

FOR IMMEDIATE RELEASE

**Bar-Ilan University and Weizmann Institute Researchers Use Computational Design
to Engineer Immune Cells to Fight Cancer and Viruses**

**Engineered T cells demonstrated stronger immune responses,
greater cancer-killing ability and improved survival in mice**

Ramat Gan, Israel (September 24, 2026) -- A joint team of researchers at Bar-Ilan University and the Weizmann Institute has used advanced computational design methods to enhance the ability of genetically engineered immune cells to recognize and attack cancer and viral targets.

Published today in [Science Advances](#), the study used protein design methods to improve a key component of T cells, which are cells of the immune system that can recognize and destroy diseased cells. Based on these calculations, the researchers created an enhanced T-cell receptor scaffold, which they called SET (Structurally Enhanced TCR), that enabled engineered T cells to respond more strongly and attack target cells more effectively. TCRs are natural receptors on T cells that recognize foreign targets, making it a key part of the cells' ability to fight disease compared to current therapeutic constructs. In laboratory experiments, the enhanced T cells produced substantially stronger immune responses and demonstrated greater ability to kill cancer cells than T cells carrying the original receptor.

The results were particularly striking in mice with human tumors. After 83 days, tumors treated with SET-containing T cells were approximately 35% smaller than those in untreated controls. By day 127, all the mice receiving the enhanced cells were still alive, compared with fewer than half of the control mice.

Importantly, the improvement was not limited to a single cancer target. The researchers applied the same approach to T cells designed to recognize several cancer-associated targets, including targets associated with melanoma and other difficult cancers, as well as targets from Epstein-Barr virus and SARS-CoV-2. In each case, the enhanced T cells showed stronger immune activity than the original cells, suggesting that the approach could generalize to a broad range of diseases.

"Computational protein design is giving us a new and much more effective way to engineer the immune system," says Prof. Cyrille J. Cohen, head of the Laboratory of Tumor Immunology and Immunotherapy at Bar-Ilan University's Goodman Faculty of Life Sciences, who led the research. "In this study, we used computational design to make T cells substantially more powerful at attacking their targets, and we saw this effect across both cancer and viral targets. Using protein design and other tools to build more effective immune cells is opening a new direction for cancer and infectious-disease therapies."

“One of the most exciting findings was that the same strategy could improve T-cell function across very different targets,” says Maria Radman of Bar-Ilan University’s Goodman Faculty of Life Sciences, the study’s first author. “We saw enhanced activity not only against cancer-associated targets, but also against viral targets. This suggests that the approach could be broadly useful for engineering T cells with stronger and more effective immune responses.”

Prof. Sarel Fleishman of the Weizmann Institute of Science, who led the computational design work together with Dr. Jake Parker, a visiting student from Australia, adds, “protein design methods are making inroads into the most challenging areas of biotherapeutic engineering. What’s particularly striking here is that a single set of mutations, strategically designed in conserved regions of the TCR, favorably impacts very different TCR types. Instead of spending years identifying enhancing mutations for every single therapeutic candidate, we expect the designed mutations to improve any TCR, dramatically accelerating the process of translating promising leads into therapeutics.”

The findings are preclinical, having been demonstrated in laboratory experiments and animal models. Further research will be required to establish the safety and potential clinical applications of the approach.

###

Photo Figure 3A: Computational design of the Structurally Enhanced T-cell Receptor (SET). Researchers used two protein-design algorithms to identify mutations that improve the stability and function of the T-cell receptor. These mutations were combined to create the enhanced SET receptor.

Photo Figure 8F-G: SET-engineered T cells slowed tumor growth and prolonged survival in mice with human melanoma tumors, demonstrating the enhanced anti-tumor activity of the computationally designed receptor.

Photo credits: Prof. Cyrille Cohen, Bar-Ilan University

Media contact: Elana Oberlander, Bar-Ilan University, (053) 425-5152; elanadovrut@gmail.com