other party to attend.

(c) Notwithstanding anything to the contrary in this Agreement, the terms "commercially reasonable efforts" or "reasonable efforts" do not require that either party (i) offer, negotiate, commit to or effect, by consent decree, hold separate order, trust or otherwise, the sale, divestiture, license or other disposition of any capital stock, assets, rights, products or businesses of Investor, Company or their respective Affiliates, (ii) agree to any restrictions on the activities of Investor, Company or their respective Affiliates, or (iii) pay any material amount or take any other action to prevent, effect the dissolution of, vacate, or lift any decree, order, judgment, injunction, temporary restraining order, or other order in any suit or proceeding that would otherwise have the effect of preventing or delaying any of the transactions contemplated by the Transaction Agreements or the Collaboration Agreement.

10.3 Assistance and Cooperation. Prior to the Closing, upon the terms and subject to the conditions set forth in this Agreement, each of the parties agrees to use all reasonable efforts to take, or cause to be taken, all actions and to do, or cause to be done, and to assist and cooperate with the other party in doing, all things necessary, proper or advisable to consummate and make effective, in the most expeditious manner practicable, the transactions contemplated by this Agreement, including using all reasonable efforts to accomplish the following: (a) taking all reasonable acts necessary to cause the conditions precedent set forth in Sections 6, 7 and 8 to be satisfied; (b) taking all reasonable actions necessary to obtain all necessary actions or non-actions, waivers, consents, approvals, orders and authorizations from Governmental Authorities and the making of all necessary registrations, declarations and filings (including registrations, declarations and filings with Governmental Authorities, if any); (c) taking all reasonable actions necessary to obtain all necessary consents, approvals or waivers from Third Parties; and (d) except as otherwise provided for in Section 10.2, defending any suits, claims, actions, investigations or proceedings, whether judicial or administrative, challenging this Agreement or the consummation of the transactions contemplated hereby, including seeking to have any stay or temporary restraining order entered by any court or other Governmental Authority vacated or reversed.

10.4 Form D; Blue Sky Filings. The Company agrees to timely file a Form D with respect to the Shares as required under Regulation D and to provide a copy thereof, promptly upon request of the Investor. The Company shall take such action as the Company shall reasonably determine is necessary in order to obtain an exemption for, or to qualify the Shares for, sale to the Investor at the Closing under applicable securities or "Blue Sky" laws of the states of the United States, and shall provide evidence of such actions promptly upon request of the Investor.

10.5 Legend Removal.

(a) Book-entry notations or certificates evidencing the Shares shall not contain the legend set forth in Section 5.10(a): (i) following a sale of such Shares pursuant to a registration statement covering the resale of such Shares, while such registration statement is effective under the Securities Act, (ii) following any sale or transfer of such Shares pursuant to Rule 144, (iii) if such Shares are eligible for sale without any restrictions under Rule 144 or (iv) if such legend is not required under applicable requirements of the Securities Act (including judicial interpretations and pronouncements issued by the staff of the SEC).

(b) The Company agrees that at such time as any legend set forth in Section 5.10 is no longer required under this Section 10.5, no later than five Business Days following the delivery by the Investor to the Company or the Company's transfer agent (the "**Transfer Agent**") of a certificate representing Shares issued with such legend, along with any other required documentation (e.g., Rule 144 representation letters), the Company will instruct the Transfer Agent to deliver or cause to be delivered to the Investor a certificate representing such Shares that is free from such legend, or, in the event that such shares are uncertificated, remove any such legend in the Company's stock records. The Company may not make any notation on its records or give instructions to the Transfer Agent that enlarge the restrictions on transfer set forth in Section 5.10.

10.6 Conduct of Business. During the period from the date hereof until the Closing, except as consented to in writing by the Investor, the Company shall not (i) declare, set aside or pay any dividend or make any other distribution or payment (whether in cash, stock or property or any combination thereof) in respect of its capital stock, or establish a record date for any of the foregoing, or (ii) make any other actual, constructive or deemed distribution in respect of any shares of its capital stock or otherwise make any payments to stockholders in their capacity as such, except pursuant to repurchases of equity pursuant to the terms of its equity compensation plans.

10.7 Passive Foreign Investment Company; Controlled Foreign Corporation. Not later than forty-five (45) days after the end of Company's fiscal year, the Company will determine whether it and each of its Subsidiaries constitutes a "passive foreign investment company" (a "PFIC") or a "controlled foreign corporation" (a "CFC") as defined for U.S. tax purposes for such fiscal year and if Company determines it is a PFIC or CFC, will so advise the Investor. For each fiscal year of the Company, commencing with the first fiscal year for which it is determined to be a PFIC, the Company and each of its Subsidiaries shall no later than ninety (90) days after the end of such fiscal year, furnish the Investor with all information necessary for them to make a qualified electing fund ("QEF") election, including (i) a PFIC Annual Information Statement under Section 1295(b) of the U.S. Internal Revenue Code, as amended (the "Code") and (ii) all information necessary for it to complete IRS Form 8621 (or a successor form). All information shall be provided in English. The Company will obtain the advice of one of the "big four" accounting firms to make the determinations and provide the information and statements as described in this paragraph.

11. Miscellaneous.

11.1 Governing Law; Submission to Jurisdiction. This Agreement shall be governed by and construed in accordance with the Laws of the State of Delaware, without regard to the conflict of laws principles thereof that would require the application of the Law of any other jurisdiction. Any action brought, arising out of, or relating to this Agreement shall be brought in the Court of Chancery of the State of Delaware. Each party hereby irrevocably submits to the exclusive jurisdiction of said Court in respect of any claim relating to the validity, interpretation and enforcement of this Agreement, and hereby waives, and agrees not to assert, as a defense in any action, suit or proceeding in which any such claim is made that it is not subject thereto or that such action, suit or proceeding may not be brought or is not maintainable in such courts, or that the venue thereof may not be appropriate or that this agreement may not be enforced in or by

such courts. The parties hereby consent to and grant the Court of Chancery of the State of Delaware jurisdiction over such parties and over the subject matter of any such claim and agree that mailing of process or other papers in connection with any such action, suit or proceeding in the manner provided in Section 11.3 or in such other manner as may be permitted by law, shall be valid and sufficient thereof.

11.2 Waiver. Waiver by a party of a breach hereunder by the other party shall not be construed as a waiver of any subsequent breach of the same or any other provision. No delay or omission by a party in exercising or availing itself of any right, power or privilege hereunder shall preclude the later exercise of any such right, power or privilege by such party. No waiver shall be effective unless made in writing with specific reference to the relevant provision(s) of this Agreement and signed by a duly authorized representative of the party granting the waiver.

11.3 Notices. All notices, instructions and other communications hereunder or in connection herewith shall be in writing, shall be sent to the address of the relevant party set forth on Exhibit B attached hereto and shall be (a) delivered personally, (b) sent by registered or certified mail, return receipt requested, postage prepaid, (c) sent via a reputable nationwide overnight courier service or (d) sent by electronic mail, with a confirmation copy to be sent by registered or certified mail, return receipt requested, postage prepaid. Any such notice, instruction or communication shall be deemed to have been delivered upon receipt if delivered by hand, three (3) Business Days after it is sent by registered or certified mail, return receipt requested, postage prepaid, one (1) Business Day after it is sent via a reputable nationwide overnight courier service or when transmitted with electronic confirmation of receipt, if transmitted by electronic mail (if such transmission is made during regular business hours of the recipient on a Business Day; or otherwise, on the next Business Day following such transmission). Either party may change its address by giving notice to the other party in the manner provided above.

11.4 Entire Agreement. This Agreement, the Registration Rights Agreement (once executed) and the Collaboration Agreement, contain the entire agreement among the parties with respect to the subject matter hereof and thereof and supersede all prior and contemporaneous arrangements or understandings, whether written or oral, with respect hereto and thereto.

11.5 Amendments. No provision in this Agreement shall be supplemented, deleted or amended except in a writing executed by an authorized representative of each of the Investor and the Company.

11.6 Headings; Nouns and Pronouns; Section References. Headings in this Agreement are for convenience of reference only and shall not be considered in construing this Agreement. Whenever the context may require, any pronouns used herein shall include the corresponding masculine, feminine or neuter forms, and the singular form of names and pronouns shall include the plural and vice-versa. References in this Agreement to a section or subsection shall be deemed to refer to a section or subsection of this Agreement unless otherwise expressly stated.

