



overview

Women's Health Overview

Diabetes and Its Effects on Body Systems

Diabetes is a chronic or long-lasting health issue in which the body has trouble keeping the sugar in the blood at normal levels. Blood sugar is also known as blood glucose. This imbalance of blood sugars happens when the body either lacks enough insulin, which comes from the pancreas and controls the amount of blood sugars in the system (type 1 diabetes), or when the body becomes resistant to insulin (type 2 diabetes). Gestational diabetes mellitus is short-term resistance to insulin that occurs from the hormones made by the placenta during pregnancy. Most women with GDM no longer have diabetes after they deliver their baby, but they are at risk in the future for type 2 diabetes so they will need to be monitored for that as they age.

It is estimated by the Centers for Disease Control and Prevention that 37 million Americans (about 1 in 10 people) have diabetes and 95% of those have type 2 diabetes. Unfortunately, 1 in 5 people are not aware they have diabetes.

Symptoms suggesting that someone may have diabetes include: increased thirst, frequent need to urinate, fatigue, blurred vision, and/or possibly tingling or pain in the hands and feet.

It is important for people to get diagnosed with diabetes given that uncontrolled diabetes can cause damage to many body systems such as the heart, kidneys, eyes and nerves. This damage is called diabetes complications. The good news is that with healthy lifestyle changes and good blood sugar control, the chance of getting diabetes complications is reduced.

Body systems and diabetes: Heart and brain Diabetes contributes to high blood pressure and high cholesterol. High cholesterol over years can form plaque (fatty deposits) causing narrowing of the arteries throughout the body. If those arteries get too narrow or a piece of plaque breaks loose in the heart, the person can have a heart attack. If it occurs in the brain, they can have a stroke.

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On Your Way to Preventing Type 2 Diabetes

If you're interested in preventing type 2 diabetes, the Centers for Disease Control and Prevention have created a guide that can help get you started. Prevention is important because type 2 diabetes is a serious, chronic health condition that can lead to other serious health issues.

The CDC's guide will help you take small steps that add up to a healthy lifestyle you can stick with and enjoy, including:

Starting point: What's motivating you to start this journey? What new version of yourself are you trying to create?

First stop: Set a weight loss goal

Second stop: Make a nutrition plan for healthier eating

Keep moving: Set a physical activity goal for healthier movement

Track your progress: Watch yourself succeed with a few easy steps

Prepare for the long run: Recognize the support you have to keep you going

By making some healthy changes, including eating healthier and getting active, you can prevent or delay type 2 diabetes and improve your physical and mental health overall.

Source: Centers for Disease Control and Prevention, "On Your Way to Preventing Type 2 Diabetes"



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newsletter is published quarterly for health care professionals and the general public with special interest in women's health issues by the Olson Center for Women's Health.

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From the Chairman

In this edition of our newsletter, Dr. Mack will discuss the effects of diabetes on women. In nonpregnant patients, diabetes can have profound effects on the eyes and kidneys and the overall risk of cardiovascular disease including hypertension, heart attacks and strokes. Controlling blood sugars is vital and can significantly reduce the health care risks mentioned above. The discovery of insulin by Banting and Best in 1921 revolutionized the care of diabetes and offered women an opportunity to improve their health and live longer lives. Because of the higher rates of mortality with diabetes many of these women perished before they had an opportunity to become pregnant.

While this topic is not limited only to pregnancy it is important to consider these patients as a particularly high-risk group. Most importantly, control of blood sugar is essential to optimize pregnancy outcomes. The risk of fetal abnormalities and miscarriage is significantly higher in those patients who have elevated blood sugars at the time of conception. It is fact that the rate of abnormal pregnancy outcomes in patients with well-controlled blood sugars at the time of conception is actually the same as pregnancy outcomes in women without diabetes.

If you or a family member have diabetes and are contemplating pregnancy, I urge you to discuss this with your health care provider and to work with them to control blood sugars. A successful pregnancy outcome is easier to achieve than you might think!

Carl V. Smith, MD, FACOG

Chairman
Department of Obstetrics and Gynecology
College of Medicine
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research news

Diabetes is Linked to Heart Disease

Diabetes mellitus (type 1 diabetes) is one of the most rapidly increasing diseases in the world. The Centers for Disease Control and Prevention report that in 2022, approximately 11% of the U.S. population has DM. The diagnostic feature of DM is increased blood glucose levels. Prediabetic patients have blood glucose levels of 80 to 120 milligrams per deciliter (mg/dL) and diabetic patients have glucose levels greater than 120 mg/dL. Although DM has many adverse effects on our bodies, it increases the risk of heart failure by 11-fold in individuals under 45 years of age and 3 to 8-fold in individuals 45 to 65 years of age.

Diabetes mellitus is often referred to as a silent killer because its effects on the heart are not noticeable until the advanced stages of the disease. Clinical studies reported in eight randomized clinical trials on heart failure patients showed that in patients with advanced-stage DM, intense control of blood glucose levels with medication alone does not reduce the risk of heart failure. **Presently, there is no cure for diabetes-induced heart failure.** Therefore, new research on the molecular mechanisms underlying the causes of heart disease is needed to develop therapeutic targets to prevent and/or treat diabetes-induced heart failure.

