UTILIZATION MANAGEMENT MEDICAL POLICY

POLICY: Hematology – Gene Therapy – Zynteglo Utilization Management Medical Policy
- Zynteglo™ (betibeglogene autotemcel intravenous infusion – Bluebird Bio)

REVIEW DATE: 09/28/2022; selected revision 10/19/2022

OVERVIEW

Zyntelgo is an autologous hematopoietic stem cell-based gene therapy indicated for the treatment of adult and pediatric patients with β-thalassemia who require regular red blood cell (RBC) transfusions.[1] The efficacy and safety of Zynteglo in children < 4 years of age have not been established; no data are available in this population. Zynteglo is given as a single dose which contains a minimum of 5.0 x 10^6 CD34+ cells/kg of body weight. The median dose of Zynteglo in the pivotal trials was 9.4 x 10^6 CD34+ cells/kg.

Disease Overview

The condition of β-thalassemia is a group of recessively inherited blood disorders caused by β-globin gene mutations that either reflect a reduced (β^+) or relative lack (β^0) of production of functional β-globin.[2] The attenuated or lack of hemoglobin (Hb) results in chronic anemia of varying degrees of severity and insufficient delivery of oxygen to the body. Those with severe anemia may require lifelong RBC transfusions and regular iron chelation to prevent iron overload. The extremely low Hb levels can lead to many types of symptoms and health-related issues (e.g., dizziness, weakness, fatigue, increased cardiac effort, tachycardia, poor growth) or ineffective erythropoiesis (e.g., bone changes, massive splenomegaly). An estimated 3,000 patients in the US have β-thalassemia and slightly less than one-half of the patients are dependent on RBC transfusions.

Clinical Efficacy

The efficacy of Zynteglo was evaluated in two ongoing, open-label, 2-year, single-arm, Phase III trials that involved patients ≤ 50 years of age with transfusion-dependent β-thalassemia (NORTHSTAR-2 and NORTHSTAR-3) who received one dose of Zynteglo.[1,3] All patients underwent mobilization of stem cells (with granulocyte colony-stimulating factor and Mozobil® [plerixafor subcutaneous injection]) and pre-treatment myeloablative conditioning with busulfan prior to treatment with Zynteglo. NORTHSTAR-2 (n = 23) involved patients who had a non-β^0/β^0 genotype. NORTHSTAR 3 (n = 18) involved patients who had a β^0/β^0 or non-β^0/β^0 genotype. In NORTHSTAR-2, 91% of patients obtained transfusion independence, the primary endpoint. Among the patients who obtained transfusion independence, the median weighted average Hb during transfusion independence was 11.8 g/dL.[1] In NORTHSTAR-3, transfusion independence was achieved by 86% of patients. Among the patients who obtained transfusion independence, the median weighted average Hb during transfusion independence was 10.2 g/dL. The median time for the last RBC transfusion prior to transfusion independence after administration of Zynteglo was slightly under 1 month in both trials. In total, 29 patients from NORTHSTAR-2 and NORTHSTAR 3 enrolled in a long-term extension. Data suggest durable results regarding transfusion independence as these two studies have had follow up for over 24 months.

Guidelines

Guidelines have not addressed Zynteglo post approval in the US. In 2021, the Thalassaemia International Federation published guidelines for the management of transfusion-dependent thalassemia.[4]

- **Chelation therapy** was cited as an effective treatment modality in improving survival, decreasing the risk of heart failure, and decreasing morbidities from transfusion-induced iron overload. The

optimal chelation regimen should be individualized and will vary among patients and their clinical status.

- **Allogeneic hematopoietic stem cell transplant (HSCT)** should be offered to patients with β-thalassemia at an early age, before complications due to iron overload have developed if a human leukocyte antigen (HLA) identical sibling is available. In some clinical circumstances, a matched unrelated donor can be adequate.
- **Reblozyl®** (luspatercept-aamt subcutaneous injection), an erythroid maturation agent, can be considered for patients ≥ 18 years of age who require regular RBC transfusions.
- **Zynteglo**, when available, may be an option for selected patients. Examples include young patients (12 to 17 years of age) with a β^+ genotype who do not have an HLA-compatible sibling donor. Also, Zynteglo can be considered in patients 17 to 55 years of age with a β+ genotype who do not have severe comorbidities and are at risk or ineligible to undergo allogeneic HSCT but can otherwise undergo an autologous gene therapy procedure with an acceptable risk.

