Sick Cells Gene Therapy FAQ

In light of the new FDA approvals for CASGEVY™ from Vertex Pharmaceuticals/CRISPR Therapeutics and Lyfgenia™ from bluebird bio, Sick Cells wants to provide up-to-date information for the SCD community.

1. **What new gene therapies are FDA-approved for SCD, and how do they work?**

On December 8th, 2023, the Food and Drug Administration (FDA) approved **CASGEVY™** and **Lyfgenia™** for patients with sickle cell disease patients 12 years of age or older and a history of vaso-occlusive events (VOEs). Both therapies are one-time gene therapies that use the body's **own** stem cells to decrease or stop VOEs.

CASGEVY™ uses your own stem cells that are collected from the patient. Therefore, no donor is needed. These cells are sent for gene editing done by CRISPR/CAS 9. This gene-editing tool will edit a *specific gene* called *BCL11A*., As a result, there is an increase in the production of fetal hemoglobin, which binds to oxygen very well however, produces less after birth. Once more fetal hemoglobin is made, this can stop the production of sickled cells and later prevent VOEs.

Lyfgenia™ uses a similar method of using your own stem cells. This gene therapy uses a vector to deliver a functional gene called HbA^{T87Q}, which mimics regular hemoglobin. It binds to oxygen like normal hemoglobin, limiting sickled cell production and reducing VOEs.

Click here for more information on CASGEVY™ and Lyfgenia™

2. **What is the "Blackbox Warning Label" included in prescribing Lyfgenia™?**

During the clinical trial of **Lyfgenia™,** two patients developed Acute Myeloid Leukemia (AML) which is a cancer of the blood and bone marrow. One patient developed Myelodysplastic Syndrome (MDS), a group of disorders that occurs because the bone marrow does not make enough healthy red blood cells.

Due to this occurrence, it is required to monitor patients closely for evidence of blood and bone marrow malignancies through complete blood counts (CBC) at least every 6 months and assess the biosafety of gene therapy vectors at months 6, 12, and as warranted.

The patients in the CASGEVY™ clinical trial did not develop these malignancies. Therefore, a blackbox warning label is not required for this gene therapy.

3. **Will there be mechanisms in place to track and report the follow-up of patients after receiving these gene therapies?**

Yes, the FDA required Vertex Pharmaceuticals and bluebird bio to report a **15-year follow-up** for patients who received Casgevy™ or Lyfgenia™. To collect robust data, the FDA required these companies to enroll up to 250 patients in a study to collect blood levels including CBCs, bone marrow production, and additional markers.

However, reporting to the FDA is **not** limited to these companies. The patient community and providers can report **any adverse symptoms** they experience while receiving these treatments **at any time.**

To report any adverse effects experienced while receiving during or after the treatment, one can report these to the FDA by the "FDA Adverse Event Reporting System" (FAERS). Click here to learn more about the FAERS system and the MedWatch Dashboard to report adverse events.

4. **What are the prices for these therapies and how will it affect patients accessing these treatments?**

CASGEVY™ has been reported to be priced at $2.2 million USD. Lyfgenia™ has been reported to be priced at $3.1 million USD. However, these are the **list prices**. The list price is the price the pharmaceutical manufacturer sets for a drug. This is similar to a manufacturer's suggested retail price (MSRP) for a new car.

The **net price** is determined by the amount the manufacturer recoups from selling their product after rebates and discounts to federal, state, and private payers. In addition, pharmaceutical companies offer direct financial assistance to patients to help cover their out-of-pocket costs not covered by insurers.

For more information, click here for Sick Cells YouTube, which discusses drug pricing and coverage decisions. Vertex Pharmaceuticals and bluebird bio also have resources available to patients to help with questions regarding costs and coverage.

5. **Does the FDA envision developing and improving gene therapy in the future?**

The FDA is **highly** hopeful that these two approvals will pave the road for developing future gene therapies and improving the lives of many living with SCD!

Lyfgenia's technology has been approved to treat other diseases such as beta-thalassemia before being approved for SCD. CASGEVY's approach is novel and SCD is the first disease approved by the FDA!

To learn more about gene therapy and how it works, please visit GenePossibilities.

Please feel free to email info@sickcells.org if you have any questions!