11.7 Severability. If, under applicable Laws, any provision hereof is invalid or unenforceable, or otherwise directly or indirectly affects the validity of any other material provision(s) of this Agreement in any jurisdiction ("**Modified Clause**"), then, it is mutually agreed that this Agreement shall endure and that the Modified Clause shall be enforced in such jurisdiction to the

maximum extent permitted under applicable Laws in such jurisdiction; provided that the parties shall consult and use all reasonable efforts to agree upon, and hereby consent to, any valid and enforceable modification of this Agreement as may be necessary to avoid any unjust enrichment of either party and to match the intent of this Agreement as closely as possible, including the economic benefits and rights contemplated herein.

11.8 Assignment. Except for an assignment of this Agreement or any rights hereunder by the Investor to an Affiliate, neither this Agreement nor any of the rights or obligations hereunder may be assigned by either the Investor or the Company without (a) the prior written consent of Company in the case of any assignment by the Investor or (b) the prior written consent of the Investor in the case of an assignment by the Company.

11.9 Successors and Assigns. This Agreement shall be binding upon and inure to the benefit of the parties and their successors and permitted assigns.

11.10 Counterparts. This Agreement may be executed in counterparts, each of which shall be deemed an original but which together shall constitute one and the same instrument.

11.11 Third Party Beneficiaries. None of the provisions of this Agreement shall be for the benefit of or enforceable by any Third Party, including any creditor of any party hereto. No Third Party shall obtain any right under any provision of this Agreement or shall by reason of any such provision make any claim in respect of any debt, liability or obligation (or otherwise) against any party hereto.

11.12 No Strict Construction. This Agreement has been prepared jointly and will not be construed against either party.

11.13 Survival of Warranties. The representations and warranties of the Company and the Investor contained in this Agreement shall survive the Closing and the delivery of the Shares.

11.14 Remedies. The rights, powers and remedies of the parties under this Agreement are cumulative and not exclusive of any other right, power or remedy which such parties may have under any other agreement or Law. No single or partial assertion or exercise of any right, power or remedy of a party hereunder shall preclude any other or further assertion or exercise thereof.

11.15 Expenses. At the Closing, the Company has agreed to reimburse Investor up to $50,000 for its legal fees and expenses. Except as set forth above, each party shall pay its own fees and expenses in connection with the preparation, negotiation, execution and delivery of the Transaction Agreements.

11.16 Securities Laws Disclosure; Publicity. Any press release the Company or the Investor, or any of their respective Affiliates, issues with respect to the Transaction must be agreed to by both parties or one of their respective Affiliates, except that the Company may issue a press release to the extent it reasonably believes necessary to comply with applicable Law, in which case the Company shall allow the Investor or an Affiliate of the Investor, to the extent reasonably practicable in the circumstances, reasonable time to comment on such release or announcement in advance of such issuance. The Company shall not publicly disclose the name of the Investor or an Affiliate of the Investor, or include the name of the Investor or an Affiliate of the Investor

in any press release or filing with the SEC or any regulatory agency or Trading Market, without the prior written consent of the Investor or an Affiliate of Investor, except (a) as required by federal securities law in connection with (i) any registration statement contemplated by the Registration Rights Agreement and (ii) the filing of final Transaction Agreements (including signature pages thereto) with the SEC, (b) to the extent such disclosure is required by law, request of the staff of the SEC or Trading Market regulations, in which case the Company shall provide the Investor or an Affiliate of Investor with prior written notice of such disclosure permitted under this subclause (b) or (c) the information is already in the public domain through no breach of this Section 11.16.

11.17 Limitation of Liability. IN NO EVENT WILL EITHER PARTY BE LIABLE TO THE OTHER PARTY (OR THE OTHER PARTY'S AFFILIATES OR SUBLICENSEES) IN CONNECTION WITH THIS AGREEMENT FOR LOST REVENUE, LOST PROFITS, LOST SAVINGS, LOSS OF USE, DAMAGE TO GOODWILL, OR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, EXEMPLARY, PUNITIVE OR INDIRECT DAMAGES UNDER ANY THEORY, INCLUDING CONTRACT, NEGLIGENCE, OR STRICT LIABILITY, EVEN IF THAT PARTY HAS BEEN PLACED ON NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

(Signature Page Follows)

IN WITNESS WHEREOF, the parties have executed and delivered this Agreement as of the date first above written.

JOHNSON & JOHNSON INNOVATION-JJDC, INC.

By: /s/ Asish K. Xavier
Name: Asish K. Xavier
Title: VP, Venture Investments

ARROWHEAD PHARMACEUTICALS, INC.

By: /s/ Christopher Anzalone
Name: Christopher Anzalone, Ph.D.
Title: President and CEO

(Signature Page to Stock Purchase Agreement)

EXHIBIT A

FORM OF REGISTRATION RIGHTS AGREEMENT

EXHIBIT B

NOTICES

If to the Company, to:

Arrowhead Pharmaceuticals, Inc.
225 S. Lake Avenue, Suite 1050
Pasadena, California 91101
Attention: General Counsel
E-Mail: General.Counsel@arrowheadpharma.com

with a copy (which shall not constitute notice) to:

Gibson, Dunn & Crutcher LLP
555 Mission Street, Suite 3000
San Francisco, CA 94105
Attention: Ryan Murr
E-Mail: RMurr@gibsondunn.com

if to the Investor, to:

Johnson & Johnson Innovation – JJDC, Inc.
410 George Street
New Brunswick, NJ 08901
Attention: Vijay Murthy & Linda Vogel
Facsimile: (732) 247-5309
E-Mail: vmurthy2@its.jnj.com

with a copy (which shall not constitute notice) to:

Johnson & Johnson Innovation-JJDC, Inc.
One Johnson & Johnson Plaza
New Brunswick, New Jersey 08933
Attention: Kevin Norman, Senior Counsel, Equity Transactions
E-Mail: knorman6@its.jnj.com

with a further copy (which shall not constitute notice) to:

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
666 Third Avenue
New York, New York 10017
Attention: Jeff Schultz, Esq.
Facsimile: (212) 983-3115
E-Mail: JSchultz@mintz.com

if to any other Person who is then the registered Holder, to the address of such Holder as it appears in the stock transfer books of the Company,

or such other address as may be designated in writing hereafter, in the same manner, by such Person.

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REGISTRATION RIGHTS AGREEMENT

This Registration Rights Agreement (this "Agreement") is made and entered into as of October 3, 2018, between Arrowhead Pharmaceuticals, Inc., a Delaware corporation (the "Company"), and Johnson & Johnson Innovation-JJDC, Inc., a New Jersey corporation (the "Purchaser").

This Agreement is made pursuant to the Stock Purchase Agreement, dated as of October 3, 2018, between the Company and the Purchaser (the "Purchase Agreement").

NOW, THEREFORE, IN CONSIDERATION of the mutual covenants contained in this Agreement, and for other good and valuable consideration the receipt and adequacy of which are hereby acknowledged, the Company and the Purchaser agree as follows:

1. Definitions.

Capitalized terms used and not otherwise defined herein that are defined in the Purchase Agreement shall have the meanings given such terms in the Purchase Agreement. As used in this Agreement, the following terms shall have the respective meanings set forth in this Section 1:

"Affiliate" means, with respect to any Person, any other Person that, directly or indirectly through one or more intermediaries, Controls, is controlled by or is under common control with such Person, as such terms are used in and construed under Rule 405 under the Securities Act.

"Control" (including the terms "controlling", "controlled by" or "under common control with") means the possession, direct or indirect, of the power to direct or cause the direction of the management and policies of a Person, whether through the ownership of voting securities, by contract or otherwise.

"Commission" means the United States Securities and Exchange Commission, or any successor entity or entities, including, if applicable, the staff of the Commission.

"Commission Guidance" means (i) any publicly-available written or oral guidance of the Commission staff, or any comments, requirements or requests of the Commission staff and (ii) the Securities Act.

"Common Stock" means the common stock, par value $0.001 per share, of the Company.