The research program of Paras K. Mishra, PhD, in the Department of Cellular and Integrative Physiology at the University of Nebraska Medical Center, focuses on understanding the cellular mechanisms that result in diabetes-induced heart disease. Dr. Mishra's goal is to develop novel therapeutic strategies to treat patients with diabetes that have heart disease. His laboratory is pursuing several interrelated projects that are funded by the National Institutes of Health and the American Heart Association.

Research in Dr. Mishra's laboratory is working to provide new therapeutics to treat the heart in patients with diabetes. His research has identified specific molecules that are depleted in these patients. He has developed experimental models to test whether the replacement of the depleted molecules will treat or prevent heart disease in patients with diabetes. Dr. Mishra is collaborating with a bioengineer to develop approaches to deliver the therapeutic molecules directly to the heart, lessening side effects on other tissues.

Dr. Mishra's laboratory is also working to improve energy efficiency in the heart of those with diabetes.

The heart requires large amounts of energy to continuously pump blood to the body. Due to impaired glucose metabolism in patients with diabetes, the heart utilizes fat to compensate for the loss of glucose-generated energy. However, the use of fat stresses the heart leading to impaired cardiac function, a hallmark of the heart of those with diabetes. Of considerable interest is research showing how a ketogenic diet may actually improve heart function in patients with diabetes, and how ketone body metabolism may improve energy efficiency in the heart of those patients.

Another project in Dr. Mishra's laboratory is focused on examining the muscle cells of the heart, the cardiomyocytes. Prolonged DM results in the death of heart muscle cells, which is irreversible in the adult heart. Research to understand the mechanism of cell death in the heart is essential for preventing and treating heart disease in those with diabetes.

Contributed by Paras K. Mishra, PhD
UNMC Department of Cellular and Integrative Physiology

Diabetes *continued from pg. 1*

Fortunately, a healthy diet, exercise, blood sugar control, blood pressure control, and the use of cholesterol-lowering medicine can reduce the risk of heart attacks and strokes in people with diabetes.

Body systems: Kidneys Uncontrolled diabetes and high blood pressure over a period of years can also damage the blood vessels in the kidneys which may lead to reduced kidney function called chronic kidney disease. When this becomes advanced, it is called kidney failure and requires dialysis or a kidney transplant. The CDC estimates that 30% of people with type 1 diabetes and 10% to 40% of people with type 2 diabetes will develop kidney failure. Again, good control of blood sugars, blood pressure, and cholesterol markedly reduces the chances of chronic kidney disease and renal failure.

Body systems: Eyes Years of high blood sugar can damage the blood vessels and the retina in the eye which is called diabetic retinopathy. This results in vision problems or even blindness. Fortunately, good glucose control reduces the chances of these complications.

Body systems: Nerves Uncontrolled blood sugars may impact the nerves that provide sensation to the hands and feet causing nerve damage called diabetic peripheral neuropathy. When circulation to the feet is poor, a sore on the foot is less likely to heal. This makes a person at high risk for a foot infection, which if not treated, is a risk for amputation. Other nerves may also be affected such as those nerves that help the stomach and intestines digest food. When those nerves are damaged it is called diabetic gastroparesis. Thankfully, good blood sugar control over a person's lifetime markedly reduces the chance of these nerve complications. If these nerve problems do occur there is medicine to reduce the discomfort associated with these problems.

Body systems: Skin, sexual organs High blood sugars, in combination with high blood pressure, can cause poor blood flow throughout the body causing nerve damage. If there is poor blood flow to the penis in a man, it can cause erectile dysfunction. In women, poor blood flow may impact the blood vessels to the uterus which can impact a pregnancy. However, good glucose and blood pressure control markedly reduce the chances of these problems.

Summary Diabetes that is not controlled causes problems for our body systems. These problems affect the blood vessels, kidneys, heart, brain, eyes, nerves, digestion, skin and sexual organs. However, we know that the combination of good glucose levels, blood pressure control, and cholesterol control significantly reduce the chances of these complications. Patients should work closely with their doctor to determine the best treatment plan for them and to ensure they are being watched for complications.

Contributed by Lynn Mack, MD

*UNMC Department of Internal Medicine
Division of Diabetes, Endocrinology and Metabolism*



**OLSON CENTER
FOR WOMEN'S HEALTH**

Mission Statement

The mission of the Olson Center for Women's Health is to provide a national comprehensive health science center at the University of Nebraska Medical Center (UNMC). Based in the Department of Obstetrics and Gynecology, the center enables UNMC to make distinctive strides in education, research and service through innovative approaches to women's health issues.

Want More Information?

