Dicerna Announces Dosing of First Patient in Phase 1 Clinical Trial of DCR-HBVS for the Treatment of Chronic Hepatitis B Virus

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— Clinical Proof-of-Concept Data Expected in Fourth Quarter of 2019 —

CAMBRIDGE, Mass.--(BUSINESS WIRE)--May 16, 2019-- Dicerna Pharmaceuticals, Inc. (Nasdaq: DRNA) (the "Company" or "Dicerna"), a leading developer of investigational ribonucleic acid interference (RNAi) therapeutics, today announced the dosing of the first patient in its Phase 1 clinical trial of DCR-HBVS, the Company's investigational GalXC ™-based therapy for the treatment of chronic hepatitis B virus (HBV) infection in adults. The Company anticipates human proof-of-concept data from the Phase 1 trial, which is known as DCR-HBVS-101, in the fourth quarter of 2019. In January 2019, Dicerna announced the dosing of the first human volunteer in this Phase 1 study.

"Dosing of the first patient in the DCR-HBVS-101 trial signals a major step toward our ultimate goal of developing a viable therapeutic option for patients with chronic hepatitis B virus, a serious liver infection that can result in advanced liver disease or liver cancer if not treated effectively," said Ralf Rosskamp, M.D., chief medical officer of Dicerna. "Based upon our encouraging preclinical data with DCR-HBVS and our initial experience with the healthy volunteers who are enrolled in this trial, we are optimistic about the clinical potential of RNA interference as an innovative approach to effectively treat chronic hepatitis B virus infection."

The DCR-HBVS-101 clinical trial is a Phase 1, randomized, placebo-controlled study designed to evaluate the safety and tolerability of DCR-HBVS in healthy volunteers (HVs) and in patients with non-cirrhotic chronic HBV infection. Secondary objectives are to characterize the pharmacokinetic profile of DCR-HBVS and to evaluate preliminary pharmacodynamics and antiviral efficacy on plasma levels of hepatitis B surface antigen (HBsAg) and HBV DNA in blood.

DCR-HBVS is comprised of a single GalXC molecule that targets HBV messenger RNAs within the HBsAg gene sequence region. Preclinical studies with a standard mouse model of HBV infection showed DCR-HBVS led to greater than 99% reduction in circulating HBsAg, suggesting a level of HBsAg suppression (both in magnitude and duration of suppression) that may be greater than that achieved from targeting within the X gene sequence region.

"Given the encouraging inhibitory activity of DCR-HBVS in animal studies, its favorable preclinical safety profile, and the lack of major safety signals among healthy volunteers dosed thus far in the DCR-HBVS-101 trial, we eagerly anticipate the results from patients with chronic hepatitis B who are treated with DCR-HBVS," said Man-Fung Yuen, D.Sc., M.D., Ph.D., Professor of Medicine and Chair of Gastroenterology and Hepatology at the University of Hong Kong. "Unlike other therapeutic approaches to treating chronic HBV infection, DCR-HBVS leverages the power of RNA interference to silence multiple viral genes in addition to the S antigen, potentially reducing HBsAg to very low levels, which could allow the patient's own immune system to generate an effective immune response. With its long-acting mechanism, DCR-HBVS may help patients with chronic HBV infection achieve a functional cure."

DCR-HBVS-101 Trial Design

The DCR-HBVS-101 clinical trial is divided into three phases or groups:

- In Group A, 30 HVs are to receive a single ascending-dose of DCR-HBVS (0.1, 1.5, 3, 6, or 12 mg/kg) or placebo, with a four-week follow-up period.
- Group B is a single-dose arm in which eight participants with HBV who are naïve to nucleoside analog therapy will receive a 3 mg/kg dose of DCR-HBVS or placebo; these participants will be followed for at least 12 weeks. The Company expects to initiate Group B dosing in the third quarter of 2019, in parallel with Group C at the 3 mg/kg dose level.
- Group C is a multiple ascending dose arm in which DCR-HBVS (1.5, 3, or 6 mg/kg) or placebo will be administered to 18 participants with HBV who are already being treated with nucleoside analogs, with a treatment and follow-up period of 16 weeks or more. The first participant dosed was from this group, at a dose of 1.5 mg/kg.

