UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 8-K

CURRENT REPORT

Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934

Date of Report (Date of earliest event reported): September 21, 2021

bluebird bio, Inc.

(Exact name of Registrant as Specified in Its Charter)

Delaware	**001-35966**	**13-3680878**
(State or Other Jurisdiction of Incorporation)	**(Commission File Number)**	**(IRS Employer Identification No.)**
60 Binney Street, Cambridge, MA		**02142**
(Address of Principal Executive Offices)		**(Zip Code)**

Registrant's Telephone Number, Including Area Code: (339) 499-9300

Not Applicable
(Former Name or Former Address, if Changed Since Last Report)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions (see General Instructions A.2. below):

☐ Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)

☐ Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)

☐ Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))

☐ Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $0.01 par value per share	BLUE	The NASDAQ Stock Market LLC

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§240.12b-2 of this chapter).

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. ☐

Item 8.01 Other Events.

On September 21, 2021, bluebird bio, Inc. ("bluebird") issued a press release announcing the submission of a Biologics License Application (BLA) to the U.S. Food and Drug Administration (FDA) for the product candidate betibeglogene autotemcel (beti-cel) gene therapy in adult, adolescent and pediatric patients with β-thalassemia who require regular red blood cell (RBC) transfusions, across all genotypes.

The full text of bluebird's press release regarding the announcement is filed as Exhibit 99.1 to this Current Report on Form 8-K and is incorporated herein by reference.

Item 9.01 Financial Statements and Exhibits.

(d) Exhibits

Exhibit No.	Description
99.1	Press release issued by bluebird bio, Inc. on September 21, 2021.
104	Cover Page Interactive Data File (embedded within the Inline XBRL document)

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

Date: September 21, 2021

bluebird bio, Inc.

By: /s/ Jason F. Cole

Jason F. Cole

Chief Operating and Legal Officer

Exhibit 99.1

bluebird bio Submits Biologics License Application (BLA) to FDA for betibeglogene autotemcel (beti-cel) Gene Therapy for Patients With β-thalassemia Who Require Regular Red Blood Cell Transfusions

BLA submission based on data from Phase 1/2 and Phase 3 Northstar studies, which represent more than 220 patient-years of experience with beti-cel

CAMBRIDGE, Mass. — (BUSINESS WIRE) — September 21, 2021 — bluebird bio, Inc. (Nasdaq: BLUE) today announced it has completed the rolling submission of its Biologics License Application (BLA) to the U.S. Food and Drug Administration (FDA) for betibeglogene autotemcel (beti-cel) gene therapy in adult, adolescent and pediatric patients with β-thalassemia who require regular red blood cell (RBC) transfusions, across all genotypes. The FDA previously granted beti-cel Orphan Drug status and Breakthrough Therapy designation for the treatment of transfusion-dependent β-thalassemia (TDT). If approved, beti-cel will be the first hematopoietic (blood) stem cell (HSC) ex-vivo gene therapy for patients in the United States.

“With this submission, we are one step closer to bringing a potentially transformative gene therapy to people living with TDT and their families,” said Andrew Obenshain, president, severe genetic diseases, bluebird bio. “At bluebird bio, we have a deep understanding of gene therapies, built over a decade of research and development in severe genetic diseases. We look forward to working with the FDA on its review of this BLA as we realize the promise that one-time gene therapies hold for patients.”

The BLA submission for beti-cel is based on data from patients treated in bluebird bio studies, including the Phase 3 HGB-207 (Northstar-2) and HGB-212 (Northstar-3) studies, and the Phase 1/2 HGB-204 (Northstar) and HGB-205 studies. Together, these studies represent more than 220 patient-years of experience with beti-cel. As of March 9, 2021, the results include a total of 63 pediatric, adolescent and adult patients who have been treated with beti-cel across β^0/β^0 and non-β^0/β^0 genotypes. The data include two patients with up to seven years of follow-up, eight with at least six years of follow-up and 19 with at least five years of follow-up, and were most recently shared during the 26th Annual Congress of the European Hematology Association (EHA2021 Virtual).

About transfusion-dependent β-thalassemia (TDT)
Transfusion-dependent β-thalassemia (TDT) is a severe genetic disease caused by mutations in the β-globin gene that cause reduced or significantly reduced adult hemoglobin (Hb), resulting in chronic anemia and lifelong dependence on red blood cell (RBC) transfusions; in order to survive, people with TDT typically require blood transfusions every 3-4 weeks to maintain adequate Hb levels, a process that takes 4-7 hours. While transfusions temporarily relieve symptoms of anemia, they do not address the underlying genetic cause of TDT. Transfusions also lead to unavoidable iron overload that can cause serious complications including progressive multi-organ damage and organ failure. Iron overload resulting from TDT or ongoing RBC transfusions requires chronic treatment with chelation therapy to manage the excess iron.

