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): January 18, 2022

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 January 18, 2022, bluebird bio, Inc. ("bluebird" or the "Company") announced that the U.S. Food and Drug Administration (FDA) has extended the review period for the biologics licensing applications (BLA) for its lentiviral vector gene therapies – betibeglogene autotemcel (beti-cel) for β-thalassemia and elivaldogene autotemcel (eli-cel) for cerebral adrenoleukodystrophy (CALD). The revised PDUFA goal dates for beti-cel and eli-cel are August 19, 2022 and September 16, 2022, respectively. The FDA extended the PDUFA goal dates for beti-cel and eli-cel to allow time to review additional clinical information previously submitted by bluebird in response to FDA information requests as part of its ongoing reviews. The information was deemed a major amendment. The extension of the FDA review timeline does not relate to new safety events for either beti-cel or eli-cel.

bluebird also provided an update on the FDA's partial clinical hold for the lovotibeglogene autotemcel (lovo-cel) gene therapy clinical program for patients under the age of 18 with sickle cell disease. Consistent with the FDA's clinical hold process, the Company has received written questions from the FDA and is continuing to evaluate what impact, if any, the partial clinical hold may have on its projected Q1 2023 timing for submitting the BLA. bluebird plans to provide an update with its annual results in February.

The full text of bluebird's press release regarding these announcements are filed as Exhibit 99.1 to this Current Report on Form 8-K and are 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 January 18, 2022.
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: January 18, 2022

bluebird bio, Inc.

By: /s/ Helen C. Fu

Helen C. Fu

Senior Vice President, General Counsel and Secretary

Exhibit 99.1

bluebird provides update on FDA review timelines for betibeglogene autotemcel (beti-cel) for beta-thalassemia and elivaldogene autotemcel (eli-cel) for cerebral adrenoleukodystrophy (CALD)

FDA PDUFA goal dates for both therapies extended by three months

CAMBRIDGE, Mass.— (BUSINESS WIRE) — January 18, 2022 — bluebird bio, Inc. (NASDAQ: BLUE) today announced that the US Food and Drug Administration (FDA) has extended the review period for the biologics licensing applications (BLA) for its lentiviral vector gene therapies – betibeglogene autotemcel (beti-cel) for β-thalassemia and elivaldogene autotemcel (eli-cel) for cerebral adrenoleukodystrophy (CALD). The revised PDUFA goal dates for beti-cel and eli-cel are August 19, 2022 and September 16, 2022, respectively.

The FDA extended the PDUFA goal dates for beti-cel and eli-cel to allow time to review additional clinical information previously submitted by the company in response to FDA information requests as part of its ongoing reviews. The information was deemed a major amendment. The extension of the FDA review timeline does not relate to new safety events for either beti-cel or eli-cel.

bluebird's BLA submission for beti-cel for adult, adolescent and pediatric patients with β-thalassemia across all genotypes who require regular red blood cell (RBC) transfusions was accepted by the FDA for priority review in November 2021. The FDA accepted the BLA for eli-cel for patients with cerebral adrenoleukodystrophy (CALD) under the age of 18 for priority review in December 2021. If approved, beti-cel and eli-cel would be the first lentiviral vector gene therapies for patients with severe genetic diseases in the United States.

"Gene therapies are complex, potentially transformative treatment options for those living with severe genetic diseases, and we all share a responsibility to be diligent for patients as we progress this novel field," said Andrew Obenshain, CEO, bluebird bio. "We look forward to continuing to work with the FDA on its ongoing reviews of beti-cel and eli-cel, and to bringing these therapies to patients with beta-thalassemia and cerebral adrenoleukodystrophy in the US later this year."