Study participants in Groups B and C, in whom HBsAg will have dropped by more than 1 log10 IU/mL below baseline at their last scheduled study visit, will continue to be followed until their HBsAg level is less than 1 log10 IU/mL below the baseline value.

For more information about the DCR-HBVS-101 clinical trial, please visit www.clinicaltrials.gov and use the identifier NCT03772249.

About Chronic Hepatitis B Virus (HBV) Infection

Hepatitis B virus (HBV) is the world's most common serious liver infection, with more than 292 million patients chronically infected, according to an estimate by the World Health Organization. Chronic HBV infection, a condition characterized by the presence of the HBV surface antigen (HBsAg) for six months or more, claims approximately 780,000 lives annually; an estimated 650,000 of these deaths are caused by cirrhosis and liver cancer as a result of chronic hepatitis B, and 130,000 of these deaths result from complications associated with acute disease.[1]

About DCR-HBVS

DCR-HBVS is an investigational drug in development for the treatment of chronic hepatitis B virus (HBV) infection. Current therapies for HBV, such as nucleoside analogs and pegylated interferon, aim to suppress the virus; however, although these treatments can provide long-term viral suppression if taken continuously, they rarely lead to a long-term functional cure, as measured by the clearance of HBV surface antigen (HBsAg) and sustained HBV deoxyribonucleic acid (DNA) suppression in patient plasma or blood. By contrast, DCR-HBVS targets HBV messenger RNA (mRNA) and leads to

greater than 99% reduction in circulating HBsAg, as observed in mouse models of HBV infection. Those data suggest that DCR-HBVS may induce long-term clearance of intrahepatic and serum HBsAg.

About Dicerna Pharmaceuticals, Inc.

Dicerna Pharmaceuticals, Inc., is a biopharmaceutical company focused on the discovery and development of innovative, subcutaneously delivered RNAi-based therapeutics for the treatment of diseases involving the liver, including rare diseases, chronic liver diseases, cardiovascular diseases, and viral infectious diseases. Dicerna is leveraging its proprietary GalXC™ RNAi technology platform to build a broad pipeline in these core therapeutic areas, focusing on target genes where connections between target gene and diseases are well understood and documented. Dicerna intends to discover, develop and commercialize novel therapeutics either on its own or in collaboration with pharmaceutical partners. Dicerna has strategic collaborations with Boehringer Ingelheim, Eli Lilly and Company and Alexion Pharmaceuticals. For more information, please visit www.dicerna.com.

Cautionary Note on Forward-Looking Statements

This press release includes forward-looking statements. Such forward-looking statements are subject to risks and uncertainties that could cause actual results to differ materially from those expressed or implied in such statements. Examples of forward-looking statements include, among others, statements we make regarding: (i) the enrollment and successful screening of patients in the Phase 1 clinical trial of DCR-HBVS; (ii) the expectation of human proof-of-concept data from the Phase 1 trial in the fourth quarter of 2019; (iii) the therapeutic and commercial potential of the GalXC™ platform, including DCR-HBVS; (iv) research and development plans and timelines related to GalXC, including DCR-HBVS; and (v) the potential of our technology and drug candidates in our research and development pipeline. The process by which an early stage investigational therapy such as DCR-HBVS and an early stage platform such as GalXC could potentially lead to an approved product is long and subject to highly significant risks. Applicable risks and uncertainties include those relating to our clinical research and other risks identified under the heading "Risk Factors" included in our most recent Form 10-Q filing and in other future filings with the Securities and Exchange Commission (SEC). These risks and uncertainties include, among others, the cost, timing and results of preclinical studies and clinical trials and other development activities; the unpredictability of the duration and results of regulatory review of New Drug Applications (NDAs) and Investigational NDAs; market acceptance for approved products and innovative therapeutic treatments; competition; the possible impairment of, inability to obtain and/or costs of obtaining intellectual property rights; possible safety or efficacy concerns, general business, financial and accounting risks; and, the risks associated with litigation. The forward-looking statements contained in this press release reflect Dicerna's current views with respect to future events, and Dicerna does not undertake and specifically disclaims any obligation to update any forward-looking statements.

References

1. Hepatitis B Foundation. Facts and Figures. 2019. Available at: http://www.hepb.org/what-is-hepatitis-b/what-is-hepb/facts-and-figures/. Accessed on January 17, 2019.

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