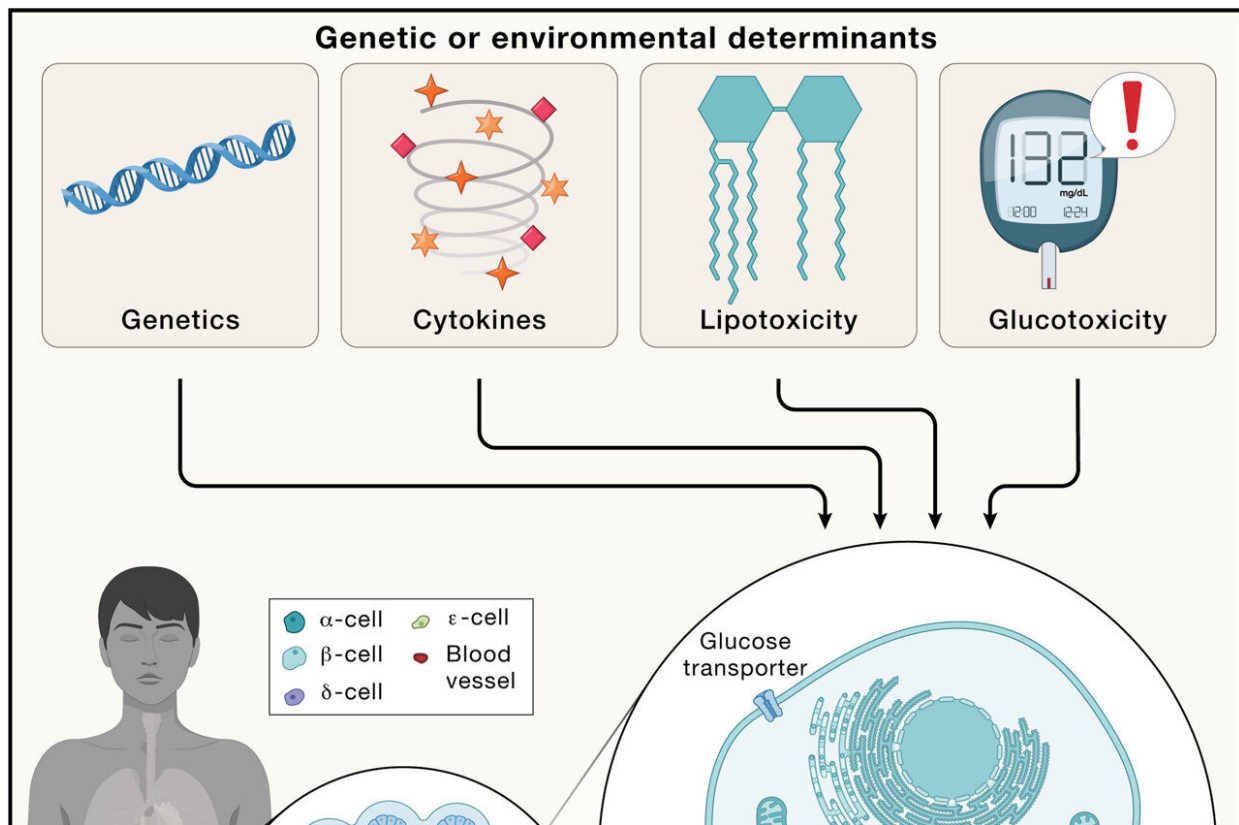


Recent advances show promise in stemming the growing prevalence of diabetes

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Schematic representation of the potential ways in which pancreatic beta cells are damaged through environmental and genetic factors. Credit: *Cell* (2024). DOI: 10.1016/j.cell.2024.06.029

A study surveying advances in diabetes pathogenesis and treatment

explores the complex factors contributing to the onset and progression of the disease, suggesting that an understanding of these dynamics is key to developing targeted interventions to reduce the risk of developing diabetes and managing its complications.

In the paper [published](#) July 25 in a special 50th anniversary issue of the journal *Cell*, the authors surveyed hundreds of studies that have emerged over the years looking at the causes underpinning types 1 (T1D) and 2 (T2D) diabetes and new treatments for the disease.