The extended PDUFA goal dates are not expected to impact the priority review status of either BLA or the potential for bluebird bio to be granted priority review vouchers upon approval of beti-cel and eli-cel in 2022. The FDA previously granted both beti-cel and eli-cel Orphan Drug status, Breakthrough Therapy designation and Rare Pediatric Disease designation.

bluebird also provided an update on the FDA's partial clinical hold for the lovotibeglogene autotemcel (lovo-cel) gene therapy clinical program for patients under the age of 18 with sickle cell disease. Consistent with the FDA's clinical hold process, the company has received written questions from the FDA and is continuing to evaluate what impact, if any, the partial clinical hold may have on its projected Q1 2023 timing for submitting the BLA. bluebird plans to provide an update with its annual results in February.

About betibeglogene autotemcel (beti-cel)
betibeglogene autotemcel (beti-cel) (pronounced BEH tee cell) is a one-time gene therapy custom-designed to treat the underlying cause of β-thalassemia in patients who require regular red blood cell (RBC) transfusions. 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) in order to correct the deficiency of adult hemoglobin that is the hallmark of β-thalassemia. Once a patient has the modified β-globin gene, they have the potential to produce beti-cel-derived adult hemoglobin (HbA^{T87Q}) at levels that may eliminate the need for transfusions. In Phase 3 beti-cel studies 89% (31/35) 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 transfusion independence, which is defined as no longer needing RBC transfusions for at least 12 months while maintaining a weighted average Hb of at least 9 g/dL.

beti-cel is manufactured using the BB305 lentiviral vector (LVV), a third-generation, self-inactivating LVV that has been studied for more than a decade across two therapeutic areas.

Adverse reactions considered related to beti-cel consisted primarily of non-serious infusion-related reactions that occurred on the day of the infusion and cytopenias. One serious adverse event (SAE) of thrombocytopenia considered possibly related to beti-cel was reported and has resolved.

The majority of AEs and SAEs in the beti-cel clinical development program were considered to be unrelated to beti-cel by the Investigator and were consistent with known side effects of HSC collection and the busulfan conditioning regimen.

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 through 15 years post treatment.

A biologics license application (BLA) for beti-cel is under priority review by the FDA. The agency has set a Prescription Drug User Fee Act (PDUFA) goal date of August 19, 2022.

About elivaldogene autotemcel (eli-cel, Lenti-D®) gene therapy
eli-cel uses ex vivo transduction with the Lenti-D lentiviral vector (LVV) to add functional copies of the *ABCD1* gene into a patient's own hematopoietic stem cells (HSCs). The addition of the functional *ABCD1* gene allows patients to produce the ALD protein (ALDP), which is thought to facilitate the breakdown of very long-chain fatty acids (VLCFAs). The expression of ALDP and effect of eli-cel is expected to be life-long. The goal of treatment with eli-cel is to stop the progression of CALD and, consequently, preserve as much neurological function as possible, including the preservation of motor function and communication ability. Importantly, with eli-cel, there is no need for donor HSCs from another person.

bluebird bio's clinical development program for eli--cel includes the completed pivotal Phase 2/3 Starbeam study (ALD-102) and the ongoing Phase 3 ALD-104 study, which has completed enrollment. Additionally, bluebird bio is conducting a long-term safety and efficacy follow-up study (LTF-304) for patients who have received eli-cel for CALD and completed two years of follow-up in ALD-102 or ALD--104. Clinical studies of eli-cel are currently on hold with the FDA. A biologics license application (BLA) for beti-cel is under priority review by the FDA. The agency has set a Prescription Drug User Fee Act (PDUFA) goal date of September 16, 2022.

About lovotibeglogene autotemcel (lovo-cel; formerly LentiGlobin® for SCD, bb1111)
lovotibeglogene autotemcel (lovo-cel) gene therapy is an investigational one-time treatment being studied for sickle cell disease (SCD), that is designed to add 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 patients have the $\beta^{A\text{-}T87Q}$-globin gene, their red blood cells (RBCs) can produce anti-sickling hemoglobin (HbA^{T87Q}) that decreases the proportion of HbS, with the goal of reducing sickled RBCs, hemolysis, and other complications. bluebird bio's clinical development program for lovo-cel includes the completed Phase 1/2 HGB-205 and ongoing Phase 1/2 HGB-206 and Phase 3 HGB-210 studies. bluebird bio is also conducting a long-term safety and efficacy follow-up study (LTF-307) for people who have participated in bluebird bio sponsored clinical studies of lovo-cel.