"Effectiveness Date" means, with respect to the Initial Registration Statement required to be filed hereunder, the ninetieth (90th) calendar day following the Closing Date (or, in the event the staff of the Commission reviews the Registration Statement, then the one hundred twentieth (120th) calendar day following the Closing Date) and with respect to any additional Registration Statements which may be required pursuant to Section 2 hereof, the ninetieth (90th) calendar day following the date on which an additional Registration Statement is required to be filed hereunder (or, in the event the staff of the Commission reviews the Registration Statement, then the one hundred twentieth (120th) calendar day following the date such additional Registration Statement is required to be filed hereunder); provided, however, that in the event the Company is notified by the Commission that one or more of the above Registration Statements will not be reviewed or is

no longer subject to further review and comments, the Effectiveness Date as to such Registration Statement shall be the fifth (5th)Trading Day following the date on which the Company is so notified in writing if such date precedes the dates otherwise required above, provided, further, if such Effectiveness Date falls on a day that is not a Trading Day, then the Effectiveness Date shall be the next succeeding Trading Day.

"Effectiveness Period" shall have the meaning set forth in Section 2(a).

"Exchange Act" means the Securities Exchange Act of 1934, as amended.

"Filing Date" means, with respect to the Initial Registration Statement required hereunder, the thirtieth (30th) calendar day following the Closing Date and, with respect to any additional Registration Statements which may be required pursuant to Section 2 hereof, the earliest practical date on which the Company is permitted by Commission Guidance to file such additional Registration Statement related to the Registrable Securities.

"Holder" or "Holders" means the holder or holders, as the case may be, from time to time of Registrable Securities.

"Indemnified Party" shall have the meaning set forth in Section 6(c).

"Indemnifying Party" shall have the meaning set forth in Section 6(c).

"Initial Registration Statement" shall mean the initial Registration Statement required to be filed to cover the resale by the Holders of the Registrable Securities pursuant to Section 2(a).

"Losses" shall have the meaning set forth in Section 6(a).

"Person**"** means an individual or corporation, partnership, trust, incorporated or unincorporated association, joint venture, limited liability company, joint stock company, government (or an agency or subdivision thereof) or other entity of any kind.

"Proceeding" means an action, claim, suit, investigation or proceeding (including, without limitation, an investigation or partial proceeding, such as a deposition), whether commenced or threatened.

"Prospectus" means the prospectus included in a Registration Statement (including, without limitation, a prospectus that includes any information previously omitted from a prospectus filed as part of an effective registration statement in reliance upon Rule 430A or Rule 430B promulgated by the Commission pursuant to the Securities Act), as amended or supplemented by any prospectus supplement, with respect to the terms of the offering of any portion of the Registrable Securities covered by a Registration Statement, and all other amendments and supplements to the Prospectus, including post-effective amendments, and all material incorporated by reference or deemed to be incorporated by reference in such Prospectus.

"Reduction Securities" shall have the meaning set forth in Section 2(b).

"Registrable Securities" means (i) the Shares issued pursuant to the Purchase Agreement and (ii) any other shares of Common Stock issued as (or issuable upon conversion or exercise of any warrant, right or other security which is issued as) a dividend or other distribution with respect to, in exchange for or in replacement of the Shares; provided, however, that any such Registrable Securities shall cease to be Registrable Securities (and the Company shall not be required to maintain the effectiveness of any, or file another, Registration Statement hereunder with respect thereto) for so long as (a) a Registration Statement with respect to the sale of such Registrable Securities is declared effective by the Commission under the Securities Act and such Registrable Securities have been disposed of by the Holder in accordance with such effective Registration Statement, (b) such Registrable Securities have been previously sold or transferred in accordance with Rule 144, or (c) such securities become eligible for resale without volume or manner-of-sale restrictions and without current public information requirements pursuant to Rule 144, as reasonably determined by the Company, upon the advice of counsel to the Company.

"Resumption Notice" shall have the meaning set forth in Section 7(c).

"Registration Statement" means each of the following: (i) an initial registration statement which is required to register the resale of the Registrable Securities, and (ii) each additional registration statement, if any, contemplated by Section 2, and including, in each case, the Prospectus, amendments and supplements to each such registration statement or Prospectus, including pre- and post-effective amendments, all exhibits thereto, and all material incorporated by reference or deemed to be incorporated by reference in such registration statement.

"Rule 144" means Rule 144 promulgated by the Commission pursuant to the Securities Act, as such Rule may be amended from time to time, or any similar rule or regulation hereafter adopted by the Commission having substantially the same effect as such Rule.

"Rule 415" means Rule 415 promulgated by the Commission pursuant to the Securities Act, as such Rule may be amended from time to time, or any similar rule or regulation hereafter adopted by the Commission having substantially the same effect as such Rule.

"Rule 424" means Rule 424 promulgated by the Commission pursuant to the Securities Act, as such Rule may be amended from time to time, or any similar rule or regulation hereafter adopted by the Commission having substantially the same effect as such Rule.

"Securities Act" means the Securities Act of 1933, as amended.

"Shares" shall have the meaning set forth in the Purchase Agreement.

"Trading Day" means any day on which the Common Stock is traded on The Nasdaq Global Select Market, or, if The Nasdaq Global Select Market is not the principal trading market for the Common Stock, then on the principal securities exchange or securities market on which the Common Stock is then traded.

"Transaction Agreements" shall have the meaning set forth in the Purchase Agreement.

"Underwritten Offering" means a registration in which Registrable Securities are sold to an underwriter for reoffering to the public.

2. Registration.

(a) On or prior to each Filing Date, the Company shall prepare and file with the Commission a Registration Statement covering the resale of all of the Registrable Securities that are not then registered on an existing and effective Registration Statement for an offering to be made on a continuous basis pursuant to Rule 415. The Registration Statement filed hereunder shall be on Form S-3 (except if the Company is not then eligible to register for resale the Registrable Securities on Form S-3, in which case such registration shall be on another appropriate form in accordance herewith) and shall contain (except if otherwise required pursuant to written comments received from the Commission upon a review of such Registration Statement) the "Plan of Distribution" in substantially the form attached hereto as Annex A (which may be modified to respond to comments, if any, provided by the Commission or at the written request of the Purchaser to address any modifications to the Plan of Distribution at the time that Purchaser issues a request for registration of the Shares in accordance with Section 2 hereof). The Company shall use its reasonable best efforts to cause a Registration Statement filed under this Agreement to be declared effective under the Securities Act promptly but, in any event, no later than the Effectiveness Date for such Registration Statement, and shall, subject to Section 7(d) hereof, use its reasonable best efforts to keep the Registration Statement continuously effective under the Securities Act until the earlier of (i) the date that is two years after the effectiveness of the Registration Statement and (ii) the date on which all securities under such Registration Statement have ceased to be Registrable Securities (the "Effectiveness Period"). Notwithstanding the foregoing, the Company shall be entitled to suspend the effectiveness of the Registration Statement at any time prior to the expiration of the Effectiveness Period for up to an aggregate of twenty (20) consecutive Trading Days or an aggregate of thirty (30) Trading Days (which need not be consecutive) in any given 360-day period. It is agreed and understood that the Company shall, from time to time, be obligated to file one or more additional Registration Statements to cover any Registrable Securities which are not registered for resale pursuant to a pre-existing Registration Statement.

(b) Notwithstanding anything contained herein to the contrary, in the event that the Commission limits the amount of Registrable Securities that may be included and sold by Holders in any Registration Statement, including the Initial Registration Statement, pursuant to Rule 415 or any other basis, the Company may reduce the number of Registrable Securities included in such Registration Statement on behalf of the Holders in whole or in part (in case of an exclusion as to a portion of such Registrable Securities, such portion shall be allocated pro rata among such Holders first in proportion to the respective numbers of Registrable Securities represented by Shares requested to be registered by each such Holder over the total amount of Registrable Securities represented by Shares) (such Registrable Securities, the "Reduction Securities"). In such event, the Company shall give the Holders prompt notice of the number of such Reduction Securities excluded and the Company will not be liable for any damages under this Agreement in connection with the exclusion of such Reduction Securities. The Company shall use its reasonable best efforts at the first opportunity that is permitted by the Commission to register for resale the Reduction Securities. Such new Registration Statement shall be on Form S-3 (except if the Company is not then eligible to register for resale the Reduction Securities on Form S-3, in which case such registration shall be on another appropriate form for such purpose) and shall contain (except if otherwise required pursuant to written comments received from the Commission upon a review of such Registration Statement) the "Plan of Distribution" in substantially the form attached hereto as Annex A (which may be modified to respond to comments, if any, provided by the Commission

or at the written request of the Purchaser to address any modifications to the Plan of Distribution at the time that Purchaser issues a request for registration of the Shares in accordance with Section 2 hereof). The Company shall use its reasonable best efforts to cause each such Registration Statement to be declared effective under the Securities Act as soon as possible but, in any event, no later than the Effectiveness Date, and shall use its reasonable best efforts to keep such Registration Statement continuously effective under the Securities Act during the entire Effectiveness Period, subject to Section 7(c) hereof.

