Engineering the immune system to kill cancer cells

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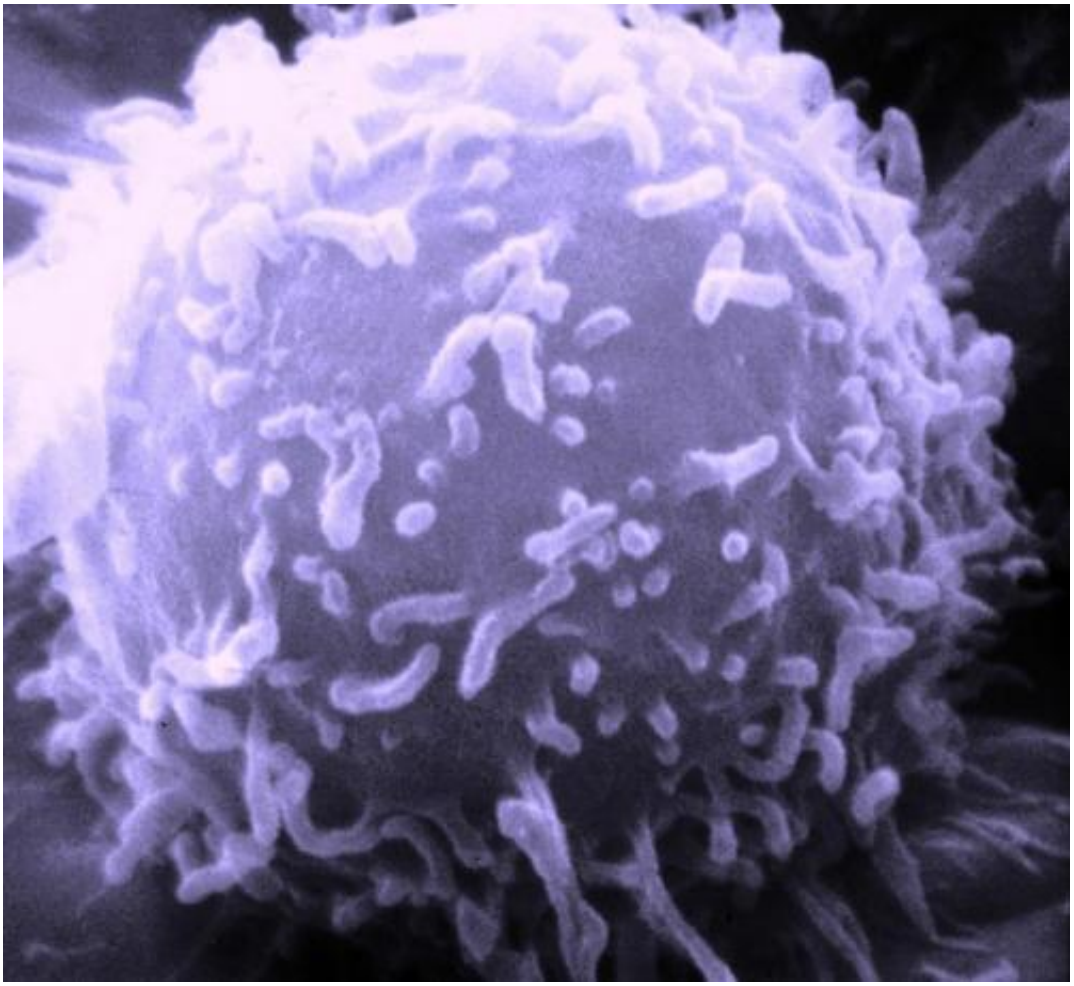

Electron microscopic image of a single human lymphocyte. Credit: Dr. Triche National Cancer Institute

In late 2015, former President Jimmy Carter announced that he was free of the metastatic melanoma that had spread to his liver and brain. In addition to surgery and radiation, Carter was treated with an immunotherapy drug, a new approach in cancer treatment that has a promising outlook.

A research team led by University of Notre Dame chemist Brian Baker is developing a new immunotherapy, a treatment that enhances immune system function in order to treat or prevent disease, as a means to more effectively target and kill cancer cells. According to Baker, "Immunotherapy is changing how cancer is treated."

T cells play a vital role in the immune system by attacking pathogens and cancer cells. The team's study, recently published in the journal *Structure*, shows how T cell receptors can be engineered for specificity and function, and provides new methods for creating T cell receptors that are able to target specific cancer antigens, harmful substances that cause the body to produce antibodies.

The work of Baker's team is directed toward taking immunotherapy beyond the treatment Carter received. T cells that have been genetically altered to express engineered T cell receptors have been explored in clinical trials. Baker and his collaborators show how these receptors can be further engineered in order to recognize specific antigens on the surfaces of cancerous cells, thereby allowing cancer to be targeted with a heightened, more directed immune response with laser-like accuracy.

"Our study demonstrates new routes for custom designing functional T cell receptors with optimal antigen recognition properties. This will help open the door for customized specificity in order to optimize T cell targeting and killing," said Baker.

More information: Daniel T. Harris et al, An Engineered Switch in T

Cell Receptor Specificity Leads to an Unusual but Functional Binding Geometry, *Structure* (2016). DOI: 10.1016/j.str.2016.04.011