POLICY STATEMENT

Prior Authorization is recommended for benefit coverage of Zynteglo. Approval is recommended for those who meet the **Criteria** and **Dosing** for the listed indication. Because of the specialized skills required for evaluation and diagnosis of patients treated with Zynteglo as well as the specialized training required for administration of Zynteglo, approval requires Zynteglo to be prescribed by or in consultation with a physician who specializes in the condition being treated. All approvals are provided for one dose per lifetime. The approval duration is 6 months to allow for an adequate time frame to prepare and administered one dose of therapy. For certain criteria, attestation is required as noted by **[attestation required by physician]**. In the criteria for Zynteglo, as appropriate, an asterisk (*) is noted next to the specified gender. In this context, the specified gender is defined as follows: females/males are defined as individuals with the biological traits of a woman/man, regardless of the individual's gender identity or gender expression.

All reviews (approvals and denials) will be forwarded to the Medical Director for evaluation. Some clients have elected Embarc Benefit Protection. For these clients, the Medical Director will coordinate with eviCore to ensure the Embarc Benefit Protection portion of the review has been completed. If the Embarc Benefit Protection portion of the review has not been completed, the Medical Director will route to Embarc@eviCore.com prior to completing the review.

Documentation: Documentation is required for use of Zynteglo where noted in the criteria as **[documentation required]**. Documentation may include, but is not limited to chart notes, laboratory tests, claims records, and/or other information.

Automation: None.

RECOMMENDED AUTHORIZATION CRITERIA

Coverage of Zynteglo is recommended in those who meet the following criteria:

FDA-Approved Indication

1. **Beta Thalassemia.** Approve for a one-time (lifetime) dose if the patient meets the following criteria (A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, and P):
   - **A)** Patient is ≥ 4 to ≤ 50 years of age; AND
   - **B)** Patient is transfusion dependent defined by meeting one of the following (i or ii) **[documentation required]**:

i. Receipt of transfusions of ≥ 100 mL per kg of body weight of packed red cells per year in the 2 years preceding enrollment **[documentation required]**; OR
ii. Patient has received transfusions eight or more times per year in the 2 years before enrollment **[documentation required]**; AND

C) Patient has one of the following genotypes as confirmed by DNA analysis (i or ii) **[documentation required]**:
i. Non-β^0/β^0 genotype **[documentation required]**; OR
Note: Examples include β^0/β^+, β^E/β^0, and β^+/β^+.
ii. β^0/β^0 genotypes **[documentation required]**; AND
Note: Other examples include $\beta^0/\beta^{+(IVS\text{-}I\text{-}110)}$ and $\beta^{+(IVS\text{-}I\text{-}110)}/\beta^{+(IVS\text{-}I\text{-}110)}$.

D) Patient does not currently have an active bacterial, viral, fungal, or parasitic infection as determined by the prescribing physician; AND

E) According to the prescribing physician, hematopoietic stem cell transplantation is appropriate for the patient; AND

F) Patient meets all of the following (i, ii, iii, iv, and v)
i. Patient plans to undergo mobilization, apheresis and myeloablative conditioning; AND
ii. The prescribing physician confirms that the hemoglobin level is or will be ≥ 11.0 g/dL within 30 days prior to the following clinical scenarios (a and b):
a) Prior to mobilization; AND
b) Before myeloablative conditioning; AND
iii. A granulocyte-colony stimulating factor product and Mozobil (plerixafor subcutaneous injection) will be utilized for mobilization; AND
Note: Filgrastim products are examples of a granulocyte-colony stimulator factor therapy.
iv. Busulfan will be used for myeloablative conditioning; AND
v. Patient meets both of the following (a and b):
a) Patient is not receiving iron chelation therapy or this therapy will be stopped at least 7 days prior to myeloablative conditioning; AND
Note: Examples of iron chelators used for this condition include deferoxamine injection; deferiprone tablets or solution; and deferasirox tablets.
b) Use of iron chelators will be avoided for 6 months after infusion of Zynteglo **[attestation required by physician]**; AND

G) Patient has received or is planning to receive prophylaxis for hepatic veno-occlusive disease/hepatic sinusoidal obstruction syndrome before myeloablative conditioning with busulfan; AND
Note: Examples of medications used include ursodeoxycholic acid or Defitelio (defibrotide intravenous infusion).