(c) If: (i) the Initial Registration Statement is not filed with the Commission on or prior to the Filing Date, (ii) the Initial Registration Statement is not declared effective by the Commission (or otherwise does not become effective) on or prior to the Effectiveness Date or (iii) after the date it is declared effective by the Commission and except as provided in Section 3(h), (A) such Registration Statement ceases for any reason (including without limitation by reason of a stop order, or the Company's failure to update the Registration Statement), to remain continuously effective as to all Registrable Securities included in such Registration Statement or (B) the Holders are not permitted to utilize the Prospectus therein to resell such Registrable Securities for any reason (other than due to a change in the "Plan of Distribution" or the inaccuracy of any information regarding the Holders) in each case for more than an aggregate of twenty (20) consecutive Trading Days or thirty (30) Trading Days (which need not be consecutive) in any given 360-day period (other than as a result of a breach of this Agreement by a Holder), (any such failure or breach in clauses (i) through (iii) above being referred to as an "Event," and, for purposes of clauses (i), or (ii), the date on which such Event occurs, or for purposes of clause (iii), the date on which such twenty (20) or thirty (30) Trading Day period is exceeded, being referred to as an "Event Date"), then in addition to any other rights the Holders may have hereunder or under applicable law, on each such Event Date and on each monthly anniversary of each such Event Date (if the applicable Event shall not have been cured by such date) until the earlier of (1) the applicable Event is cured or (2) the Registrable Securities are eligible for resale pursuant to Rule 144 without manner of sale or volume restrictions or the current public information requirement, the Company shall pay to each Holder an amount in cash, as liquidated damages and not as a penalty ("Liquidated Damages"), equal to one percent (1%) of the aggregate purchase price paid by such Holder pursuant to the Purchase Agreement for any unregistered Registrable Securities then held by such Holder. The parties agree that (1) notwithstanding anything to the contrary herein or in the Purchase Agreement, no Liquidated Damages shall be payable with respect to any period after the expiration of the Effectiveness Period, (it being understood that this sentence shall not relieve the Company of any Liquidated Damages accruing prior to the Effectiveness Deadline) and in no event shall, the aggregate amount of Liquidated Damages (excluding Liquidated Damages payable in respect of an Event described in Section 2(c)(iv) herein) payable to a Holder exceed, in the aggregate, six percent (6%) of the aggregate purchase price paid by such Holder pursuant to the Purchase Agreement) and (2) in no event shall the Company be liable in any thirty (30) day period for Liquidated Damages under this Agreement (including Liquidated Damages payable in respect of an Event described in Section 2(c)(iv) herein) in excess of two percent (2%) of the aggregate purchase price paid by the Holders pursuant to the Purchase Agreement. The Liquidated Damages pursuant to the terms hereof shall apply on a daily pro-rata basis for any portion of a month prior to the cure of an Event, except in the case of the first Event Date. The Company shall not be liable for Liquidated Damages under this Agreement as to any Registrable Securities which are not permitted by the Commission to be included in a Registration Statement. In such case, the Liquidated Damages shall be calculated to only apply to the percentage of Registrable Securities

which are permitted to be included in such Registration Statement. The Effectiveness Deadline for a Registration Statement shall be extended without default or Liquidated Damages hereunder in the event that the Company's failure to obtain the effectiveness of the Registration Statement on a timely basis results from the failure of a Purchaser to timely provide the Company with information requested by the Company and necessary to complete the Registration Statement in accordance with the requirements of the Securities Act (in which the Effectiveness Deadline would be extended with respect to Registrable Securities held by such Purchaser).

3. Registration Procedures.

In connection with the Company's registration obligations hereunder, the Company shall:

(a) Not less than three Trading Days prior to the filing of a Registration Statement or any related Prospectus or any amendment or supplement thereto, furnish to the Holders copies of all such documents proposed to be filed (other than those incorporated by reference). Notwithstanding the foregoing, the Company shall not be required to furnish to the Holders any prospectus supplement being prepared and filed solely to name new or additional selling stockholders unless such Holders are named in such prospectus supplement. In addition, in the event that any Registration Statement is on Form S-1 (or other form which does not permit incorporation by reference), the Company shall not be required to furnish to the Holders any prospectus supplement containing information included in a report or proxy statement filed under the Exchange Act that would be incorporated by reference in such Registration Statement if such Registration Statement were on Form S-3 (or other form which permits incorporation by reference). The Company shall duly consider any comments made by Holders and received by the Company not later than two Trading Days prior to the filing of the Registration Statement, but shall not be required to accept any such comments to which it reasonably objects.

(b) (i) Prepare and file with the Commission such amendments, including post-effective amendments, to each Registration Statement and the Prospectus used in connection therewith as may be necessary to keep such Registration Statement continuously effective as to the applicable Registrable Securities for its Effectiveness Period and prepare and file with the Commission such additional Registration Statements in order to register for resale under the Securities Act all of the Registrable Securities; (ii) cause the related Prospectus to be amended or supplemented by any required Prospectus supplement, and as so supplemented or amended to be filed pursuant to Rule 424; (iii) respond as promptly as reasonably possible to any comments received from the Commission with respect to each Registration Statement or any amendment thereto; and (iv) comply in all material respects with the provisions of the Securities Act and the Exchange Act with respect to the Registration Statements and the disposition of all Registrable Securities covered by each Registration Statement.

(c) Notify the Holders as promptly as reasonably possible (and, in the case of (i)(A) below, not less than three Trading Days prior to such filing) and (if requested by any such Person) confirm such notice in writing no later than one Trading Day following the day: (i)(A) when a Prospectus or any prospectus supplement (but only to the extent notice is required under Section 3(a) above) or post-effective amendment to a Registration Statement is proposed to be filed; (B) when the Commission notifies the Company in writing whether there will be a "review" of such Registration Statement and whenever the Commission comments in writing on such Registration Statement (in

which case the Company shall, solely to the extent such comments relate to the Selling Stockholder or the Plan of Distribution, provide true and complete copies thereof and all written responses thereto to each of the Holders that pertain to the Holders as a Selling Stockholder; for purposes of clarity the Company shall have no obligation to provide any information that it reasonably believes would constitute material and non-public information); and (C) with respect to each Registration Statement or any post-effective amendment, when the same has been declared effective; (ii) of any request by the Commission or any other Federal or state governmental authority for amendments or supplements to a Registration Statement or Prospectus or for additional information that pertains to the Holders as selling stockholders or the Plan of Distribution; (iii) of the issuance by the Commission of any stop order suspending the effectiveness of a Registration Statement covering any or all of the Registrable Securities or the initiation of any Proceedings for that purpose; (iv) of the receipt by the Company of any notification with respect to the suspension of the qualification or exemption from qualification of any of the Registrable Securities for sale in any jurisdiction, or the initiation or threatening of any Proceeding for such purpose; (v) of the occurrence of any event or passage of time that makes the financial statements included or incorporated by reference in a Registration Statement ineligible for inclusion or incorporation by reference therein or any statement made in such Registration Statement or Prospectus or any document incorporated or deemed to be incorporated therein by reference untrue in any material respect or that requires any revisions to such Registration Statement, Prospectus or other documents so that, in the case of such Registration Statement or the Prospectus, as the case may be, it will not contain any untrue statement of a material fact or omit to state any material fact required to be stated therein or necessary to make the statements therein, in light of the circumstances under which they were made, not misleading; and (vi) of the occurrence or existence of any pending corporate development with respect to the Company that the Company believes may be material and that, in the determination of the Company, makes it not in the best interest of the Company to allow continued availability of a Registration Statement or Prospectus; provided, that any and all of such information shall remain confidential to each Holder until such information otherwise becomes public, unless disclosure by a Holder is required by law.

(d) Use its reasonable best efforts to avoid the issuance of, or, if issued, obtain the withdrawal of (i) any order suspending the effectiveness of a Registration Statement, or (ii) any suspension of the qualification (or exemption from qualification) of any of the Registrable Securities for sale in any jurisdiction, at the earliest practicable moment.

