



CRISPR Therapeutics and Vertex Present New Data for Investigational CRISPR/Cas9 Gene-Editing Therapy, CTX001™ at American Society of Hematology Annual Meeting and Exposition, Together With Publication in the New England Journal of Medicine

- Beta thalassemia: All seven patients were transfusion independent with 3 to 18 months of follow-up after CTX001 infusion -
- Sickle cell disease: All three patients were free of vaso-occlusive crises with 3 to 15 months of follow-up after CTX001 infusion -
- Nineteen patients have been dosed with CTX001 across both programs -
- *The New England Journal of Medicine* publishes CTX001 manuscript containing the first report of investigational use of CRISPR/Cas9-based gene editing to treat inherited diseases in humans -

ZUG, Switzerland and CAMBRIDGE, Mass. and BOSTON, December 5, 2020 – [CRISPR Therapeutics](#) (Nasdaq: CRSP) and [Vertex Pharmaceuticals Incorporated](#) (Nasdaq: VRTX) today announced new data on a total of 10 patients treated with the investigational CRISPR/Cas9-based gene-editing therapy, CTX001, that show a consistent and sustained response to treatment. All seven patients with transfusion-dependent beta thalassemia (TDT), including three who have either a severe or β^0/β^0 genotype, were transfusion independent at last follow-up and all three patients with sickle cell disease (SCD) were free of vaso-occlusive crises (VOCs) from CTX001 infusion through last follow-up. These data will be presented during the Scientific Plenary at the annual ASH Meeting and Exposition on December 6, 2020. A summary of the results from the CLIMB-111 and CLIMB-121 Phase 1/2 clinical studies is provided below.

The companies also announced that *The New England Journal of Medicine (NEJM)* has published an independently peer-reviewed article entitled “CRISPR-Cas9 Gene Editing for Sickle Cell Disease and β Thalassemia.” The article includes detailed information on the first patient with TDT enrolled in CLIMB-111 and the first patient with severe SCD enrolled in CLIMB-121, at 18 and 15 months of follow-up, respectively.

CTX001 is being investigated in these two ongoing Phase 1/2 clinical trials as a potential one-time curative therapy for patients suffering from TDT and severe SCD.

“We are pleased with the data presented at ASH, which demonstrate potential benefit and durability among a larger population of patients with transfusion-dependent beta thalassemia and sickle cell disease,” said Samarth Kulkarni, Ph.D., Chief Executive Officer of CRISPR Therapeutics. “Additionally, the *NEJM* case study is the first peer-reviewed journal publication for our CRISPR/Cas9 gene therapy, CTX001. Together this is further validation of the potential of CTX001 to become a best-in-class therapy. We plan to continue the rapid advancement of our clinical trials to bring these much-needed therapies to patients.”

“These are the first published results from CRISPR/Cas9 therapy in people with a genetic disease and represent an important milestone in medicine and for our collaboration with CRISPR Therapeutics. Most importantly, these data represent a critical step in our effort to bring transformative and potentially curative therapies to patients,” said Reshma Kewalramani, M.D., Chief Executive Officer and President, Vertex. “With clinical proof-of-concept for both beta thalassemia and sickle cell disease and 19 patients dosed, we look forward to continued efforts to bring our investigational treatment to patients living with TDT and SCD as quickly as we can.”

“Our vision with this approach is to use the patient’s own stem cells to provide a transformative treatment for these diseases, something almost unimaginable a few years ago,” said Dr. Haydar Frangoul, M.D., Medical Director of Pediatric Hematology and Oncology at Sarah Cannon Research Institute, HCA Healthcare’s TriStar Centennial Medical Center. “With these data in 10 patients, we can see the potential to fulfill this vision. With more data and longer duration of follow-up, we will hopefully confirm that we have a durable therapy that may transform the lives of many patients.”