About betibeglogene autotemcel (beti-cel)
betibeglogene autotemcel (beti-cel) is a one-time gene therapy custom-designed to treat the underlying cause of transfusion-dependent β-thalassemia (TDT). In order to correct the deficiency of adult hemoglobin that is the hallmark of TDT, beti-cel adds functional copies of a modified form of the β-globin gene ($\beta^{A\text{-}T87Q}$-globin gene) into a patient’s own hematopoietic (blood) stem cells (HSCs). Once a patient has the $\beta^{A\text{-}T87Q}$-globin gene, they have the potential to produce HbA^{T87Q}, which is gene therapy-derived adult hemoglobin (Hb) at levels that may eliminate or significantly reduce the need for transfusions. In beti-cel studies, transfusion independence (TI) is defined as no longer needing red blood cell (RBC) transfusions for at least 12 months while maintaining a weighted average Hb of at least 9 g/dL. Across Phase 3 studies, 89% (32/36) of evaluable patients across ages and genotypes, including pediatric patients as young as four years of age and those with the most severe β^0/β^0 genotypes, achieved TI.

beti-cel is manufactured using the BB305 lentiviral vector (LVV), a third-generation, self-inactivating LVV. The BB305 LVV contains a cellular (non-viral) regulatory element, known as a promoter, that drives gene expression only in the erythroid cell lineage (RBCs and their precursors).

Adverse reactions considered related to beti-cel were uncommon and consisted primarily of infusion-related reactions (abdominal pain, hot flush, dyspnea, tachycardia and non-cardiac chest pain) and cytopenias (thrombocytopenia, leukopenia and neutropenia). Pain in extremity shortly after treatment was also documented. One of these adverse events (AE) was a serious adverse event (SAE) of thrombocytopenia considered possibly related to beti-cel.

The majority of AEs and SAEs unrelated to beti-cel were consistent with the known side effects of HSC collection and bone marrow ablation with busulfan (including several SAEs of veno-occlusive disease).

The Phase 3 Northstar-2 (HGB-207) and Northstar-3 (HGB-212) studies evaluating beti-cel are ongoing; enrollment is complete, and all patients have been treated. bluebird bio is also conducting a long-term follow-up study, LTF-303, to monitor safety and efficacy, for people who have participated in bluebird bio-sponsored beti-cel clinical studies. Patients treated with beti-cel in the commercial setting will also be able to enroll in the REG-501 registry study for long-term safety and efficacy follow-up.

Previously, the European Commission granted conditional marketing authorization for beti-cel, marketed as ZYNTEGLO™ gene therapy, for patients 12 years and older with TDT who do not have a β^0/β^0 genotype, for whom HSC transplantation is appropriate, but a human leukocyte antigen-matched related HSC donor is not available. In August 2021, bluebird bio announced its decision to focus its severe genetic disease business in the U.S.

About bluebird bio, Inc.
bluebird bio is pioneering gene therapy with purpose. From our Cambridge, Mass., headquarters, we're developing gene and cell therapies for severe genetic diseases and cancer, with the goal that people facing potentially fatal conditions with limited treatment options can live their lives fully. Beyond our labs, we're working to positively disrupt the healthcare system to create access, transparency and education so that gene therapy can become available to all those who can benefit.

bluebird bio is a human company powered by human stories. We're putting our care and expertise to work across a spectrum of disorders including cerebral adrenoleukodystrophy, sickle cell disease, β-thalassemia and multiple myeloma using three gene therapy technologies: gene addition, cell therapy and (megaTAL-enabled) gene editing.

bluebird bio has an additional nest in Seattle, Wash. For more information, visit bluebirdbio.com.

Follow bluebird bio on social media: @bluebirdbio, LinkedIn, Instagram and YouTube.

bluebird bio Cautionary Statement Regarding Forward-Looking Statements
This press release contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. All statements that are not statements of historical facts are, or may be deemed to be, forward-looking statements, including statements regarding the Company's plans and expectations of BLA submissions. Such forward-looking statements are based on historical performance and current expectations and projections about our future financial results, goals, plans and objectives and involve inherent risks, assumptions and uncertainties, including internal or external factors that could delay, divert or change any of them in the next several years, that are difficult to predict, may be beyond our control and could cause our future financial results, goals, plans and objectives to differ materially from those expressed in, or implied by, the statements. No forward-looking statement can be guaranteed. Forward-looking statements in this press release should be evaluated together with the many risks and uncertainties that affect bluebird bio's business, particularly those identified in the risk factors discussion in bluebird bio's Annual

Report on Form 10-K, as updated by our subsequent Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and other filings with the Securities and Exchange Commission. These risks and uncertainties include, but are not limited to: the risk that the efficacy and safety results from our prior and ongoing clinical trials will not continue or be repeated in our ongoing or planned clinical trials; the risk that additional insertional oncogenic or other safety events associated with lentiviral vector, drug product, or myeloablation will be discovered or reported over time; the risk that regulatory authorities will require additional information regarding our product candidates including to resolve the clinical hold on our eli-cel program, resulting in delay to our anticipated timelines for regulatory submissions, including our applications for marketing approval; and the risk that any one or more of our product candidates, will not be successfully developed, approved or commercialized. The forward-looking statements included in this document are made only as of the date of this document and except as otherwise required by applicable law, bluebird bio undertakes no obligation to publicly update or revise any forward-looking statement, whether as a result of new information, future events, changed circumstances or otherwise.

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