(e) Furnish to each Holder, without charge, at least one conformed copy of each Registration Statement and each amendment thereto and all exhibits to the extent reasonably requested by such Person (including those previously furnished or incorporated by reference) promptly after the filing of such documents with the Commission; provided, that the Company shall have no obligation to provide any document pursuant to this clause that is available on the Commission's EDGAR system.

(f) Promptly deliver to each Holder, without charge, as many copies of each Prospectus or Prospectuses (including each form of prospectus) and each amendment or supplement thereto as such Persons may reasonably request. Subject to Section 7(c) hereof, the Company hereby consents to the use of such Prospectus and each amendment or supplement thereto by each of the selling Holders in connection with the offering and sale of the Registrable Securities covered by such Prospectus and any amendment or supplement thereto.

(g) Prior to any public offering of Registrable Securities, use its reasonable best efforts to register or qualify or cooperate with the selling Holders in connection with the registration or qualification (or exemption from such registration or qualification) of such Registrable Securities for offer and sale under the securities or Blue Sky laws of those jurisdictions within the United States as any Holder reasonably requests in writing to keep each such registration or qualification (or exemption therefrom) effective during the Effectiveness Period and to do any and all other acts or things necessary or advisable to enable the disposition in such jurisdictions of the Registrable Securities covered by the Registration Statements; provided, that the Company shall not be required to qualify generally to do business in any jurisdiction where it is not then so qualified or subject the Company to any material tax in any such jurisdiction where it is not then so subject.

(h) Cooperate with the Holders to facilitate the timely preparation and delivery of certificates or book-entry statements representing Registrable Securities to be delivered to a transferee pursuant to the Registration Statements, which certificates or book-entry statements shall be free, to the extent permitted by the Purchase Agreement, of all restrictive legends, and to enable such Registrable Securities to be in such denominations and registered in such names as any such Holders may request.

(i) Upon the occurrence of any event contemplated by Section 3(c)(v), as promptly as reasonably possible, prepare a supplement or amendment, including a post-effective amendment, to the affected Registration Statements or a supplement to the related Prospectus or any document incorporated or deemed to be incorporated therein by reference, and file any other required document so that, as thereafter delivered, no Registration Statement nor any Prospectus will contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein, in light of the circumstances under which they were made, not misleading.

(j) The Company may require each selling Holder to furnish to the Company a certified statement as to the number of shares of Common Stock beneficially owned by such Holder and any Affiliate thereof, the natural persons thereof that have voting and dispositive control over the shares and any other information with respect to such Holder as the Commission requests.

4. Holder's Obligations.

It shall be a condition precedent to the obligations of the Company to complete any registration pursuant to this Agreement with respect to the Registrable Securities of a Holder that such Holder shall timely furnish to the Company such information regarding itself, the Registrable Securities held by it and the intended method of disposition of the Registrable Securities held by it as shall be reasonably required by the Company to effect and maintain the effectiveness of the registration of such Registrable Securities and shall timely execute such documents in connection with such registration as the Company may reasonably request.. Any sale of any Registrable Securities by any Holder pursuant to a Prospectus delivered by such Holder shall constitute a representation and warranty by such Holder that the information regarding such Holder is as set forth in such Prospectus, and that such Prospectus does not as of the time of such sale contain any untrue statement of a material fact regarding such Holder or omit to state any material fact regarding such Holder necessary to make the statements in such Prospectus, in the light of the circumstances under which they were made, not misleading, solely to the extent such facts are based upon information

regarding such Holder furnished in writing to the Company by such Holder for use in such Prospectus.

5. Registration Expenses.

All fees and expenses incident to the Company's performance of or compliance with its obligations under this Agreement (excluding any underwriting discounts and selling commissions, which shall be borne solely by the Holder(s)) shall be borne by the Company whether or not any Registrable Securities are sold pursuant to a Registration Statement. The fees and expenses referred to in the foregoing sentence shall include, without limitation, (i) all registration and filing fees (including, without limitation, fees and expenses (A) with respect to filings required to be made with the principal trading market on which the Common Stock is then listed for trading, and (B) in compliance with applicable state securities or Blue Sky laws), (ii) printing expenses (including, without limitation, expenses of printing certificates for Registrable Securities and of printing prospectuses if the printing of prospectuses is reasonably requested by the holders of a majority of the Registrable Securities included in the Registration Statement), (iii) messenger, telephone and delivery expenses, (iv) reasonable fees and disbursements of counsel for the Company, (v) Securities Act liability insurance, if the Company so desires such insurance, and (vi) reasonable fees and expenses of all other Persons retained by the Company in connection with the consummation of the transactions contemplated by this Agreement. In addition, the Company shall be responsible for all of its internal expenses incurred in connection with the consummation of the transactions contemplated by this Agreement (including, without limitation, all salaries and expenses of its officers and employees performing legal or accounting duties), the expense of any annual audit and the fees and expenses incurred in connection with the listing of the Registrable Securities on any securities exchange as required hereunder. In no event shall the Company be responsible for any broker or similar commissions of any Holder or, except to the extent provided for in the Transaction Agreements, any legal fees or other costs of the Holders. To the extent that underwriting discounts and selling commissions are incurred in connection with the sale of Registrable Securities in an Underwritten Offering hereunder, such underwriting discounts and selling commissions shall be borne by the Holders of Registrable Securities sold pursuant to such Underwritten Offering, pro rata on the basis of the number of Registrable Securities sold on their behalf in such Underwritten Offering.

6. Indemnification.

(a) Indemnification by the Company. The Company shall, notwithstanding any termination of this Agreement, indemnify and hold harmless each Holder, the officers, directors, agents, partners, members, stockholders and employees of each Holder, each Person who controls any such Holder (within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act) and the officers, directors, agents, partners, members, stockholders and employees of each such controlling Person, to the fullest extent permitted by applicable law, from and against any and all losses, claims, damages, liabilities, costs (including, without limitation, costs of preparation and attorneys' fees) and expenses (collectively, "Losses"), as incurred, arising out of or relating to any untrue or alleged untrue statement of a material fact contained in any Registration Statement, any Prospectus or any form of prospectus or in any amendment or supplement thereto (it being understood that the Holder has approved Annex A hereto for this purpose), or arising out of or relating to any omission or alleged omission of a material fact required to be stated therein or

necessary to make the statements therein (in the case of any Prospectus or form of prospectus or supplement thereto, in light of the circumstances under which they were made) not misleading, except to the extent, but only to the extent, that (1) such untrue statements, alleged untrue statements, omissions or alleged omissions are based solely upon information regarding such Holder furnished in writing to the Company by such Holder expressly for use therein, or to the extent that such information relates to such Holder or such Holder's proposed method of distribution of Registrable Securities and was reviewed and expressly approved in writing by such Holder expressly for use in the Registration Statement, such Prospectus or such form of Prospectus or in any amendment or supplement thereto (it being understood that the Holder has approved Annex A hereto for this purpose) or (2) in the case of an occurrence of an event of the type specified in Section 3(c)(ii)-(v), the use by such Holder of an outdated or defective Prospectus after the Company has notified such Holder in writing (in accordance with Section 7(g) below) that the Prospectus is outdated or defective and prior to the receipt by such Holder of a Resumption Notice (as defined below) or an amended or supplemented Prospectus, but only if and to the extent that following the receipt of a Resumption Notice or the amended or supplemented Prospectus the misstatement or omission giving rise to such Loss would have been corrected. The Company shall notify the Holders promptly of the institution, threat or assertion of any Proceeding of which the Company is aware in connection with the transactions contemplated by this Agreement.

