



VA research on **DIABETES**

VA researchers are working to develop better ways to prevent and treat diabetes, especially in special populations such as the elderly, amputees, minorities, spinal cord-injured patients, and those with kidney or heart disease.

ABOUT DIABETES

- Diabetes is a chronic disease in which the body cannot produce or properly use insulin, which it needs to bring sugar out of the bloodstream and into cells. As a result of high blood sugar, damage eventually occurs to blood vessels and organs.
- More than 30 million Americans have diabetes, and 84 million more are at risk to develop the disease. Many Veterans have the disease, including some who developed it as a result of being exposed to herbicides while serving in Vietnam.
- Symptoms of diabetes include blurry vision, excessive thirst, fatigue, frequent urination, hunger, and weight loss. Persons with diabetes need to have their hemoglobin A1c levels checked every three to six months.
- There are three major types of diabetes. In Type 1 diabetes, usually diagnosed in childhood, the body makes little or no insulin, so daily injections of insulin are needed. In Type 2 diabetes, the pancreas does not make enough insulin to keep blood glucose levels normal, often because the body does not respond well to insulin. The third type of diabetes is gestational diabetes, high blood glucose that develops during pregnancy.

- Between 90-95% of adults with diabetes have Type 2 diabetes. More are at risk due to overweight or obesity.
- Diabetes affects nearly 25% of VA's patient population. The disease is the leading cause of blindness, end-stage renal disease, and amputation for VA patients.

VA RESEARCH ON DIABETES: OVERVIEW

- VA researchers are studying innovative strategies and technologies, including group visits, telemedicine, peer counseling, and internet-based education and case management, to enhance access to diabetes care and improve outcomes for patients.
- VA investigators conducted the VA Diabetes Trial, a multiyear study examining the relationship between glucose control in diabetics and cardiovascular health. The seven-year study included nearly 1,800 patients with diabetes. Follow-up studies were conducted 10 and 15 years after the initial study.
- VA researchers are using data from other large studies, such as the VA-DOD Millennium Cohort Study, to examine predictors of diabetes in service members and Veterans. They have found links

between diabetes and sleep apnea, poor sleep quality, statin use, and obesity.

SELECTED MILESTONES AND MAJOR EVENTS

- 1977** – Received the Nobel Prize in physiology or medicine ([Dr. Rosalyn Yalow](#)), for developing a new way to measure insulin and other hormones in the blood
- 1998** – Discovered that an [implantable insulin pump](#) offers better blood sugar control, weight control, and quality of life for adult than multiple daily injections
- 2009** – Determined, through the [VA Diabetes Trial](#), that intensively controlling blood sugar reduces the risks of heart disease only modestly
- 2013** – Found, in the VA-DOD [Millennium Cohort Study](#), that sleep apnea and poor sleep quality predict diabetes, independent of other diabetes risk factors or mental health
- 2013** – Began participation in a National Institutes of Health (NIH) [study](#) testing the long-term benefits and risks of four widely used diabetes drugs in combination with metformin
- 2017** – [Learned](#) that a diagnosis of PTSD in pregnant women Veterans was associated

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with an increased risk of gestational diabetes and preeclampsia

2018 – [Developed](#) a novel glucose monitoring system to help hospitals monitor the development of hypoglycemia in patients

RECENT STUDIES: SELECTED HIGHLIGHTS

• **Improvements in insulin release wane after treatment stops**, suggests a study chaired by a VA Puget Sound Health Care System researcher. The study compared the use of different treatment among adults with the aim of preserving beta cell function, the key to the body’s ability to make and release insulin. While participants showed improvements in beta cell function and blood glucose control while on the treatments, these improvements did not persist after treatment. ([Diabetes Care](#), September 2019)

• **Benefits of tight glucose control wane once a strict regimen is stopped**, according to a 15-year follow-up of the VA Diabetes Trial. The study showed that glucose-lowering reduced the consequences of diabetes for those who continued to lower their blood sugar levels. However, declines in cardiovascular events, risk of death, and kidney events were not significant when intensive blood sugar lowering treatment was no longer being used. ([New England Journal of Medicine](#), June 6, 2019)

• **VA patients with diabetes have similar health outcomes regardless**

of primary provider type, according to a Durham VA Health Care System study. The study found no significant differences in outcomes between patients with physicians, nurse practitioners, or physician assistants as their primary provider. Within VA, about one-third of primary care visits are with PAs or NPs, rather than with physicians. ([JAAPA](#), June 2019)

• **Early nonadherence to diabetes drugs leads to poor health outcomes.** Patients who did not adhere early on to their medication treatment for Type 2 diabetes were more likely to have heart attacks and strokes, according to a VA MidSouth Healthcare Network study. The research team looked at data from more than 159,000 Veterans over an 11-year period. The less compliant patients were to their medication regimen within the first year, the higher their chances were of having a heart attack or stroke, and to have died during a five-year period. ([Diabetic Medicine](#), November 2018)

• **Million Veteran Program suggests drug targets for diabetes and heart disease.** Using DNA samples from 300,000 MVP participants, researchers have singled out a handful of genetic mutations that govern cholesterol levels in adults, and that may inform the development of drugs for diabetes and cardiovascular disease. Mutations in the ANGPTL4 gene affected the development of diabetes, and the researchers hope a drug can be developed that will mimic the beneficial mutation in that gene. ([Nature Genetics](#),

November 2018)

• **Air pollution contributes significantly to diabetes around the world**, found a study by VA St. Louis Health Care System researchers. Outdoor air pollution, even at levels that are considered safe, can lead to an increased risk of diabetes. Researchers analyzed the records of 1.7 million Veterans for the study, along with data from the EPA and NASA on airborne particulates. They estimate that pollution contributes to 14% of new diabetes cases in a year. Previous research had shown a link between air pollution and diabetes, but not the extent of the risk. ([Lancet Planetary Health](#), July 2018)

• **Many patients with diabetes show early signs of chronic kidney disease**, found a study by VA MidSouth Healthcare Network researchers. Patients could have undiagnosed kidney disease even before they are aware they have diabetes, according to the study. Out of nearly 37,000 Veterans with diabetes studies, 32% had evidence of chronic kidney disease before their diabetes diagnosis, based on two common measures of kidney function. ([PLoS One](#), Feb. 9, 2018)

For more information on VA studies on diabetes and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

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