First stem cell study could lead to development of therapy to reduce inflammation caused by CF

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A 39-year-old man with cystic fibrosis (CF) made history by becoming the first person to receive human adult stem cells in a new research study that researchers hope will someday lead to the development of a therapy to reduce the inflammation and infection caused by CF.

The pioneering subject in the study is Bob Held from Alliance, Ohio, who on Jan. 26 received an infusion of cells called allogeneic human mesenchymal stem cells (hMSC), adult stem cells collected from the bone marrow of healthy volunteers. Mr. Held was diagnosed with CF when he was 16 months old.

Currently, there is no cure for CF, and life expectancy for patients who survive into adulthood is approximately 41 years of age.

"It was a very exciting day for us with the very first participant in the first stem cell trial for cystic fibrosis," said James Chmiel, MD, the principal investigator of the study at University Hospitals Rainbow Babies & Children's Hospital.

The Phase 1 trial will assess the safety and tolerability of hMSCs in adult patients with CF.

"This is an early phase trial, and the most important thing is to ensure safety," said Dr. Chmiel. "This study consists of a single infusion of stem cells. We will follow the study participants for a year to make sure it's safe. Before applying any therapy on a broad basis, we want to make sure that it's safe."

While the goal of the study is safety, Dr. Chmiel hopes this is a first step towards the ultimate goal of developing a therapy to reduce lung inflammation and infection, resulting in longer and healthier lives for people with CF.

"While there's been a tremendous increase in survival for people with CF from when I entered the field in the 1990s, that's still not good enough," said Dr. Chmiel, Director of the Cystic Fibrosis Therapeutics Development Center at UH

Rainbow Babies & Children's Hospital and Professor of Pediatrics at Case Western Reserve University School of Medicine. "While we've made great progress, we still have a long way to go."

The stem cells that Mr. Held received were collected from the bone marrow of a healthy adult volunteer. UH is a national leader in the use of stem cell therapy with hMSCs. Researchers from UH, along with the CWRU School of Medicine, discovered hMSCs. The hMSCs possess many properties that are ideal for the treatment of inflammatory and degenerative diseases, and they possess natural abilities to detect changes in their environment, such as inflammation. The hope is that hMSCs can reduce the inflammation in the lungs caused by CF.

CF's main effect is on the lungs. They fill with a sticky mucus as a reaction - really an over-reaction - by the body's immune system to bacteria. The lungs are the source for much of the illness and shortened lifespan seen in CF.

"One of the issues in CF is that people with the disease get bacterial infections in their lungs, and these bacteria incite a vigorous and excessive inflammatory response," explained Dr. Chmiel. "It's actually the body's inflammatory response that damages the lungs. The inflammatory response tries to eliminate the bacteria, but it's not successful. Instead, the inflammatory system releases molecules that damage the individual's own airways. The lung disease causes much of the illness and is responsible for the majority of the mortality of the disease."

The stem cells are donated by healthy adult volunteers who go through a rigorous screening process. The stem cells are cultured in the UH stem cell facility. Volunteers with CF who are in the study receive an infusion through an IV.

"Once in the patient's body, the stem cell tracks to the area where there's a significant amount of inflammation, and they take up residence there. The stem cells then respond to the environment, and hopefully reverse some of the abnormalities," said Dr. Chmiel. "We hope in future studies to demonstrate that the stem cells reduce the infection and inflammation and return the lungs to a more normal state."

"This therapy aims to turn down the inflammatory response, not eliminate it because we still have to keep the bacteria in check. We want to reduce inflammation and the subsequent lung damage caused by inflammation

without allowing the bacteria to proliferate," said Dr. Chmiel.

A total of 15 clinically stable adults with CF will be enrolled in the study. Support for the study is from the Cystic Fibrosis Foundation.

The patient, Mr. Held, considers himself fortunate to be close to 40 with CF. When he was growing up, he said he'd miss 50 days of school each year because of the disease. Every day, he needs to breathe in aerosols for about two hours in the morning and 1-1/2 hours before bed to keep his lungs functioning. While he hasn't been sick from the illness since his late teens, he does check himself into the hospital a couple of times a year for precautionary measures and to prevent himself from "getting into a valley" with CF.

His late wife, Michelle, died of CF seven years ago. They had met when they were kids, but didn't get married until 2012. She died from the disease suddenly 28 days after they married.

"My only regret is that I didn't ask her out sooner," said Mr. Held.
He is participating in the study to carry on Michelle's legacy, and "I am hoping the future generations of CF patients can get better treatments and that eventually a cure will be found for them," he said.

Source:

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