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Arrowhead and Spring Bank Announce Clinical Collaboration for ARC-520 and SB 9200 in Chronic Hepatitis B

PASADENA, Calif. & HOPKINTON, Mass.--(BUSINESS WIRE)-- Arrowhead Pharmaceuticals Inc. (NASDAQ: ARWR) and Spring Bank Pharmaceuticals, Inc. (NASDAQ: SBPH), a clinical-stage biopharmaceutical company developing novel therapeutics for the treatment of viral infections, cancer, and inflammatory diseases, today announced an agreement to perform collaborative studies on Arrowhead's ARC-520 and Spring Bank's SB 9200, for the treatment of chronic Hepatitis B (HBV). The companies plan to first conduct preclinical models with both agents together and then study the agents clinically in a cohort to be added to Arrowhead's ongoing MONARCH Phase 2b study, in which patients will receive a dosing regimen that includes ARC-520, SB 9200, and an oral direct-acting antiviral.

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"The MONARCH Phase 2b combination study was specifically designed to be iterative in nature, allowing us to seamlessly add cohorts when additional novel agents are available to study in combination with ARC-520," said Bruce Given, M.D., chief operating officer and head of R&D at Arrowhead. "We see ARC-520, which is designed to silence the production of all HBV gene products, as a potential backbone therapy for combinations. Spring Bank's SB 9200 is a promising immunomodulatory agent with an interesting mechanism that we think has significant therapeutic potential in combination with ARC-520 and a NUC."

"Our collaboration with our colleagues at Arrowhead Pharmaceuticals will be the first study of two completely novel agents in HBV, both focused on delivering a functional cure," said Nezam Afdhal, M.D., chief medical officer at Spring Bank Pharmaceuticals. "We believe combining SB 9200 with Arrowhead's ARC-520, along with an approved nucleotide(side) polymerase inhibitor, has the potential to lead to a functional cure. Together, we hope to demonstrate in the MONARCH trial that triple therapy can increase HBV functional cure rates with a more favorable tolerability profile and perhaps a shorter duration of treatment relative to current standard of care with interferon-based regimens."

About SB 9200

SB 9200 is Spring Bank's novel small molecule, orally-available selective immunomodulator compound being developed as both monotherapy and combination therapy as a backbone for the treatment of chronic HBV and other viral diseases. SB 9200 is currently being studied in the ACHIEVE Phase II global trial. Part A of the ACHIEVE study is a placebo-controlled, sequential cohort, double blind trial to evaluate increasing doses of SB 9200 as monotherapy for 12 weeks followed by tenofovir disoproxil fumarate 300mg (Viread® Gilead Sciences Inc.) for a further 12 weeks. Part B of the ACHIEVE study will evaluate SB 9200 in combination with tenofovir and as monotherapy versus tenofovir monotherapy after the optimal doses of SB 9200 are determined in Part A.

About ARC-520

Arrowhead's ARC-520 is being investigated for its potential to produce functional cures in patients with chronic hepatitis B virus (HBV) infection. ARC-520 intervenes upstream of the reverse transcription process where current standard-of-care nucleotide and nucleoside analogs act, and is designed to silence the production of all HBV gene products. The small interfering RNAs (siRNAs) in ARC-520 engage the body's normal cellular RNAi machinery and direct specific cleavage of HBV RNA transcripts, thereby reducing the levels of HBV proteins and the RNA template used to produce viral DNA. Arrowhead is investigating ARC-520 specifically to determine if significantly reducing circulating and non-circulating viral proteins and RNA will allow for re-constitution of an effective host immune response and ultimately HBsAg seroclearance resulting in functional cure. As many as 350-400 million people worldwide are chronically infected with the hepatitis B virus, which can lead to cirrhosis of the liver and is responsible for 80% of primary liver cancers globally. Arrowhead is currently conducting Phase 2b multiple dose and combination studies in chronic HBV patients. In clinical studies to date, the most common reported adverse events in all subjects completing treatment were upper respiratory infection and headache.

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. The company's pipeline includes ARC-520 and ARC-521 for chronic hepatitis B virus infection, ARC-AAT for liver disease associated with alpha-1 antitrypsin deficiency, ARC-F12 for hereditary angioedema and thromboembolic disorders, ARC-LPA for cardiovascular disease, and ARC-HIF2 for renal cell carcinoma.

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/alerts.cfm.

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About Spring Bank Pharmaceuticals

Spring Bank Pharmaceuticals is a clinical-stage biopharmaceutical company engaged in the discovery and development of a novel class of therapeutics using its proprietary small molecule nucleic acid hybrid, or SMNH, chemistry platform. The company is developing its most advanced SMNH product candidate, SB 9200, for the treatment of viral diseases, including hepatitis B virus.

Arrowhead 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 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.

Spring Bank Safe Harbor Statement:

Any statements in this press release about Spring Bank's future expectations, plans and prospects, including statements about Spring Bank's financial prospects, future operations and sufficiency of funds for future operations, clinical development of Spring Bank's product candidates, expectations regarding future clinical trials and future expectations and plans and prospects for Spring Bank and other statements containing the words "believes," "anticipates," "estimates," "expects," "intends," "plans," "predicts," "projects," "targets," "may," "potential," "will," "would," "could," "should," "continue," and similar expressions, constitute forward-looking statements within the meaning of The Private Securities Litigation Reform Act of 1995. Actual results may differ materially from those indicated by such forward-looking statements as a result of various important factors, including whether Spring Bank's cash resources will be sufficient to fund its continuing operations for the periods anticipated; whether results obtained in clinical trials will be indicative of results obtained in future clinical trials; whether Spring Bank's product candidates will advance through the clinical trial process on a timely basis; whether the results of such trials will warrant submission for approval from the United States Food and Drug Administration or equivalent foreign regulatory agencies; whether Spring Bank's product candidates will receive approval from regulatory agencies on a timely basis or at all; whether, if product candidates obtain approval, they will be successfully distributed and marketed; and other factors discussed in the "Risk Factors" section of Spring Bank's quarterly report on Form 10-Q for the quarter ended June 30, 2016, which is on file with the SEC, and in other filings Spring Bank makes with the SEC from time to time. In addition, the forward-looking statements included in this press release represent Spring Bank's views as of the date hereof. Spring Bank anticipates that subsequent events and developments will cause Spring Bank's views to change. However, while Spring Bank may elect to update these forward-looking statements at some point in the future, Spring Bank specifically disclaims any obligation to do so. These forward-looking statements should not be relied upon as representing Spring Bank's views as of any date subsequent to the date hereof.

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