CLIMB-111 Trial in TDT: Updated Results

A total of 13 patients with TDT have been dosed with CTX001, including eight additional patients since the last update in June 2020.

The seven patients with TDT reported at ASH are patients who had reached at least three months of follow-up after CTX001 dosing and therefore could be assessed for initial safety and efficacy. All seven patients showed a similar pattern of response, with rapid and sustained increases in total hemoglobin, fetal hemoglobin and transfusion independence at last analysis.

All seven patients were transfusion independent with follow-up ranging from three to 18 months after CTX001 infusion, with normal to near normal total hemoglobin levels at last visit, including total hemoglobin from 9.7 to 14.1 g/dL and fetal hemoglobin from 40.9% to 97.7%.

Bone marrow allelic editing data collected from four patients with six months of follow-up and from one patient with 12 months of follow-up after CTX001 infusion demonstrated a durable effect.

The safety data from all seven patients were generally consistent with an autologous stem cell transplant and myeloablative conditioning. There were four serious adverse events (SAEs) considered related or possibly related to CTX001 reported in one patient: headache, hemophagocytic lymphohistiocytosis (HLH), acute respiratory distress syndrome and idiopathic pneumonia syndrome. All four SAEs occurred in the context of HLH and have resolved. The majority of non-serious adverse events were considered mild to moderate.

CLIMB-121 Trial in Severe SCD: Updated Results

A total of six patients with SCD have been dosed with CTX001, including four additional patients since the last update in June 2020.

The three patients reported at ASH are patients who had reached at least three months of follow-up after CTX001 dosing and therefore could be assessed for initial safety and efficacy. All three patients showed a similar pattern of response, with rapid and sustained increases in total hemoglobin and fetal hemoglobin, as well as elimination of VOCs through last analysis.

All three patients remained VOC-free with follow-up ranging from three to 15 months after CTX001 infusion and had hemoglobin levels in the normal to near normal range at last visit, including total hemoglobin from 11.5 to 13.2 g/dL and fetal hemoglobin levels from 31.3% to 48.0%.

Bone marrow allelic editing data collected from one patient with six months of follow-up and from one patient with 12 months of follow-up after CTX001 infusion demonstrated a durable effect.

The safety data from all three patients were generally consistent with an autologous stem cell transplant and myeloablative conditioning. There were no SAEs considered related to CTX001, and the majority of non-serious adverse events were considered mild to moderate.

About CTX001

CTX001 is an investigational, autologous, *ex vivo* CRISPR/Cas9 gene-edited therapy that is being evaluated for patients suffering from TDT or severe SCD, in which a patient's hematopoietic stem cells are edited to produce high levels of fetal hemoglobin (HbF; hemoglobin F) in red blood cells. HbF is a form of the oxygen-carrying hemoglobin that is naturally present at birth, which then switches to the adult form of hemoglobin. The elevation of HbF by CTX001 has the potential to alleviate transfusion requirements for patients with TDT and reduce painful and debilitating sickle crises for patients with SCD.

Based on progress in this program to date, CTX001 has been granted Regenerative Medicine Advanced Therapy (RMAT), Fast Track, Orphan Drug, and Rare Pediatric Disease designations from the U.S. Food and Drug Administration (FDA) for both TDT and SCD. CTX001 has also been granted Orphan Drug Designation from the European Commission for both TDT and SCD, as well as Priority Medicines (PRIME) designation from the European Medicines Agency (EMA) for SCD.

CTX001 is being developed under a co-development and co-commercialization agreement between CRISPR Therapeutics and Vertex. Among gene-editing approaches being investigated/evaluated for TDT and SCD, CTX001 is the furthest advanced in clinical development.

About CLIMB-111

The ongoing Phase 1/2 open-label trial, CLIMB-Thal-111, is designed to assess the safety and efficacy of a single dose of CTX001 in patients ages 12 to 35 with TDT. The trial will enroll up to 45 patients and follow patients for approximately two years after infusion. Each patient will be asked to participate in a long-term follow-up trial.