Visit our website: **OlsonCenter.com**

Learn more about our health care providers, services and programs available at the Olson Center for Women's Health. Our website also offers women's health information. Here are a few topics:

- Breastfeeding
- Breast health and disease
- Cardiovascular health
- Gastrointestinal health
- Gynecologic health
- Incontinence
- Reproductive endocrinology/infertility
- Pregnancy
- Wellness
- Incontinence

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25th Annual



Omaha
Women's
Health & Wellness
Conference

Adaptability, Resiliency and Hope

Friday, Oct. 7, 8 a.m. to 4:30 p.m.

We are committed to your safety. Due to the COVID-19 pandemic, we will offer a limited number of in-person registrants and a larger number of virtual registrants.

Call the Olson Center for Women's Health at **402.559.6345** or go to **OmahaWomensHealthAndWellness.com** for more information.

A day of education for the community. Continuing education will be provided for nurses and social workers.

In-person live attendance prices:

General registration - \$75, Nurses and social workers - \$110

Virtual live attendance prices:

General registration - \$15, Nurses and social workers - \$50

What is the **Pancreas**?

The pancreas is a part of your digestive system and sits in the back of the abdomen (belly). It is about six inches in length and is surrounded by the stomach, spleen, liver, and gallbladder. It is considered both an organ and a gland. As a gland, it performs exocrine functions, meaning it releases its products into a system of ducts and not directly into the bloodstream. As an organ it performs endocrine functions, meaning its products are released directly into the bloodstream.

Exocrine function:

In the exocrine system, the pancreas releases several different enzymes to help break down your food. These include lipase, amylase, and protease.

Lipase: Helps to absorb fat- and fat-soluble vitamins (vitamin A, D, E and K). If a person doesn't have enough lipase, they can have trouble absorbing fat and vitamins. Symptoms of this could be diarrhea or fatty stools.

Amylase: Helps in breaking down carbohydrates and starches into sugar to help the body make energy. When there is not enough amylase a symptom could be diarrhea.

Protease: Helps break down protein as well as helps control the growth of bacteria and yeast within the intestines. If someone does not have enough protease, they can develop an imbalance in good bacteria in the intestines which can lead to loose stools or diarrhea.

Endocrine function:

In the endocrine system, the main job of the pancreas is to help control blood sugar by producing insulin and glucagon. It also helps produce amylin and gastrin which further aid in digestion and appetite.

Insulin: Is made in the beta cells of the pancreas. This hormone helps lower blood sugar levels.

Glucagon: Is made in the alpha cells. This hormone helps bring blood sugar levels up.

Gastrin: This is largely produced in the stomach but the pancreas does have a few G-cells that help produce this hormone. Its main job is to produce stomach acid for food breakdown.

Amylin: This is produced in the beta cells and helps to tell your stomach when to empty into the small intestine and go on to the next step in digestion. This is also helpful in controlling your appetite.

Conditions of the pancreas:

Type 1 diabetes: The beta cells are poorly functioning or nonfunctioning and do not produce insulin which leads to elevated blood sugar. This can make people feel ill and lead to various complications and damage to other organs in the body.

Type 2 diabetes: The beta cells still produce insulin but the body does not use the insulin correctly which leads to elevated blood sugar and similar complications as type 1 diabetes, if not managed properly.

Pancreatitis: This is inflammation of the pancreas. This occurs when the enzymes created by the pancreas start to work too early within the pancreas itself, rather than when they reach the small intestine where they are used to break down food. This can be caused by excessive alcohol use as well as gallstones blocking the duct where enzymes travel to the small intestines.

Pancreatic cancer: This occurs when cells start to regenerate and mutate to become cancerous. People who smoke cigarettes are at higher risk of developing this type of cancer.

Pancreas health/treatment:

To keep your pancreas healthy, you should try to eat a healthy and lower-fat diet as well as partake in regular physical activity to help maintain a healthy weight. It is also good to avoid smoking and heavy alcohol use. If you or your doctor suspects a problem with your pancreas, they can perform multiple tests including blood tests, stool tests, and imaging tests (ultrasound, CT, MRI, ERCP, or angiography). When a diagnosis has been made, a treatment plan can be determined.

Contributed by Katie Drey, PA-C

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New Wednesday Morning Urogynecology Clinic with Amandeep Mahal, MD, FACOG



Amandeep Mahal, MD, FACOG, is board certified in female pelvic medicine and reconstructive surgery (urogynecology). He received his medical degree from Creighton University in Omaha, Nebraska. He completed his residency in obstetrics and gynecology at the University of Iowa in Iowa City before pursuing a pelvic reconstructive fellowship at Stanford University in Palo Alto, California. Dr. Mahal is a fellow of the American College of Obstetricians and Gynecologists. His specialties include minimally invasive, natural orifice surgery as well as voiding dysfunction, and post-menopausal sexual health management.

When it comes to patient care, Dr. Mahal believes that medical decisions regarding treatment, surgery, and possible research participation should be driven by the patient and not by the doctor. At his appointments, the top priority is answering questions so that patients better understand the diagnosis and conditions. With better understanding, patients can make an informed decision with the guidance of their care team.

With today's dynamic health care, emerging treatments are adding to our abilities to improve our quality of life. Dr. Mahal prides himself on staying up on national trends and bringing new therapies to patients.

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