Support and Education: Handout 9

Introduction: At each follow-up visit the D2d study will provide you with a handout on the lifestyle changes you can make to reduce your risk for diabetes. Research shows that losing 5% to 7% of your body weight (about 10 to 14 pounds for a 200-pound person) and getting at least 150 minutes each week of physical activity can help you prevent or delay type 2 diabetes. We hope you find the information in these handouts helpful.

Understanding Pre-diabetes

Blood sugar and energy

Your body changes much of the food you eat into a type of sugar called glucose. This sugar travels to all the cells in your body. Your body cells need this sugar to give you the energy you need to be healthy.

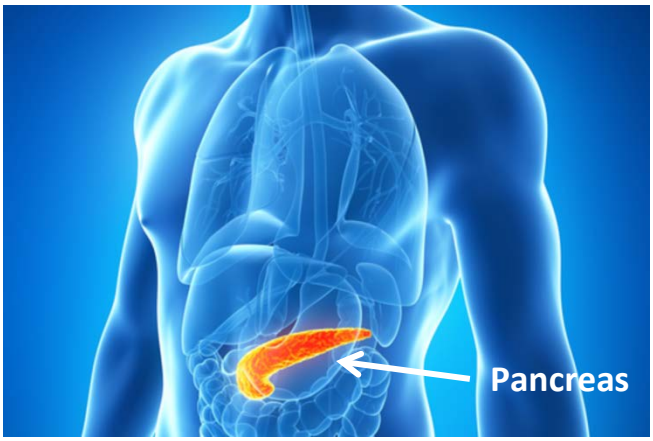
What is insulin?

Insulin is a hormone, or chemical, that your body makes to help move the sugar from your blood into your cells where it can be used. Insulin is made in the ***pancreas,*** an organ located behind the stomach. Without insulin, your cells can't get the sugar they need to keep you healthy. By moving sugar from your blood into your body's cells, insulin helps keep your blood sugar level in a good range (not too high; not too low). When your blood sugar levels are regularly in the high range and your body is not able to keep your blood sugar levels in a good range, you have diabetes.

Glucose

Insulin

Cell



How does insulin affect blood sugar levels?

After a meal, your blood sugar level rises, and the pancreas reacts by releasing insulin into the blood. Insulin and sugar then both travel to cells throughout your body. Insulin works like a key that allows the sugar to enter the cells.

Adapted from NIDDK's Health Information website on Diabetes

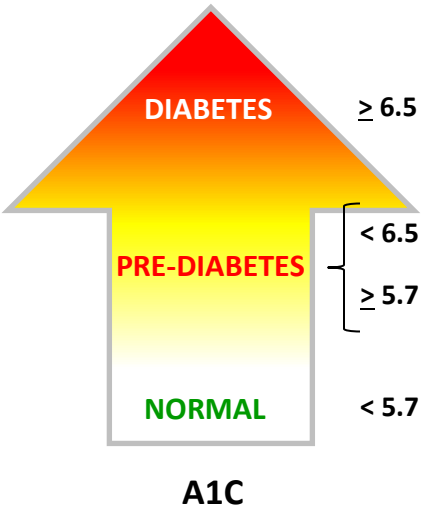
How does insulin affect blood sugar levels?

- Insulin helps your muscle, fat, and liver cells absorb sugar from the bloodstream
- Insulin helps your liver and muscle tissue store excess sugar so it can be used later for energy (for example when you need extra energy for exercise)
- Insulin also lowers blood sugar levels by sending a signal to the liver to produce less glucose

In a healthy person, all of these functions allow blood sugar and insulin levels to remain in the normal range.

What is pre-diabetes?

Pre-diabetes is a condition in which blood sugar (or A1c, which reflects your average blood sugar level) is higher than normal, but not high enough for a diagnosis of diabetes.



In pre-diabetes, muscle, fat, and liver cells may not respond properly to insulin, making it harder for them to absorb sugar from the bloodstream.

This is called ***insulin resistance***. With insulin resistance, the body needs more insulin than normal to help sugar enter cells.

The pancreas tries to keep up with this increased demand for insulin by producing more. As long as it is able to produce enough insulin to overcome the insulin resistance, blood sugar levels stay in the healthy range.

Adapted from NIDDK's Health Information website on Diabetes

But over time, if the pancreas cannot keep up with the body's increased need for insulin, excess sugar builds up in the bloodstream, leading eventually to type 2 diabetes. If your blood sugar stays too high, for too long, it can lead to serious health problems, especially with the kidneys, heart, eyes, and feet.

What causes insulin resistance?

- **Excess Weight**

  Some experts believe being overweight, and especially having excess fat around the waist, is a primary cause of insulin resistance. It is thought that excess belly fat produces hormones and substances that can cause long-lasting inflammation in the body and may trigger insulin resistance.

- **Physical Inactivity**

  Studies show that after exercising, muscles become more sensitive to insulin, reversing insulin resistance and lowering blood sugar levels. Exercise also helps muscles absorb sugar without the need for insulin. The more muscle a body has, the more sugar it can absorb and use to control blood glucose levels.

- **Smoking**

  When you smoke, your body may be less able to respond to insulin. If you smoke, you may have a greater chance of developing diabetes.

- **Sleep Problems**

  Studies show that untreated sleep problems, especially sleep apnea, can increase the risk of insulin resistance and type 2 diabetes. Sleep apnea is a common disorder in which a person's breathing is interrupted during sleep. People may often move out of deep sleep and into light sleep when their breathing pauses or becomes shallow, resulting in poor sleep quality.

Adapted from NIDDK's Health Information website on Diabetes

Putting pre-diabetes in reverse

What steps can you, as a D2d study participant, take to help reverse insulin resistance and pre-diabetes?

Most people with pre-diabetes develop type 2 diabetes within 10 years, unless they change their lifestyle.

But here's the good news:

By making those lifestyle changes that include losing 5 to 7 percent of your body weight (about 10 to 14 pounds for people who weigh 200 pounds) along with changes in your diet and level of physical activity, you can actually ***reverse*** insulin resistance and pre-diabetes, thus preventing or delaying type 2 diabetes. You can decrease your risk by:

- Eating a healthy diet and reaching and maintaining a healthy weight
- Increasing your physical activity
- Not smoking
- Getting adequate sleep

And, through your participation in D2d, you are helping physicians at over 20 research sites across the United States to see whether daily vitamin D supplementation can delay the onset of diabetes in people who are at increased risk. Understanding whether vitamin D has an effect on glucose (sugar) metabolism may lead to new treatments for diabetes.

Adapted from NIDDK's Health Information website on Diabetes