

# NIH News in Health

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## Managing Diabetes New Technologies Can Make It Easier

Your body takes care of countless tasks for you. You might not notice all it's doing to keep you healthy until something goes wrong. Diabetes is a serious disease that happens when your body has trouble managing and using blood glucose, a sugar that your body uses as fuel. When you have diabetes, you must actively take on this process yourself. New technologies are being tested to make it easier for you to control diabetes and to help you stay healthy.

More than 100 million Americans are living with diabetes or prediabetes, a condition where blood glucose levels are higher than normal, but not high enough to be considered diabetes. People with diabetes must frequently check their blood glucose (or blood sugar) and take quick action if it gets too high or low. They must also constantly consider how all meals, physical activity, and things like stress will affect their blood glucose.

**Types of Diabetes** • How people with diabetes manage their blood glucose levels depends, in part, on the type of diabetes they have. The most common are type 1, type 2, and gestational diabetes.

With type 1 diabetes, your body



doesn't make enough of a **hormone** called insulin. Insulin signals the body's cells to let glucose inside. The body can't produce enough insulin because the immune system, your body's defense against germs and foreign substances, mistakenly attacks and destroys the cells in your pancreas that make insulin.

Type 2 diabetes is the most common. It occurs when either your body's cells have trouble using insulin or your body doesn't produce enough insulin to handle the glucose in your blood.

Both types can develop at any age. Type 1 is most often diagnosed in children and young adults, while type 2 shows up most in middle-age and older people. Gestational diabetes occurs only during pregnancy, but increases your chances of developing type 2 later in life.

Diabetes symptoms can vary by type. Some shared symptoms

include increased thirst, hunger, and urination. Symptoms of type 1 can start quickly, over a few weeks. Type 2 symptoms tend to develop slowly over years, making them less noticeable.

**Blood Glucose Control** • Many people with diabetes check their blood glucose with a blood glucose meter. This portable machine measures how much glucose is in the blood. You get a drop of blood by pricking the side of your fingertip with a small, specialized needle. Then you apply the blood to a test strip. The meter shows you how much glucose is in your blood at that moment.

People with type 1 diabetes, and some people with type 2, correct and manage their blood glucose with injections of synthetic insulin. A missed, or miscalculated, dose can lead to serious complications, immediately and over time. Diabetes increases your risk for blindness, heart disease, stroke, kidney failure, and amputation.

"It's a significant burden to self-test sugar levels several times a day, count carbohydrates with each meal, take into account the impact of physical activity, and then calculate

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### Definitions

#### Hormone

A substance produced in one part of the body to signal another part to react a certain way.

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the amount of insulin you need to inject multiple times a day with a syringe or the help of an insulin pump,” explains Dr. Guillermo Arreaza-Rubín, who heads NIH’s Diabetes Technology Program. Any error in this management may lead to life-threatening complications like severe hypoglycemia, which is very low blood glucose.

“Hypoglycemia is one of the main reasons people with type 1 visit hospital emergency rooms every day,” Arreaza-Rubín says. “It happens more frequently during the night and is a major cause of fear and anxiety among people with diabetes and their families.”

**Help From Technology** • NIH funded-scientists are testing promising technologies to help people better manage diabetes. For example, “artificial pancreas” systems monitor blood glucose levels and provide insulin, or a combination of insulin and another important hormone, automatically. The devices vary in how easy they are to set up and use.

“Our device, called the iLet, is designed to minimize the guesswork

and time drain that comes with managing type 1 diabetes,” says Dr. Edward Damiano, a biomedical engineering expert at Boston University who’s co-founded a company to further develop the technology. The device only requires that you type in your body weight to get started. “The system does the heavy lifting of regulating blood glucose, freeing up the user to live a less burdened and more spontaneous life.”

Previous studies have shown that artificial pancreas systems can be safer than the current standard for insulin delivery. Several different devices are now being tested in more people for longer periods of time. Researchers are looking at safety, user-friendliness, the physical and emotional health of the participants, and cost.

