Arrowhead Pharmaceuticals Presents Late-Breaking Preliminary Clinical Data on ARO-HBV at Liver Meeting® 2018

November 9, 2018

- Mean HBsAg reduction of -1.9 Log10 (-98.7%) with a range of -1.3 Log10 (-95.0%) to -3.8 Log10 (-99.98%)

- ARO-HBV appears to be well-tolerated at monthly doses up to 400 mg

PASADENA, Calif.--(BUSINESS WIRE)--Nov. 9, 2018-- Arrowhead Pharmaceuticals Inc. (NASDAQ: ARWR) today announced preliminary clinical data from a Phase 1/2 study (AROHBV1001) of ARO-HBV, a third-generation subcutaneously administered RNA interference (RNAi) therapeutic candidate being developed as a potential treatment for patients with chronic hepatitis B virus (HBV) infection. Key new data highlighting initial results from AROHBV1001 will be presented in a late-breaking poster at The Liver Meeting®, the Annual Meeting of the American Association for the Study of Liver Disease (AASLD), being held in San Francisco.

Arrowhead recently entered into a license agreement with Janssen Pharmaceuticals, Inc., part of the Janssen Pharmaceutical Companies of Johnson & Johnson, to develop and commercialize ARO-HBV.

Initial results from normal healthy volunteers (NHV) who received a single dose of ARO-HBV or placebo (n=30) and chronic hepatitis B patients who received three monthly doses of ARO-HBV in combination with entecavir or tenofovir (NUC) with greater than six weeks of available hepatitis B surface antigen (HBsAg) data (n=24) include the following:

- ARO-HBV administered subcutaneously appears to be well-tolerated at single or multiple monthly doses up to 400 mg
    - Mild injection site reactions were observed with approximately 12% of subcutaneous injections
- Strong HBsAg responses were observed in all HBV patients
    - Mean NADIR -1.9 Log10 (-98.7%)
    - Range -1.3 (-95.0%) to -3.8 Log10 (-99.98%)
- HBsAg reductions were similar in hepatitis B e-antigen (HBeAg) positive and HBeAg negative patients
    - Mean HBsAg NADIR in HBeAg positive (n=11) -2.1 Log10
    - Mean HBsAg NADIR in HBeAg negative (n=13) -1.8 Log10
- HBsAg reductions were similar for NUC naïve patients (cohort 8) and NUC experienced patients (cohort 9)
    - Mean HBsAg reduction on day 57 for cohort 8 (n=4) -1.7 Log10
    - Mean HBsAg reduction on day 57 for cohort 9 (n=4) -1.9 Log10
- This study highlighted an improvement over results with Arrowhead's first-generation compound ARC-520, which targeted only HBV transcripts derived from cccDNA (Wooddell, 2017)
- HBsAg responses observed with ARO-HBV are consistent with the ability of ARO-HBV to silence HBV mRNA from cccDNA and host-integrated viral DNA, a major source of HBsAg in certain patient populations (Wooddell, 2018)
- Responses were also observed in all other virologic parameters (HBV DNA, HBV RNA, HBeAg, HBcrAg)

"ARO-HBV continues to achieve high levels of activity across all HBV patient types in the AROHBV1001 study and, additionally, ARO-HBV's tolerability profile supports its continued development," said Bruce Given, M.D., Arrowhead's chief operating officer and head of R&D. "We are also thrilled to have Janssen as a new partner for the future development and potential commercialization of ARO-HBV. Both of our organizations share the aim to advance transformational medicines that achieve higher rates of functional cure with a finite treatment duration for patients with chronic hepatitis B viral infection."

Poster Details:

First Results with RNA interference (RNAi) in Chronic Hepatitis B (CHB) Using ARO-HBV

- Publication Number: LB-25
- Session: Late-Breaking Poster Session
- Session Date and Time: November 12, 2018 from 8:00 AM to 5:30 PM PT
- Location: Moscone Center North/South Building, Hall C
- Authors: Dr. Edward J. Gane, *et al.*

A copy of the poster may be accessed on the Events and Presentations page under the Investors section of the Arrowhead website.

About AROHBV1001

AROHBV1001 (NCT03365947) is a Phase 1/2 clinical study 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 monthly subcutaneous injections of ARO-HBV at doses of 25, 50, 100, 200, 300, and 400 mg. The 25 and 50 mg dose cohorts were recently added, and cohort sizes were increased to n=8 in the dose escalation HBV patient cohorts to better characterize ARO-HBV dose response. The study is also evaluating whether there is added effect with weekly or bi-weekly loading doses. AROHBV1001 is designed to enroll 30 healthy volunteers and up to 72 HBV patients.

This interim analysis reports on all single dose NHV cohorts and initial CHB cohorts that received monthly doses of ARO-HBV and had greater than 6 weeks of HBsAg assay results. For CHB, viral DNA (Roche Cobas, LLOQ 20 IU/mL), viral RNA (Abbott m2000, LLOQ 1.65 Log U/mL, Butler 2018) and antigens (qHBsAg (Roche Elecsys, LLOQ 0.05 IU/mL), qHBeAg (Diasorin Liaison, LLOQ 0.01 PEIU/mL), qHBcrAg (Fujirebo Lumipulse, LLOQ 1 kU/mL)) were measured periodically.

Here we report on safety and tolerability in all NHV and safety, tolerability and virologic assessments in CHB cohorts 2b-5b, 8 and 9. Cohorts 2b-5b were HBeAg positive or negative, NUC naïve or NUC experienced at baseline, and cohorts 8 and 9 were HBeAg positive, treatment naïve or NUC experienced, respectively. NUC experienced patients continued their daily NUC throughout the study and NUC naïve CHB patients started daily NUC on day 1.

Single dose PK in NHV will be reported elsewhere. Virologic results reported are through 56 days after 3rd dose (day 113) when available or most recent.

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 our clinical programs, our ability to finance our operations, the likelihood and timing of the receipt of future milestone and licensing fees, the future success of our scientific studies, our ability to successfully develop and commercialize 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.

Source: Arrowhead Pharmaceuticals, Inc.

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