About CLIMB-121

The ongoing Phase 1/2 open-label trial, CLIMB-SCD-121, is designed to assess the safety and efficacy of a single dose of CTX001 in patients ages 12 to 35 with severe SCD. The trial will enroll up to 45 patients and follow patients for approximately two years after infusion. Each patient will be asked to participate in a long-term follow-up trial.

About the Gene-Editing Process in These Trials

Patients who enroll in these trials will have their own hematopoietic stem and progenitor cells collected from peripheral blood. The patient's cells will be edited using the CRISPR/Cas9 technology. The edited cells, CTX001, will then be infused back into the patient as part of a stem cell transplant, a process which involves, among other things, a patient being treated with myeloablative busulfan conditioning. Patients undergoing stem cell transplants may also encounter side effects (ranging from mild to severe) that are unrelated to the administration of CTX001. Patients will initially be monitored to determine when the edited cells begin to produce mature blood cells, a process known as engraftment. After engraftment, patients will continue to be monitored to track the impact of CTX001 on multiple measures of disease and for safety.

About the CRISPR-Vertex Collaboration

CRISPR Therapeutics and Vertex entered into a strategic research collaboration in 2015 focused on the use of CRISPR/Cas9 to discover and develop potential new treatments aimed at the underlying genetic causes of human disease. CTX001 represents the first potential treatment to emerge from the joint research program. CRISPR Therapeutics and Vertex will jointly develop and commercialize CTX001 and equally share all research and development costs and profits worldwide.

About CRISPR Therapeutics

CRISPR Therapeutics is a leading gene editing company focused on developing transformative gene-based medicines for serious diseases using its proprietary CRISPR/Cas9 platform. CRISPR/Cas9 is a revolutionary gene editing technology that allows for precise, directed changes to genomic DNA. CRISPR Therapeutics has established a portfolio of therapeutic programs across a broad range of disease areas including hemoglobinopathies, oncology, regenerative medicine and rare diseases. To accelerate and expand its efforts, CRISPR Therapeutics has established strategic collaborations with leading companies including Bayer, Vertex Pharmaceuticals and ViaCyte, Inc. CRISPR Therapeutics AG is headquartered in Zug, Switzerland, with its wholly-owned U.S. subsidiary, CRISPR Therapeutics, Inc., and R&D operations based in Cambridge, Massachusetts, and business offices in San Francisco, California and London, United Kingdom. For more information, please visit www.crisprtx.com.

CRISPR Therapeutics Forward-Looking Statement

This press release may contain a number of "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995, as amended, including statements made by Dr. Kulkarni, Dr. Kewalramani and Dr. Frangoul in this press release, as well as statements regarding CRISPR Therapeutics' expectations about any or all of the

following: (i) the safety, efficacy and clinical progress of CRISPR Therapeutics' various clinical programs including CTX001; (ii) the status of clinical trials (including, without limitation, the expected timing of data releases) related to product candidates under development by CRISPR Therapeutics and its collaborators, including expectations regarding the data that are being presented in this press release, at the annual ASH Meeting and Exposition, and in the NEJM article; (iii) the expected benefits of CRISPR Therapeutics' collaborations; and (iv) the therapeutic value, development, and commercial potential of CRISPR/Cas9 gene editing technologies and therapies. Without limiting the foregoing, the words "believes," "anticipates," "plans," "expects" and similar expressions are intended to identify forward-looking statements. Although CRISPR Therapeutics believes that such statements are based on reasonable assumptions within the bounds of its knowledge of its business and operations, existing and prospective investors are cautioned that forward-looking statements are inherently uncertain, are neither promises nor guarantees and not to place undue reliance on such statements, which speak only as of the date they are made. Actual performance and results may differ materially from those projected or suggested in the forward-looking statements due to various risks and uncertainties. These risks and uncertainties include, among others: that preliminary data from any clinical trial and initial data from a limited number of patients (as is the case with CTX001 at this time) may not be indicative of final or future trial results; that CTX001 clinical trial results may not be favorable or may not support registration or further development; potential impacts due to the coronavirus pandemic, such as to the timing and progress of clinical trials; that future competitive or other market factors may adversely affect the commercial potential for CTX001; uncertainties regarding the intellectual property protection for CRISPR Therapeutics' technology; and those risks and uncertainties described under the heading "Risk Factors" in CRISPR Therapeutics' most recent annual report on Form 10-K, quarterly report on Form 10-Q, and in any other subsequent filings made by CRISPR Therapeutics with the U.S. Securities and Exchange Commission, which are available on the SEC's website at www.sec.gov. CRISPR Therapeutics disclaims any obligation or undertaking to update or revise any forward-looking statements contained in this press release, other than to the extent required by law.