(b) Indemnification by Holders. Each Holder shall, notwithstanding any termination of this Agreement, severally and not jointly, indemnify and hold harmless the Company, its directors, officers, agents and employees, each Person who controls the Company (within the meaning of Section 15 of the Securities Act and Section 20 of the Exchange Act), and the directors, officers, agents, partners, members, stockholders or employees of such controlling Persons, to the fullest extent permitted by applicable law, from and against all Losses, as incurred, arising solely out of or based solely upon: (x) for so long as the Company is not a eligible to use Form S-3 under the Securities Act for a primary offering in reliance on General Instruction I.B.1 of such form and the prospectus delivery requirements of the Securities Act apply to sales by such Holder, such Holder's failure to comply with the prospectus delivery requirements of the Securities Act or (y) any untrue statement of a material fact contained in any Registration Statement, any Prospectus, or any form of prospectus, or in any amendment or supplement thereto, or arising solely out of or based solely upon any omission of a material fact required to be stated therein or necessary to make the statements therein (in the case of any Prospectus, or any form of prospectus or supplement thereto, in light of the circumstances under which they were made) not misleading to the extent, but only to the extent that, (1) such untrue statements or omissions are based solely upon information regarding such Holder furnished in writing to the Company by such Holder expressly for use therein, or to the extent that such information relates to such Holder or such Holder's proposed method of distribution of Registrable Securities and was reviewed and expressly approved in writing by such Holder expressly for use in the Registration Statement, such Prospectus or such form of Prospectus or in any amendment or supplement thereto (it being understood that the Holder has approved Annex A hereto for this purpose) or (2) in the case of an occurrence of an event of the type specified in Section 3(c)(ii)-(v), the use by such Holder of an outdated or defective Prospectus after the Company has notified such Holder in writing (in accordance with Section 7(g) below) that the Prospectus is outdated or defective and prior to the receipt by such Holder of Resumption Notice or an amended or supplemented Prospectus, but only if and to the extent that following the receipt of a Resumption Notice or the amended or supplemented Prospectus the misstatement or omission giving rise to such Loss would have been corrected. In no event shall

the liability of any selling Holder hereunder be greater in amount than the dollar amount of the net proceeds received by such Holder upon the sale of the Registrable Securities giving rise to such indemnification obligation.

(c) Conduct of Indemnification Proceedings. If any Proceeding shall be brought or asserted against any Person entitled to indemnity hereunder (an "Indemnified Party"), such Indemnified Party shall promptly notify the Person from whom indemnity is sought (the "Indemnifying Party") in writing, and the Indemnifying Party shall assume the defense thereof, including the employment of counsel reasonably satisfactory to the Indemnified Party and the payment of all fees and expenses incurred in connection with defense thereof; provided, that the failure of any Indemnified Party to give such notice shall not relieve the Indemnifying Party of its obligations or liabilities pursuant to this Agreement, except and only to the extent that it shall be finally determined by a court of competent jurisdiction (which determination is not subject to appeal or further review) that such failure shall have proximately and materially adversely prejudiced the Indemnifying Party.

An Indemnified Party shall have the right to employ separate counsel in any such Proceeding and to participate in the defense thereof, but the fees and expenses of such counsel shall be at the expense of such Indemnified Party or Parties unless: (1) the Indemnifying Party has agreed in writing to pay such fees and expenses; (2) the Indemnifying Party shall have failed promptly to assume the defense of such Proceeding and to employ counsel reasonably satisfactory to such Indemnified Party in any such Proceeding; or (3) the named parties to any such Proceeding (including any impleaded parties) include both such Indemnified Party and the Indemnifying Party, and such Indemnified Party shall have been advised by counsel that a conflict of interest is likely to exist if the same counsel were to represent such Indemnified Party and the Indemnifying Party (in which case, if such Indemnified Party notifies the Indemnifying Party in writing that it elects to employ separate counsel at the expense of the Indemnifying Party, the Indemnifying Party shall not have the right to assume the defense thereof and such counsel shall be at the expense of the Indemnifying Party); provided, that the Indemnifying Party shall not be liable for the fees and expenses of more than one separate firm of attorneys at any time for all Indemnified Parties pursuant to this Section 6(c). The Indemnifying Party shall not be liable for any settlement of any such Proceeding effected without its written consent, which consent shall not be unreasonably withheld. No Indemnifying Party shall, without the prior written consent of the Indemnified Party, effect any settlement of any pending Proceeding in respect of which any Indemnified Party is a party, unless such settlement includes an unconditional release of such Indemnified Party from all liability on claims that are the subject matter of such Proceeding.

Each Indemnified Party shall furnish such information regarding itself or the claim in question as an Indemnifying Party may reasonably request in writing and as shall be reasonably required in connection with defense of such claim and litigation resulting therefrom.

All fees and expenses of the Indemnified Party (including reasonable fees and expenses to the extent incurred in connection with investigating or preparing to defend such Proceeding in a manner not inconsistent with this Section) shall be paid to the Indemnified Party, as incurred, within ten (10) Trading Days of written notice thereof to the Indemnifying Party (regardless of whether it is ultimately determined that an Indemnified Party is not entitled to indemnification hereunder; provided, that the Indemnifying Party may require such Indemnified Party to undertake

to reimburse all such fees and expenses to the extent it is finally judicially determined that such Indemnified Party is not entitled to indemnification hereunder).

(d) Contribution. If a claim for indemnification under Section 6(a) or 6(b) is unavailable to an Indemnified Party (by reason of public policy or otherwise), then each Indemnifying Party, in lieu of indemnifying such Indemnified Party, shall contribute to the amount paid or payable by such Indemnified Party as a result of such Losses, in such proportion as is appropriate to reflect the relative fault of the Indemnifying Party and Indemnified Party in connection with the actions, statements or omissions that resulted in such Losses as well as any other relevant equitable considerations. The relative fault of such Indemnifying Party and Indemnified Party shall be determined by reference to, among other things, whether any action in question, including any untrue or alleged untrue statement of a material fact or omission or alleged omission of a material fact, has been taken or made by, or relates to information supplied by, such Indemnifying Party or Indemnified Party, and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such action, statement or omission. The amount paid or payable by a party as a result of any Losses shall be deemed to include, subject to the limitations set forth in Section 6(c), any reasonable attorneys' or other reasonable fees or expenses incurred by such party in connection with any Proceeding to the extent such party would have been indemnified for such fees or expenses if the indemnification provided for in this Section was available to such party in accordance with its terms.

The parties hereto agree that it would not be just and equitable if contribution pursuant to this Section 6(d) were determined by pro rata allocation or by any other method of allocation that does not take into account the equitable considerations referred to in the immediately preceding paragraph. Notwithstanding the provisions of this Section 6(d), no Holder shall be required to contribute, in the aggregate, any amount in excess of the amount by which the proceeds actually received by such Holder from the sale of the Registrable Securities subject to the Proceeding exceeds the amount of any damages that such Holder has otherwise been required to pay by reason of such untrue or alleged untrue statement or omission or alleged omission. No person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) shall be entitled to contribution from any person who was not guilty of such fraudulent misrepresentation.

The indemnity and contribution agreements contained in this Section 6 are in addition to any liability that the Indemnifying Parties may have to the Indemnified Parties and are not in diminution or limitation of the indemnification provisions under the Purchase Agreement.

7. Miscellaneous.

(a) Remedies. In the event of a breach by the Company or by a Holder, of any of their obligations under this Agreement, each Holder or the Company, as the case may be, in addition to being entitled to exercise all rights granted by law and under this Agreement, including recovery of damages, will be entitled to specific performance of its rights under this Agreement. The Company and each Holder agree that monetary damages would not provide adequate compensation for any losses incurred by reason of a breach by it of any of the provisions of this Agreement and hereby further agree that, in the event of any action for specific performance in respect of such breach, it shall waive the defense that a remedy at law would be adequate.

(b) Compliance. Each Holder covenants and agrees that it will comply with the prospectus delivery requirements of the Securities Act as applicable to it in connection with sales of Registrable Securities pursuant to the Registration Statement.

(c) Discontinued Disposition. Each Holder agrees by its acquisition of such Registrable Securities that, upon receipt of a notice from the Company of the occurrence of an any event of the kind described in Section 3(c), such Holder will forthwith discontinue disposition of such Registrable Securities under the Registration Statement until such Holder's receipt of the copies of the supplemented Prospectus and/or amended Registration Statement or until it is advised in writing (a "Resumption Notice") by the Company that the use of the applicable Prospectus may be resumed, and, in either case, has received copies of any additional or supplemental filings that are incorporated or deemed to be incorporated by reference in such Prospectus or Registration Statement. The Company may provide appropriate stop orders to the Transfer Agent to enforce the provisions of this paragraph.

(d) Furnishing of Information. Each Holder shall furnish in writing to the Company such information regarding itself, the Registrable Securities held by it and the intended method of disposition of the Registrable Securities held by it, as shall be reasonably requested by the Company to effect the registration of such Registrable Securities and shall execute such documents in connection with such registration as the Company may reasonably request.

