Immune therapy shows early promise for advanced leukemia

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Patient's own cells are genetically engineered for use in treatment, study finds.

(HealthDay)—An experimental therapy that targets the immune system might offer a new way to treat an often deadly form of adult leukemia, a preliminary study suggests.

The research involved only five adults with recurrent B-cell acute lymphoblastic leukemia (ALL), a cancer of the blood and bone marrow. ALL progresses quickly, and patients can die within weeks if untreated. The typical first treatment is three separate phases of chemotherapy drugs.

For many patients, that beats back the cancer. But it often returns. At that point, the only hope for long-term survival is to have another round of chemo that wipes out the cancer, followed by a bone marrow transplant.

But when the disease recurs, it is often resistant to many chemo drugs, explained Dr. Renier Brentjens, an oncologist at Memorial Sloan-Kettering Cancer Center in New York City.

So, Brentjens and his colleagues tested a different approach. They took immune system T-cells from the blood of five patients, then genetically engineered the cells to express so-called chimeric antigen receptors (CARs), which help the T-cells recognize and destroy ALL cells.

The five patients received infusions of their tweaked T-cells after having standard chemotherapy. All five quickly saw a complete remission—within eight days for one patient, the researchers found.

Four patients went on to a bone marrow transplant, the researchers reported March 20 in the journal *Science Translational Medicine*. The fifth was ineligible because he had heart disease and other health conditions that made the transplant too risky.

"To our amazement, we got a full and a very rapid elimination of the tumor in these patients," said Dr. Michel Sadelain, another Sloan-Kettering researcher who worked on the study.

Many questions remain, however. And the treatment—known as adoptive T-cell therapy—is not available outside of the research setting.

"This is still an experimental therapy," Brentjens said. "But it's a promising therapy."

In the United States, close to 6,100 people will be diagnosed with ALL this year, and more than 1,400 will die, according to the National Cancer Institute. ALL most often arises in children, but adults account for about three-quarters of deaths.

Most cases of ALL are the B-cell form, and Brentjens said about 30 percent of adult patients are cured. When the cancer recurs, patients have a shot at long-term survival if they can get a bone marrow transplant. But if their cancer resists the pre-transplant chemo, the outlook is grim, Brentjens said.

Adoptive T-cell therapy is a form of immunotherapy, a promising type of treatment which uses the patient's own immune system to battle tumors.

For now, the T-cell therapy is being studied as a "bridge" to a bone marrow transplant for these ALL patients. But Brentjens said the ultimate hope is to use it as an "up-front" therapy, along with chemotherapy, to help prevent ALL recurrences in the first place.

This is the first published study to test the T-cell therapy against adult ALL, but researchers have already studied it in some patients with advanced chronic lymphocytic leukemia (CLL), which mainly affects older adults.

Dr. David Porter, a University of Pennsylvania researcher involved in the work on CLL, called the results in these five ALL patients "remarkable."

Porter, director of blood and marrow transplantation at Penn's Abramson Cancer Center, agreed that one of the questions for the future will be whether the T- cell therapy can be used earlier in ALL treatment. "But we're a long way off from that right now," Porter stressed.

"This is very early in development," he said. "We are just starting to learn about the short-term side effects, and we don't know about the long-term effectiveness or safety."

One question is whether T-cell therapy alone can bring about a long-term remission for patients with recurrent ALL. Most patients in this study got a bone marrow transplant because that is the standard of care, Brentjens said.

But as the researchers treat more patients, they can follow those who are ineligible for a bone marrow transplant and see how they fare after the immunotherapy alone.

Sadelain said that it's possible that the T-cell therapy might need to be repeated.

Safety questions exist as well. "The risk of this therapy would be creating an overwhelming immune response," Sadelain said. That could lead to extremely high fever or other potentially life-threatening effects.

In this study, funded by the cancer institute, two patients had signs of an overly strong immune response. But it was manageable with anti-inflammatory steroid drugs, Sadelain added.

Another expert, Richard Winneker, senior vice president of research for the Leukemia & Lymphoma Society, said he was encouraged by the results. "And this should certainly stimulate further work," he said.

The leukemia society has funded Penn's work on adoptive T-cell therapy, and Winneker said, "We're thrilled to see this field showing positive results."

Brentjens and Sadelain hold a patent on the CAR used in the therapy.

More information: Learn more about adult ALL from the American Cancer Society.