Can what works to treat cancer work for diabetes?

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To live with type 1 diabetes is to be ruled by relentless routine. Food must be carefully monitored, and the only treatment, subcutaneous insulin, is burdensome—requiring regular injections or an insulin pump,

continuous glucose monitoring and/or finger sticks to test one's blood sugar levels.

For many of the 1.9 million Americans with the condition, that might be about to change. Researchers at UC San Francisco are exploring how two recently approved immunotherapy treatments could be expanded to treat type 1 diabetes more broadly.

Working collaboratively across disease specialties, diabetes researchers are looking at how oncologists use chimeric antigen receptor (CAR) T-cell therapy to reprogram a person's immune system to attack her own cancer cells. They hope to similarly reprogram the immune system to fight diabetes.

"It turns out the switches that researchers are playing with in cancer, to activate the immune system, are the same ones that are useful in diabetes to halt the immune system," said Mark Anderson, MD, Ph.D., the Robert B. Friend and Michelle M. Friend Endowed Chair in Diabetes Research and director of the UCSF Diabetes Center. "In fact, the immune therapy drugs we use to kill cancer can trigger type 1 diabetes in some people."

This type of novel insight is something Anderson envisions happening more when diabetes and cancer researchers move in next to each other in UCSF's new Parnassus Research and Academic Building, especially since there will be dedicated space for clinical trials.

Usually, in academic medicine, researchers and clinicians are organized by disease, but in Parnassus they'll be organized by the mechanisms underlying disease—in this case, the behavior of T cells. By understanding the mechanism, they can disrupt it—potentially across multiple diseases.

"Imagine someone is in a trial and receiving a cancer drug, and it leads to type 1 diabetes," Anderson said. "Our lab will be right there, and we can measure their immune cells to try to see what's happening with the diabetes, while our oncology colleagues continue working on cancer. We will be able to measure things directly in humans as they happen by merging the two efforts together."

'End of the beginning' for type 1 diabetes research

As T-cell research advances, others are working to expand the use of teplizumab, a breakthrough drug approved by the FDA in late 2022 to delay the onset of type 1 diabetes in people at risk of developing the condition. Teplizumab, the first approved immunotherapy treatment for type 1 diabetes, treats the condition by deactivating the immune cells that attack insulin-producing cells.

Research is also currently underway on how teplizumab could be used in people who are not just at risk but were recently diagnosed with type 1 diabetes—a game changer for those who would otherwise be tethered to lifelong insulin therapy.

Stephen Gitelman, MD, UCSF Mary B. Olney, MD/KAK Distinguished Professor in Pediatric Diabetes and Clinical Research, is the lead UCSF investigator for a multi-institution study into whether children and adolescents can use teplizumab within two months of diagnosis to help preserve their remaining insulin-producing beta cells, thus lowering their doses of supplemental insulin.

"The participants are doing very well," Gitelman said. "We administered a daily infusion for two weeks, then another round six months later, and we are looking to see if there is a benefit at 24 months. We should have the detailed results later this summer."

The approval of teplizumab for prevention of type 1 diabetes is the "end of the beginning," he adds, meaning that it's a significant step forward in research, yet there's much more to discover.

"It opens up a lot of important questions to explore with this drug and with other drugs. What about its use in children under age 8 who are at the highest risk of new-onset type 1? What if we give more than one course of the drug in prevention or pair it with other drugs? It's early days and an exciting time."

Provided by University of California, San Francisco

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