They examine the role that genes, environmental factors, and social determinants of health play and diabetes' effect on cardiovascular and kidney disease.

What they found shows there are many advances in treatments that could stem the tide of a disease that has struck millions of people around the globe and continues to grow. In addition, some of these advances could be used to treat other disorders. But there are still challenges ahead.

"As the prevalence of diabetes continues to grow around the world, it is important to understand the latest advancements in research so that clinicians can provide the best care to their patients, and patients can make informed choices that support improved health outcomes," said lead author Dr. E. Dale Abel, chair of the UCLA Department of Medicine.

"This is an educational resource that integrates the latest research and trends in [diabetes management](#), which may have implications for clinical practice as the diabetic patient population continues to grow.

"This review will be the go-to reference for physicians and researchers, providing a state-of-the-art update of where the field is currently, and where it is headed."

Most people with diabetes are affected by type 2 diabetes, for which inadequate diet and obesity are important underlying causes. Type 1 diabetes accounts for fewer than 5% of all cases. As of 2021, about 529 million people around the world were diagnosed with diabetes, representing about 6.1% of the global population, or about one in 16 people.

Prevalence in some regions is as high as 12.3%. Type 2 diabetes comprises about 96% of cases, with more than half due to obesity. Some 1.31 billion people are projected to have the disease by 2050, with prevalence rising as high as 16.8% in North Africa and the Middle East and 11.3% in Latin America and the Caribbean, the researchers write.

Genetics, the central nervous system, and the interplay between various organs as well as social and environmental factors such as [food insecurity](#) and air pollution play a role in the development of diabetes.

But some recent discoveries represent significant strides toward managing and perhaps even reversing the disease. For instance, a 2019 study found that a 14-day course of the antibody teplizumab delayed the progression of type 1 diabetes from stage 1 to stage 3 by 24 months. A follow-up analysis in 2021 showed that the delay could be up to 32.5 months.

Based on these results, the U.S. Food and Drug Administration approved teplizumab as the first disease-modifying therapy for type 1 diabetes, the researchers write.

Advances in insulins with optimized pharmacokinetics, algorithm-driven subcutaneous insulin pumps, continuous glucose monitoring, and improved tools for self-management have significantly improved the quality of life and outcomes for people with stage 3 type 1 diabetes.

In addition, [stem cells](#) could replace insulin-producing cells that are lost in type 1 diabetes, Abel said.

For type 2 diabetes, three classes of glucose-lowering medicines that were introduced in the last 20 years—GLP1RAs (glucagon like peptide-1 receptor agonists), DPP-4 inhibitors, and SGLT-2 inhibitors—have enabled people to control their glucose levels without gaining weight and with a low risk of developing hypoglycemia.

Personalized and precision medicine approaches are being explored to target the molecular mechanisms behind diabetes. However, they must demonstrate that benefits are clinically superior to standard care and are cost-effective. Also, it remains to be seen if precision approaches can be implemented in all settings worldwide, including those with few resources.

Combinations of GLP1RAs and with molecules that target other receptors such as GIP have shown even greater efficacy in treating diabetes. Recent trials have also shown that they are very effective in treating obesity, certain types of heart failure and even sleep apnea, in part because of their potency to induce weight loss and reduce inflammation. Clinical trials are now underway to test their efficacy in treating other disorders such as Alzheimer's disease, Abel said.

"Advances in therapy now raise the hope of preventing or curing T1D and treating T2D in ways that not only improve metabolic homeostasis, but also concretely reduce the risk and progression of cardio-renal disease," the researchers write.

"Finally, as we understand and develop tools for discerning the underlying heterogeneity leading to diabetes and its complications, the stage will be set for targeting therapies and prevention strategies to optimize their impact in ways that will be broadly applicable across

diverse populations and availability of health care resources."

More information: E. Dale Abel et al, Diabetes mellitus—Progress and opportunities in the evolving epidemic, *Cell* (2024). [DOI: 10.1016/j.cell.2024.06.029](https://doi.org/10.1016/j.cell.2024.06.029)

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