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About Vertex

Vertex is a global biotechnology company that invests in scientific innovation to create transformative medicines for people with serious diseases. The company has multiple approved medicines that treat the underlying cause of cystic fibrosis (CF) — a rare, life-threatening genetic disease — and has several ongoing clinical and research programs in CF. Beyond CF, Vertex has a robust pipeline of investigational small molecule medicines in other serious diseases where it has deep insight into causal human biology, including pain, alpha-1 antitrypsin deficiency and APOL1-mediated kidney diseases. In addition, Vertex has a rapidly expanding pipeline of genetic and cell therapies for diseases such as sickle cell disease, beta thalassemia, Duchenne muscular dystrophy and type 1 diabetes mellitus.

Founded in 1989 in Cambridge, Mass., Vertex's global headquarters is now located in Boston's Innovation District and its international headquarters is in London. Additionally, the company has research and development sites and commercial offices in North America, Europe, Australia and Latin America. Vertex is consistently recognized as one of the industry's top places to work, including 11 consecutive years on Science magazine's Top Employers list and a best place to work for LGBTQ equality by the Human Rights Campaign. For company updates and to learn more about Vertex's history of innovation, visit www.vrtx.com or follow us on Facebook, Twitter, LinkedIn, YouTube and Instagram.

Vertex Special Note Regarding Forward-Looking Statements

This press release contains forward-looking statements as defined in the Private Securities Litigation Reform Act of 1995, including, without limitation, statements made by Dr. Samarth Kulkarni, Dr. Reshma Kewalramani and Dr. Haydar Frangoul in this press release and statements regarding the expectations and plans to present data at the annual ASH Meeting and Exposition, the development, including expected timeline for development, updated data on patients treated to date and new data on additional patients, and the potential benefits and curative therapy of CTX001, our plans and expectations for our clinical trials and clinical trial sites, including statements regarding patient enrollment, and the status of our clinical trials of our product candidates under development by us and our collaborators, including activities at the clinical trial sites and potential outcomes. While Vertex believes the forward-looking statements contained in this press release are accurate, these forward-looking statements represent the company's beliefs only as of the date of this press release and there are a number of risks and uncertainties that could cause actual events or results to differ materially from those expressed or implied by such forward-looking statements. Those risks and uncertainties include, among other things, that data from a limited number of patients may not be indicative of final clinical trial results, that data from the company's development programs, including its programs with its collaborators, may not support registration or further development of its compounds due to safety, efficacy, or other reasons, that the COVID-19 pandemic may impact the status or progress of our clinical trials and clinical trial sites and the clinical trials and clinical trial sites of our collaborators, including patient enrollment, and other risks listed under the heading "Risk Factors" in Vertex's most recent annual report and subsequent quarterly reports filed with the Securities and Exchange Commission at www.sec.gov and available through the company's website at www.vrtx.com. You should not place undue reliance on these statements or the scientific data presented. Vertex disclaims any obligation to update the information contained in this press release as new information becomes available.

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