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): December 10, 2022

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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.)**

455 Grand Union Boulevard, Somerville, MA	**02145**
(Address of Principal Executive Offices)	**(Zip Code)**

(339) 499-9300
(Registrant's telephone number, including area code)

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 December 10, 2022, bluebird bio, Inc. (the "Company") announced that it presented new and updated data at the 64th American Society of Hematology (ASH) Annual Meeting and Exposition that demonstrated sustained treatment effect in patients treated with betibeglogene autotemcel (beti-cel) and lovotibeglogene autotemcel (lovo-cel) gene therapies through additional follow-up. Case studies of two patients diagnosed with persistent anemia following lovo-cel treatment were also presented.

Long-term follow-up data presented at ASH included follow-up for patients living with beta-thalassemia who require regular red blood cell (RBC) transfusions (n=63) up to 8 years post-treatment (n=3), across ages and genotypes.

As of July 2022, 63 patients received beti-cel across four clinical studies and were followed for a median of 52.0 (20.1–101.7) months. The clinical studies include two Phase 3 studies (n=41), which led to the U.S. Food and Drug Administration (FDA) approval of ZYNTEGLO as the first and only gene therapy for patients with beta-thalassemia who require regular red blood cell transfusions in August 2022. In the Phase 3 studies, 90.2% (37/41) of patients achieved transfusion independence (TI). Patients who achieved TI produced normal or near-normal levels of total hemoglobin and demonstrated improvements in markers of iron overload and markers of ineffective erythropoiesis as of the time of the data cut.

Patients who achieved TI also showed continued improvement in patient-reported quality-of-life measures through three years following treatment in a long term follow up study, LTF-303. Based on testimonials collected at Month 36 from patients who achieved TI, the ability to seek employment or be employed increased to 93% of patients (13/14) from 67% (10/15) at baseline. There was also a reduction in the number of absences from school compared with baseline (from 95% (18/19) of impacted patients to 50% (5/10)). In addition, 81% (17/21) of patients reported improvement in physical activity at three years, and 100% (20/20) reported that they felt they had benefited from undergoing treatment with beti-cel.

No hematologic malignancies, insertional oncogenesis, replication competent lentivirus, or clonal predominance was observed and overall, the safety of the beti-cel treatment regimen largely reflected the known side effects of hematopoietic stem cell collection and the busulfan conditioning regimen. Nineteen percent (12/63) of patients experienced ≥1 adverse event (AE) considered related or possibly related to beti-cel; the most common beti-cel related AEs were abdominal pain (5/63 (8%)) and thrombocytopenia (3/63 (5%)). Veno-occlusive liver disease, observed in 11% (7/63) of patients, resolved after treatment. One patient who achieved TI required packed red blood cell (pRBC) transfusions for acute events (for surgery, Phase 3, n=1).

Case studies presented at ASH provided detail on investigations into two cases of persistent anemia observed in one adult and one pediatric patient in Group C, the pivotal cohort of the HGB-206 study of lovo-cel; data were as of August 2022.

Both patients in such case studies presented at ASH had two α-globin gene deletions (−α3.7/−α3.7), also known as alpha-thalassemia trait, and, notably, are the only patients in the study with this specific genotype. Integration site analysis and next-generation sequencing showed no evidence of clonal processes (vector-related or otherwise) and findings are not consistent with an emerging hematologic malignancy. Clinical investigations presented suggest that the alpha-thalassemia trait likely contributed to anemia after lovo-cel infusion. Following these cases, this genotype was added to exclusion criteria for ongoing studies.

Updated data from the HGB-206 parent study presented at ASH showed 96% (31/32) of patients treated in Group C experienced complete resolution of severe vaso-occlusive events (sVOE) through 24 months of follow-up; a single sVOE was observed in the adult patient experiencing persistent anemia. As of the last follow-up at 24 months, the adult patient was transfusion dependent and experiencing intermittent exacerbations of chronic pain, while the pediatric patient has not required transfusions and remains clinically well.

In Group C of HGB-206, the safety profile of the lovo-cel treatment regimen from day 1 to month 24 generally reflects the known side effects of busulfan conditioning regimen, and adverse events commonly seen in the population being evaluated. The most frequently reported serious adverse events after lovo-cel infusion in two or more HGB-206 Group C patients were pain (11.1%) and abdominal pain, anemia, drug withdrawal syndrome (opiate), nausea, suicidal ideation, and vomiting (5.6% each). There have been no cases of veno-occlusive liver disease, graft failure, insertional oncogenesis or replication-competent lentivirus.

Studies evaluating lovo-cel in SCD represent the most mature sickle cell disease gene therapy dataset in the industry, with the longest available follow-up data. As of August 2022, 50 patients have been treated with lovo-cel across the HGB-205 (n=3), HGB-206 (n=45) and HGB-210 (n=2) clinical studies, with up to 7 years of patient follow-up (median: 37.7 months) representing 176.5 total patient-years of data.

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.

bluebird bio, Inc.

Date: December 12, 2022

By: /s/ Andrew Obenshain

Name: Andrew Obenshain

Title: President and Chief Executive Officer