Safety is a priority for researchers. “When people with type 1 exercise, their blood glucose can respond in unpredictable and potentially dangerous ways,” explains University of Virginia engineer Dr. Marc Breton. He led a recent study that showed an artificial pancreas system improved glycemic control and reduced hypoglycemia in adolescents with type 1 diabetes as they participated in winter sports, like skiing and snowboarding.

“The artificial pancreas performed very well in an extremely challenging environment,” he says. “Eventually, it may allow people with diabetes the freedom to participate safely in physical activities that they likely avoided in the past.”

One FDA-approved artificial pancreas is already available for people with diabetes. Devices that are more fully automated may become available to the public within the next couple years. Researchers are considering how to use these systems for people with type 2, gestational diabetes, and

**Ask Your Doctor**

- What type of diabetes do I have?
- How do I best manage my type of diabetes?
- How and when do I test my blood sugar?
- What are the benefits and risks of any medications or treatments?
- Can you suggest a healthy meal plan and safe ways to be more active?
- How often should I schedule checkups?
- Are there new technologies that can help me manage my type of diabetes?
- Would a clinical trial (research study) be right for me?

other conditions involving elevated blood glucose levels.

Other scientists are taking different approaches to replace insulin more effectively. For example, “smart insulins” would become active only when needed. Researchers are also looking for ways to regenerate or replace insulin-producing cells—and to stop the body from attacking them.

“These technologies will help make managing diabetes easier and will help make people who use them healthier,” says Damiano. “I see them as a bridge to a cure for type 1 diabetes.”

While future tools may make it easier to manage your diabetes, you can learn how to manage diabetes with the tools we have now to live a long, healthy life. Medications, glucose monitors, and insulin pumps are all available now to help people with diabetes. If you have diabetes, talk with your health care provider about your options. ■

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**Web Links**

For more about diabetes, see “Links” in the online article: [newsinhealth.nih.gov/2017/12/managing-diabetes](http://newsinhealth.nih.gov/2017/12/managing-diabetes)

# Battling a Bulging Hernia

## Don't Ignore Your Groin Pain

Usually, the wall of the abdomen is strong. The muscles keep your intestine in place. But if there's a weak spot, the intestine can push through and form a hernia. A person may be born with a weakness there, or the weakness may develop over time later in life.

"It's like when you look at an old tire on a car and you see kind of a bulge on the sidewall of the tire. That's because there's a weakness in the wall of the tire. And the air is pushing the wall of the tire outward to create that bulge," says Dr. Dana K. Andersen, an NIH hernia expert.

A hernia developing in the abdomen is extremely common. Babies, children, and adults get them. Most of the time, hernias are found in men over 40.

Can lifting heavy objects give you a hernia? Maybe if you already have a weakness in the wall of your abdomen.

"The majority—three-quarters—of abdominal wall hernias are in the groin," Andersen says. The groin region is the lower abdomen.

The first sign of a hernia is a small bulge from the lower abdomen. You may notice it only when you stand

up, cough, jump, or strain. That's because those activities increase the pressure within your abdomen. That increased pressure can make a part of your intestine pop out of an area of weakness. When you lie down, the bulge may go away.

If you think you may have a hernia, ask your doctor. A doctor can usually detect a hernia during a physical exam. Your doctor can rule out other conditions that cause bulges or lumps.

If the bulge is very soft, your doctor may be able to massage the intestine back into the abdomen. A small, soft hernia that does not cause pain may not need treatment right away.

The doctor may suggest watching and waiting for changes, like pain, to develop. If a hernia is painful or large, your doctor may suggest you see a surgeon for advice. You may need surgery to repair the hernia.

If your doctor can't massage the intestine back into the abdomen, that means it's trapped. A trapped intestine is dangerous because its blood supply can be cut off or strangulated. "The rim of the defect is forming a sort of a noose around the abdominal contents," Andersen explains. "If that noose is tight enough so that the loop of intestine can't be eased back through the defect, then the concern is that the intestine itself could be injured by strangulation."