(e) Amendments and Waivers. No provision of this Agreement may be waived or amended except in a written instrument signed by the Company and the Holder or Holders (as applicable) of no less than a majority of the then outstanding Registrable Securities. The Company shall provide prior notice to all Holders of any proposed waiver or amendment. No waiver of any default with respect to any provision, condition or requirement of this Agreement shall be deemed to be a continuing waiver in the future or a waiver of any subsequent default or a waiver of any other provision, condition or requirement hereof, nor shall any delay or omission of either party to exercise any right hereunder in any manner impair the exercise of any such right.

(f) Piggy-Back Registrations. If at any time during the Effectiveness Period, except as contemplated by Section 2(b) hereof, there is not an effective Registration Statement covering all of the Registrable Securities and the Company shall determine to prepare and file with the Commission a registration statement relating to an offering for its own account or the account of others under the Securities Act of any of its equity securities, other than on Form S-4 or Form S-8 (each as promulgated under the Securities Act) or their then equivalents relating to equity securities to be issued solely in connection with any acquisition of any entity or business or equity securities issuable in connection with the stock option or other employee benefit plans, then the Company shall send to each Holder a written notice of such determination and, if within 15 days after the date of such notice, any such Holder shall so request in writing, the Company shall include in such registration statement all or any part of such Registrable Securities such Holder requests to be registered; provided, however, that the Company shall not be required to register any Registrable Securities pursuant to this Section 7(f) that are eligible for resale pursuant to Rule 144 promulgated under the Securities Act without volume limitation or that are the subject of a then effective Registration Statement. The Company shall have the right to terminate or withdraw any registration initiated by it under this Section 7(f) prior to the effectiveness of such registration whether or not any Holder has elected to include securities in such registration.

(g) Termination of Registration Rights. For the avoidance of doubt, it is expressly agreed and understood that (i) in the event that there are no Registrable Securities outstanding as of a Filing Date, then the Company shall have no obligation to file, cause to be declared effective or to keep effective any Registration Statement hereunder (including any Registration Statement previously filed pursuant to this Agreement) and (ii) all registration rights granted to the Holders hereunder, shall terminate in their entirety effective on the first date on which there shall cease to be any Registrable Securities outstanding.

(h) SEC Reports. With a view to making available to the Holders the benefits of Rule 144 under the Securities Act and any other rule or regulation of the Commission that may at any time permit a Holder to sell Registrable Securities of the Company to the public without registration or pursuant to a registration on Form S-3, for so long as any Holder owns Shares, the Company agrees to: (i) make and keep available adequate current public information, as those terms are understood and defined in SEC Rule 144; and (ii) furnish to any Holder, forthwith upon request (A) a written statement by the Company that it has complied with the reporting requirements of Rule 144, (B) a copy of the most recent annual or quarterly report of the Company and such other reports and documents so filed by the Company, and (C) such other information as may be reasonably requested in availing any Holder of any rule or regulation of the Commission (exclusive of Rule 144A) which permits the selling of any Shares without registration or pursuant to Form S-3.

(i) Notices. All notices, requests, consents and other communications hereunder shall be in writing, shall be sent by confirmed electronic mail, or mailed by first-class registered or certified airmail, or nationally recognized overnight express courier, postage prepaid, and shall be deemed given when so sent in the case of electronic mail transmission, or when so received in the case of mail or courier, and addressed as follows:

if to the Company, to:

Arrowhead Pharmaceuticals, Inc.
225 S. Lake Avenue, Suite 1050
Pasadena, California 91101
Attention: General Counsel

E-Mail: General.Counsel@arrowheadpharma.com

with a copy (which shall not constitute notice) to:

Gibson, Dunn & Crutcher LLP
555 Mission Street, Suite 3000San Francisco, CA 94105
Attention: Ryan Murr
E-Mail: rmurr@gibsondunn.com

if to the Purchaser, to:

Johnson & Johnson Innovation – JJDC, Inc.
410 George Street
New Brunswick, NJ 08901

Attention: Vijay Murthy & Linda Vogel
Facsimile: (732) 247-5309
E-Mail: vmurthy2@its.jnj.com

with a copy (which shall not constitute notice) to:

Johnson & Johnson Innovation-JJDC, Inc.
One Johnson & Johnson Plaza
New Brunswick, New Jersey 08933
Attention: Kevin Norman, Senior Counsel, Equity Transactions
E-Mail: knorman6@its.jnj.com

with a further copy (which shall not constitute notice) to:

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
666 Third Avenue
New York, New York 10017
Attention: Jeff Schultz, Esq.
Facsimile: (212) 983-3115
E-Mail: JSchultz@mintz.com

if to any other Person who is then the registered Holder, to the address of such Holder as it appears in the stock transfer books of the Company,

or such other address as may be designated in writing hereafter, in the same manner, by such Person.

(j) Successors and Assigns. This Agreement shall inure to the benefit of and be binding upon the successors and permitted assigns of each of the parties and shall inure to the benefit of each Holder. Each Holder may assign its respective rights hereunder in the manner and to the Persons as permitted under the Purchase Agreement.

(k) Execution and Counterparts. This Agreement may be executed in any number of counterparts, each of which when so executed shall be deemed to be an original and, all of which taken together shall constitute one and the same Agreement and shall become effective when counterparts have been signed by each party and delivered to the other parties, it being understood that all parties need not sign the same counterpart. In the event that any signature is delivered by facsimile transmission or by e-mail delivery of a ".pdf" format data file, such signature shall create a valid binding obligation of the party executing (or on whose behalf such signature is executed) the same with the same force and effect as if such facsimile or ".pdf" signature were the original thereof.

(l) Governing Law. This Agreement shall be governed by and construed in accordance with the Laws of the State of Delaware, without regard to the conflict of laws principles thereof that would require the application of the Law of any other jurisdiction. Any action brought, arising out of, or relating to this Agreement shall be brought in the Court of Chancery of the State of Delaware. Each party hereby irrevocably submits to the exclusive jurisdiction of said Court in respect of any claim relating to the validity, interpretation and enforcement of this Agreement, and hereby

waives, and agrees not to assert, as a defense in any action, suit or proceeding in which any such claim is made that it is not subject thereto or that such action, suit or proceeding may not be brought or is not maintainable in such courts, or that the venue thereof may not be appropriate or that this agreement may not be enforced in or by such courts. The parties hereby consent to and grant the Court of Chancery of the State of Delaware jurisdiction over such parties and over the subject matter of any such claim and agree that mailing of process or other papers in connection with any such action, suit or proceeding in the manner provided in Section 7(i) or in such other manner as may be permitted by law, shall be valid and sufficient thereof. Each party hereby irrevocably waives personal service of process and consents to process being served in any such suit, action or proceeding by mailing a copy thereof via registered or certified mail or overnight delivery (with evidence of delivery) to such party at the address in effect for notices to it under this Agreement and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any other manner permitted by law.

(m) Cumulative Remedies. The remedies provided herein are cumulative and not exclusive of any remedies provided by law.

(n) Severability. If any term, provision, covenant or restriction of this Agreement is held by a court of competent jurisdiction to be invalid, illegal, void or unenforceable, the remainder of the terms, provisions, covenants and restrictions set forth herein shall remain in full force and effect and shall in no way be affected, impaired or invalidated, and the parties hereto shall use their reasonable best efforts to find and employ an alternative means to achieve the same or substantially the same result as that contemplated by such term, provision, covenant or restriction. It is hereby stipulated and declared to be the intention of the parties that they would have executed the remaining terms, provisions, covenants and restrictions without including any of such that may be hereafter declared invalid, illegal, void or unenforceable.

(o) Use of Terms. The parties agree and acknowledge that when, in this Agreement, the Company is required to use its reasonable best efforts to perform any covenant under this Agreement, such requirement shall not obligate the Company, in the reasonable judgment of the disinterested members of its Board of Directors, to perform any act that will have a material adverse effect on the Company.

(p) Headings. The headings in this Agreement are for convenience of reference only and shall not limit or otherwise affect the meaning hereof.

(q) Entire Agreement. This Agreement and the Purchase Agreement contain the entire agreement among the parties with respect to the subject matter hereof and thereof and supersede all prior and contemporaneous arrangements or understandings, whether written or oral, with respect hereto and thereto.

[*Signature pages follow*]

IN WITNESS WHEREOF, the parties have executed this Registration Rights Agreement as of the date first written above.

ARROWHEAD PHARMACEUTICALS, INC.

By: /s/ Christopher Anzalone
Name: Christopher Anzalone, Ph.D.
Title: President and CEO

JOHNSON & JOHNSON INNOVATION-JJDC, INC.