H) Females* of reproductive potential must have the prescribing physician confirm the following (i and ii):
i. A negative serum pregnancy test was or will be obtained prior to the start of mobilization and re-confirmed prior to conditioning procedures, as well as before Zynteglo administration; AND
ii. The patient will use an effective method of contraception from the start of mobilization through at least 6 months after administration of Zynteglo; AND

I) Males* must have the prescribing physician confirm that the patient will be using an effective method of contraception from the start of mobilization through at least 6 months after administration of Zynteglo; AND

J) Prior to collection of cells for manufacturing, screening is negative for the following (i and ii):
i. Human T-lymphotropic virus 1 and 2 **[documentation required]**; AND
ii. Human immunodeficiency virus 1 and 2 **[documentation required]**; AND

K) Patient meets one of the following (i or ii):
i. Patients ≥ 16 years of age have a Karnofsky performance status score of ≥ 80 **[documentation required]**; OR

ii. Patients < 16 years of age have a Lansky performance status score of ≥ 80 **[documentation required]**; AND

L) Patient meets both of the following (i and ii):
- **i.** Patient has a recent white blood cell count ≥ 3 x 10^9/L **[documentation required]**; AND
- **ii.** Patient has a recent platelet count ≥ 100 x 10^9/L **[documentation required]**; AND

M) Patient meets both of the following (i and ii):
- **i.** Patient has been evaluated for the presence of severe iron overload **[documentation required]**; AND
- **ii.** Patient does not have evidence of severe iron overload **[attestation required by physician]**; AND

  Note: Examples of severe iron overload could include abnormal myocardial iron results (a T2*-weighted magnetic resonance imaging measurement of myocardial iron of less than 10 msec); high liver iron concentration (≥ 15.5 mg/g); liver biopsy results suggest abnormalities; or clinical evidence of organ damage (e.g., endocrine comorbidities).

N) Patient does not have any of the following (i, ii, iii, iv, v, and vi):
- **i.** Prior or current malignancy or myeloproliferative disorder; AND

  Note: This does not include adequately treated cone biopsied in situ carcinoma of the cervix uteri and basal or squamous cell carcinoma of the skin.
- **ii.** Familial cancer syndrome or a history of such in their immediate family; AND
- **iii.** An estimated glomerular filtration rate of < 70 mL/min/1.73 m^2 **[documentation required]**; AND
- **iv.** Uncorrected bleeding disorder; AND
- **v.** A diffusion capacity of carbon monoxide < 50% of predicted **[documentation required]**; AND
- **vi.** Advanced liver disease; AND

  Note: Examples include evidence of cirrhosis and/or persistent alanine aminotransferase, aspartate aminotransferase or direct bilirubin values greater than three times the upper limit of normal; AND

O) Patient meets one of the following (i or ii):
- **i.** Patient does not have a Human Leukocyte Antigen (HLA)-Matched Family Donor; OR
- **ii.** Patient has a Human Leukocyte Antigen (HLA)-Matched Family Donor but the individual is not able or is unwilling to donate; AND

P) Medication is prescribed by a hematologist and/or a stem cell transplant specialist.

* Refer to the Policy Statement.

Dosing. The recommended dose of Zynteglo is a single intravenous infusion which contains a minimum of 5.0 x 10^6 CD34+ cells/kg of body weight.

CONDITIONS NOT RECOMMENDED FOR APPROVAL

Coverage of Zynteglo is not recommended in the following situations:

1. **Concurrent Use with Reblozyl** (luspatercept-aamt subcutaneous injection). Reblozyl was not utilized with Zynteglo in the pivotal trials.

2. **Prior Hematopoietic Stem Cell Transplantation [attestation required by physician]**. Patients who had received a prior hematopoietic stem cell transplantation were not allowed to participate in the pivotal clinical trials involving Zynteglo.

3. **Prior Receipt of Gene Therapy.** Prior receipt of gene therapy was a reason for patient exclusion in the two pivotal trials.

4. Coverage is not recommended for circumstances not listed in the Recommended Authorization Criteria. Criteria will be updated as new published data are available.

REFERENCES

1. Zynteglo™ intravenous infusion [prescribing information]. Somerville, MA: Bluebird Bio; August 2022.
2. Taher AT, Musallam KM, Cappellini MD, et al. β-thalassemias. *N Engl J Med*. 2021;384;727-743.
3. Locatelli F, Thompson AA, Kwiatkowski JL, et al. Betibeglogene autotemcel gene therapy for non-β^0/β^0 genotype β-thalassemia. *N Engl J Med*. 2022;386:417-427.
4. Farmakis D, Porter J, Taher A, et al, for the 2021 TIF Guidelines Taskforce. 2021 Thalassaemia International Federation guidelines for the management of transfusion-dependent thalassemia. *Hemasphere*. 2022;6:8(e732).

HISTORY

Type of Revision	Summary of Changes	Review Date
New Policy	--	09/28/2022
Selected Revision	The phase "Gene Therapy" was added to the header. In addition, the following change was made: **Beta Thalassemia:** Criteria changed from "Patient has a recent white blood cell count ≥ 3 x 10^9/L [documentation required]"; OR "Patient has a recent platelet count ≥ 100 x 10^9/L [documentation required]" to requiring both criterion be met.	10/19/2022