The safety profile of the lovo-cel treatment regimen is predominately reflective of the known risks of autologous stem cell transplantation and myeloablative single-agent busulfan conditioning, as well as underlying SCD. Adverse drug reactions due to lovo-cel include hot flush, decreased blood pressure, acute myeloid leukemia (AML), and anemia.

As of February 17, 2021, a total of 49 patients have been treated with lovo-cel, with up to six years of patient follow-up, in the HGB-205 (n=3), HGB-206 (n=44), and HGB-210 (n=2) clinical studies. The

HGB-206 total includes: Group A (n=7), B (n=2), and C (n=35), representing progressive adaptations to the manufacturing and treatment processes. In the Group C cohort of the Phase 1/2 HGB-206 study, no severe vaso-occlusive events (VOEs) were reported with up to 24 months of follow-up in patients with a history of at least four severe VOEs and at least six months of follow-up.

In the initial cohort (Group A) of the HGB-206 study, two patients treated with lovo-cel developed AML. After thorough investigations into the cases, bluebird bio determined that these were unlikely related to the insertion of bluebird's lentiviral vector (LVV) gene therapy for SCD.

For more information on lovo-cel studies, visit: https://www.bluebirdbio.com/our-science/clinical-trials or clinicaltrials.gov.

The FDA has granted orphan drug designation, fast track designation, regenerative medicine advanced therapy (RMAT) designation, and rare pediatric disease designation for lovo-cel.

lovo-cel is investigational and has not been approved in any geography.

About bluebird bio, Inc.
bluebird bio is pursuing curative gene therapies to give patients and their families more bluebird days.

With a dedicated focus on severe genetic diseases, bluebird has industry-leading clinical and research programs for sickle cell disease, β-thalassemia and cerebral adrenoleukodystrophy and is advancing research to apply new technologies to these and other diseases. We custom design each of our therapies to address the underlying cause of disease and have developed in-depth and effective analytical methods to understand the safety of our lentiviral vector technologies and drive the field of gene therapy forward.

Founded in 2010, bluebird has the largest and deepest ex-vivo gene therapy data set in the world—setting the standard for industry. Today, bluebird continues to forge new paths, combining our real-world experience with a deep commitment to patient communities and a people-centric culture that attracts and grows a diverse flock of dedicated birds.

For more information, visit bluebirdbio.com or follow us on social media at @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 but not limited to our statements regarding our expectations for our interactions with the FDA and the timing for the regulatory approval and potential commercial launch for beti-cel and eli-cel, and regarding the partial clinical hold of lovo-cel. 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 include, but are not limited to: the risk that the FDA's review of the BLAs for beti-cel and/or eli-cel may require one more additional extensions; the risk that beti-cel and/or eli-cel may not be approved within the

priority review timeframe or at all, and consequently the risk that we may not be eligible to receive the associated priority review voucher upon the approval of beti-cel and/or eli-cel; the risk that the extension of BLA review may impact the conduct and timelines of our other programs; the risk that resolving the partial clinical hold of lovo-cel may require us to collect additional data or information beyond what we currently expect; the risk that we may not be able to address the FDA's concerns regarding lovo-cel in the treatment of patients with sickle cell under the age of 18 quickly or at all; the risk that we may not be able to collect the manufacturing comparability data needed to support a BLA submission for lovo-cel on our projected timelines; the risk that our planned BLA submission for lovo-cel may be delayed or may be for a narrower indication or patient population than we expected; the risk that the efficacy and safety results from our prior and ongoing clinical trials will not continue or be seen in additional patients treated with our product candidates; 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 any one or more of our product candidates will not be successfully developed, approved or commercialized; and the risks related to the ongoing COVID-19 pandemic. 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.

Investors:
Courtney O'Leary, 978-621-7347
coleary@bluebirdbio.com

or

Media:
Sarah Alspach, 215-287-6354
sarah.alspach@bluebirdbio.com

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