By: /s/ Asish K. Xavier
Name: Asish K. Xavier
Title: VP, Venture Investments

ANNEX A

PLAN OF DISTRIBUTION

The selling stockholders and any of their pledgees, donees, transferees, assignees or other successors-in-interest may, from time to time, sell, transfer or otherwise dispose of any or all of their shares of common stock or interests in shares of common stock on any stock exchange, market or trading facility on which the shares are traded or in private transactions. These dispositions may be at fixed prices, at prevailing market prices at the time of sale, at prices related to the prevailing market price, at varying prices determined at the time of sale, or at negotiated prices. The selling stockholders may use one or more of the following methods when disposing of the shares or interests therein:

- ordinary brokerage transactions and transactions in which the broker-dealer solicits purchasers;
- block trades in which the broker-dealer will attempt to sell the shares as agent but may position and resell a portion of the block as principal to facilitate the transaction;
- through brokers, dealers or underwriters that may act solely as agents;
- purchases by a broker-dealer as principal and resale by the broker-dealer for its account;
- an exchange distribution in accordance with the rules of the applicable exchange;
- privately negotiated transactions;
- through the writing or settlement of options or other hedging transactions entered into after the effective date of the registration statement of which this prospectus is a part, whether through an options exchange or otherwise;
- broker-dealers may agree with the selling stockholders to sell a specified number of such shares at a stipulated price per share;
- a combination of any such methods of disposition; and
- any other method permitted pursuant to applicable law.

The selling stockholders may also sell shares under Rule 144 under the Securities Act of 1933, as amended, or Securities Act, if available, rather than under this prospectus.

Broker-dealers engaged by the selling stockholders may arrange for other broker-dealers to participate in sales. Broker-dealers may receive commissions or discounts from the selling stockholders (or, if any broker-dealer acts as agent for the purchaser of shares, from the purchaser) in amounts to be negotiated. The selling stockholders do not expect these commissions and discounts to exceed what is customary in the types of transactions involved.

The selling stockholders may from time to time pledge or grant a security interest in some or all of the shares of common stock owned by them and, if they default in the performance of their secured obligations, the pledgees or secured parties may offer and sell shares of common stock from time to time under this prospectus, or under a supplement or amendment to this prospectus under Rule 424(b)(3) or other applicable provision of the Securities Act amending the list of selling stockholders to include the pledgee, transferee or other successors in interest as selling stockholders under this prospectus.

Upon being notified in writing by a selling stockholder that any material arrangement has been entered into with a broker-dealer for the sale of common stock through a block trade, special offering, exchange distribution or secondary distribution or a purchase by a broker or dealer, we will file a supplement to this prospectus, if required, pursuant to Rule 424(b) under the Securities Act, disclosing (i) the name of each such selling stockholder and of the participating broker-dealer(s), (ii) the number of shares involved, (iii) the price at which such shares of common stock were sold, (iv) the commissions paid or discounts or concessions allowed to such broker-dealer(s), where applicable, (v) that such broker-dealer(s) did not conduct any investigation to verify the information set out or incorporated by reference in this prospectus, and (vi) other facts material to the transaction. In addition, upon being notified in writing by a selling stockholder that a donee or pledge intends to sell more than 500 shares of common stock, we will file a supplement to this prospectus if then required in accordance with applicable securities law.

The selling stockholders also may transfer the shares of common stock in other circumstances, in which case the transferees, pledgees or other successors in interest will be the selling beneficial owners for purposes of this prospectus.

In connection with the sale of the shares of common stock or interests in shares of common stock, the selling stockholders may enter into hedging transactions after the effective date of the registration statement of which this prospectus is a part with broker-dealers or other financial institutions, which may in turn engage in short sales of the common stock in the course of hedging the positions they assume. The selling stockholders may also sell shares of common stock short after the effective date of the registration statement of which this prospectus is a part and deliver these securities to close out their short positions, or loan or pledge the common stock to broker-dealers that in turn may sell these securities. The selling stockholders may also enter into option or other transactions after the effective date of the registration statement of which this prospectus is a part with broker-dealers or other financial institutions or the creation of one or more derivative securities which require the delivery to such broker-dealer or other financial institution of shares offered by this prospectus, which shares such broker-dealer or other financial institution may resell pursuant to this prospectus (as supplemented or amended to reflect such transaction).

The selling stockholders and any broker-dealers or agents that are involved in selling the shares may be deemed to be “underwriters” within the meaning of the Securities Act in connection with such sales. In such event, any commissions received by such broker-dealers or agents and any profit on the resale of the shares purchased by them may be deemed to be underwriting commissions or discounts under the Securities Act and the rules of the Financial Industry Regulatory Authority (FINRA).

We have advised the selling stockholders that they are required to comply with Regulation M promulgated under the Securities Exchange Act of 1934, as amended, during such time as they may be engaged in a distribution of the shares. The foregoing may affect the marketability of the common stock.

The aggregate proceeds to the selling stockholders from the sale of the common stock offered by them will be the purchase price of the common stock less discounts or commissions, if any. Each of the selling stockholders reserves the right to accept and, together with their agents from time to time, to reject, in whole or in part, any proposed purchase of common stock to be made directly or through agents. We will not receive any of the proceeds from this offering.

We are required to pay all fees and expenses incident to the registration of the shares. We have agreed to indemnify the selling stockholders against certain losses, claims, damages and liabilities, including liabilities under the Securities Act or otherwise.

We have agreed with the selling stockholders to keep the registration statement of which this prospectus constitutes a part effective until the earlier of (a) such time as all of the shares covered by this prospectus have been disposed of pursuant to and in accordance with the registration statement or (b) the date on which the shares of common stock covered by this prospectus may be sold or transferred by non-affiliates without any volume limitations or pursuant to Rule 144 of the Securities Act.

Exhibit 31.1

CERTIFICATION PURSUANT SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Christopher Anzalone, Chief Executive Officer of Arrowhead Pharmaceuticals, Inc., certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Arrowhead Pharmaceuticals, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 7, 2019

/s/ CHRISTOPHER ANZALONE

Christopher Anzalone
Chief Executive Officer

Exhibit 31.2

CERTIFICATION PURSUANT SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Kenneth A. Myszkowski, Chief Financial Officer of Arrowhead Pharmaceuticals, Inc., certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Arrowhead Pharmaceuticals, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 7, 2019

/s/ Kenneth A. Myszkowski

Kenneth A. Myszkowski,
Chief Financial Officer

Exhibit 32.1

CERTIFICATION PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

I, Christopher Anzalone, Chief Executive Officer of Arrowhead Pharmaceuticals, Inc. (the "Company"), certify, pursuant to Rule 13(a)-14(b) or Rule 15(d)-14(b) of the Securities Exchange Act of 1934 and 18 U.S.C. Section 1350, that (i) the Quarterly Report on Form 10-Q of the Company for the quarterly period ended December 31, 2018, fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and (ii) the information contained in such Quarterly Report on Form 10-Q fairly presents in all material respects the financial condition and results of operations of the Company.

Date: February 7, 2019

/s/ CHRISTOPHER ANZALONE

Christopher Anzalone
Chief Executive Officer

A signed original of these written statements required by 18 U.S.C. Section 1350 has been provided to Arrowhead Pharmaceuticals, Inc. and will be retained by Arrowhead Pharmaceuticals, Inc. and furnished to the Securities and Exchange Commission or its staff upon request.

Exhibit 32.2

CERTIFICATION PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

I, Kenneth A. Myszkowski, Chief Financial Officer of Arrowhead Pharmaceuticals, Inc. (the "Company"), certify, pursuant to Rule 13(a)-14(b) or Rule 15(d)-14(b) of the Securities Exchange Act of 1934 and 18 U.S.C. Section 1350, that (i) the Quarterly Report on Form 10-Q of the Company for the quarterly period ended December 31, 2018, fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and (ii) the information contained in such Quarterly Report on Form 10-Q fairly presents in all material respects the financial condition and results of operations of the Company.

Date: February 7, 2019

/s/ Kenneth A. Myszkowski

Kenneth A. Myszkowski
Chief Financial Officer

A signed original of these written statements required by 18 U.S.C. Section 1350 has been provided to Arrowhead Pharmaceuticals, Inc. and will be retained by Arrowhead Pharmaceuticals, Inc. and furnished to the Securities and Exchange Commission or its staff upon request.