A strangulated hernia can be very serious and even life threatening. Symptoms include severe pain that doesn't go away, nausea, and vomiting.

Surgery is usually needed if the intestine is trapped—and emergency surgery if it's strangulated. A hernia is one of the most common reasons for surgery in the United States. "It's a successful and low-risk procedure done about 800,000 times a year in the United States," Andersen says.

If you think you may have a hernia, talk with your doctor. And check out the tips in Wise Choices for how to keep a hernia from getting worse. Keep in mind that anyone with sudden pain in the groin should immediately seek medical help. ■



### Wise Choices

If you have a hernia, try to keep it from getting worse:

- Avoid heavy lifting when you can. Lifting puts stress on the groin.
- When you must lift, don't bend over. Lift objects by using the legs, not the back.
- Eat high-fiber foods and drink plenty of water. This helps prevent constipation and straining during bowel movements.
- Maintain a healthy body weight.



### Web Links

For more about hernias, see "Links" in the online article : [newsinhealth.nih.gov/2017/12/battling-bulging-hernia](https://newsinhealth.nih.gov/2017/12/battling-bulging-hernia)



## Health Capsules

For links to more information, please visit our web site and see these stories online.

### Your Family's Health History

Get to know your family better this holiday season by talking about health. Do any health conditions seem to run in your family? For example, have many people in your family had diabetes, cancer, a heart attack, or anything else? Now is the time to find out. Ask about the health history of your grandparents, parents, aunts, uncles, and the rest. You can share this information with your health care team.

Knowing your family's health history can help your health care

team provide better care for you. It helps them know which medical tests to suggest for detecting early warning signs of certain diseases. Early testing helps because doctors can try to prevent a disease or treat it as soon as possible.

An online tool makes it easy to collect the information in one place. It's called "My Family Health Portrait." It's simple to fill out. And it's fast. It takes about 15 to 30 minutes.

The online tool is private. It

doesn't keep a record of your data. It's available only to you for downloading or printing. After that, it's up to you whether you want to share the information with family members or provide it to your health care team.

The tool was developed by the U.S. Surgeon General. This national health campaign to share family health history was launched in 2004 and has been active every year since. For more information, visit [www.genome.gov/17516481](http://www.genome.gov/17516481). ■

### How Do Medical Scans Work?

Is your doctor sending you for an MRI, a CT scan, or other medical scan? Do you know what to expect? Or how the test results can help with making a diagnosis or planning treatment? There's a free app from NIH to answer your questions. It's called "Understanding Medical Scans." You can use it anywhere to

help you prepare for a medical scan.

The app describes MRI, CT, ultrasound, PET, and X-ray. Colorful images and videos show you what the machines look like. You can also see what kinds of images they make.

This app has lots of information that will help you prepare for a medical scan. Plus, you'll be

better able to ask your health care team specific questions about the procedure.

Download the app for free to your iOS or Android mobile device. You can find the links by visiting [www.nibib.nih.gov/understanding-medical-scans-app](http://www.nibib.nih.gov/understanding-medical-scans-app). ■



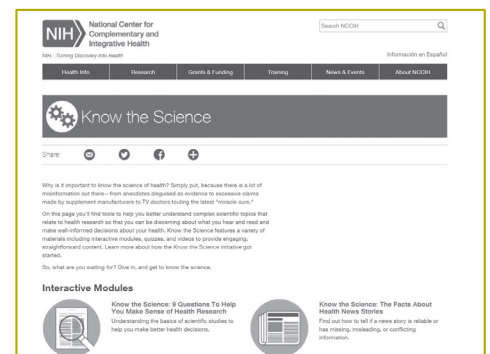
### Featured Website

Know the Science of Health

[nccih.nih.gov/health/know-science](http://nccih.nih.gov/health/know-science)

You probably often hear or read about the results of health research studies. Want to better understand the complex science that relates to health research? Explore the interactive modules, quizzes, and videos created by NIH's National

Center for Complementary and Integrative Health. These tools can help you weigh what you hear and read. Knowing the science can help you make educated decisions about your health.



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