November 2018 | Patients

Spotlight on Health

Insulin Resistance and Diabetes

Glucose is a sugar that is an important source of energy for our bodies. It comes from the foods we eat—even foods that aren't sweet. Too much glucose in the blood can lead to diabetes. Type 2 diabetes is the most common type of diabetes, and it usually happens in people who are overweight or not very physically active.[1] In contrast, Type 1 diabetes is rarer. It is usually caused by the body mistakenly attacking cells that make insulin in the pancreas (discussed below). Other types of diabetes have different causes. Because diabetes causes serious health problems, it is important to know your risk of developing it.

Type 2 diabetes doesn't happen overnight. It begins with a condition called insulin resistance. This newsletter will discuss insulin resistance and diabetes, and how testing for insulin resistance can tell if you are likely to get diabetes. The good news is that you can make lifestyle changes that can slow down, or stop, insulin resistance and diabetes.

Insulin Resistance, Prediabetes, Diabetes, and Other Medical Conditions

The amount of glucose in the blood is controlled by a hormone called insulin. Insulin makes it possible for your body to use the glucose that comes from food to make energy. Without enough insulin, or if your body does not respond to insulin, glucose builds up in your blood. Insulin is made by an organ called the pancreas.

For people with insulin resistance, cells in the body become less sensitive to insulin. To make up for this, the pancreas works harder to make more insulin and keep the glucose level from getting too high. Eventually, the pancreas makes as much insulin as it can. When this happens, the amount of glucose in the blood begins to rise. Therefore, insulin resistance may lead to prediabetes (elevated blood glucose) and then type 2 diabetes (high blood glucose).This slow process can take 10 to 15 years.[1] Because insulin resistance, prediabetes, and diabetes may not cause symptoms, many people have these conditions without knowing it.

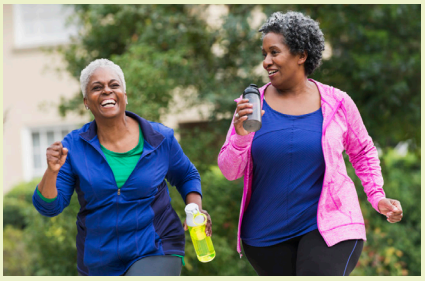
Insulin resistance and diabetes are a huge problem in the United States. More than 60 million people have insulin resistance.[2] Around 1 in 3 people has prediabetes.[3] More than two-thirds of people with prediabetes will develop type 2 diabetes within 10 years.[4] Altogether, around 1 in 10 people have type 2 diabetes.[3]

Diabetes causes serious health problems, including heart disease, stroke, and damage to blood vessels leading to amputation, kidney failure, and loss of vision. Other medical conditions related to insulin resistance include heart and liver disease, polycystic ovarian syndrome, Alzheimer disease, and some types of cancer.[5]

Why People Become Insulin Resistant

The most common reason people become insulin resistant is having too much body fat.[1] This creates a vicious circle: having too much body fat increases insulin resistance, and too much insulin leads to more body fat![1]

People who develop insulin resistance are generally the same people who will develop type 2 diabetes (see Sidebar on this page).



Who Develops Insulin Resistance

Anyone can develop insulin resistance and type 2 diabetes, but some factors increase your risk. These include[3,4]

- Age: 45 years or older
- Race: African American, Hispanic/Latino American, Native American, Pacific Islander, or Asian American
- Little physical activity: less than 10 minutes per week of moderate or vigorous activity
- Being overweight or obese
- High blood pressure (140/90 mm Hg or greater)
- Low levels of high-density lipoprotein (HDL) cholesterol in your blood (less than 35 mg/dL)
- High levels of triglycerides in your blood (greater than 250 mg/dL)
- A first-degree relative with diabetes
- A history of cardiovascular disease
- Gestational diabetes or polycystic ovary syndrome

Treating Insulin Resistance

Lifestyle changes can reverse insulin resistance and delay or prevent type 2 diabetes.[6] The earlier changes are made, the more effective they can be. Eating less and increasing exercise helps you lose weight. Exercise also makes muscles more sensitive to insulin, so less insulin is needed. Eating fewer carbohydrates (eg, cakes, bread, candy) also decreases the amount of insulin that cells need.

The Diabetes Prevention Program can help people make these lifestyle changes. Classes are available throughout the country and can be taken in person or online (CDC.gov/diabetes/prevention/index.html). The classes teach people the most effective ways to lose weight and become more active. Some of the topics are

- Eating healthy
- Increasing physical activity
- Dealing with stress
- Tracking your meals and activity
- Setting goals
- Staying motivated

How Your Healthcare Provider Can Help

Diagnosing insulin resistance as early as possible is very important because lifestyle changes are so effective. However, insulin resistance is difficult to diagnose because there may be no obvious signs or symptoms. If signs or symptoms are present your healthcare provider may order blood tests. They may also order tests if they think you may be at risk for insulin resistance (or prediabetes or type 2 diabetes) based on your medical history (see Sidebar on previous page).

How the Laboratory Can Help

Quest Diagnostics offers a test that can tell your doctor if you are likely to have insulin resistance. The test measures the amount of insulin, and a related substance called C-peptide, in your blood. Even if your blood glucose is normal, levels of insulin and C-peptide go up if you have insulin resistance.[7] Quest also offers tests that tell if you're likely to develop type 2 diabetes, and tests that help diagnose prediabetes and type 2 diabetes.

Additional Information

For more information, visit Quest Diagnostics at QuestDiagnostics.com/home/patients/health-test-info/chronic-disease/diabetes/common-types.html, or these helpful websites:

- **National Institute of Diabetes and Digestive and Kidney Diseases:** NIDDK.nih.gov/health-information/diabetes/overview/what-is-diabetes/prediabetes-insulin-resistance
- **Healthline:** Healthline.com/health/diabetes/insulin-resistance-symptoms#glucose-tolerance-testing
- **Centers for Disease Control and Prevention:** CDC.gov/diabetes/library/spotlights/diabetes-insulin-resistance.html

References

1. Freeman AM, Pennings N. Insulin resistance. *StatPearls [Internet].* Treasure Island, FL: StatPearls Publishing; 2018. https://www.ncbi.nlm.nih.gov/books/NBK507839/. Updated June 26, 2018. Accessed September 1, 2018.
2. About diabetes. American Heart Association website. https://www.heart.org/en/health-topics/diabetes/about-diabetes. Accessed October 1, 2018.
3. National diabetes statistics report, 2017. Centers for Disease Control and Prevention website. http://www.diabetes.org/assets/pdfs/basics/cdc-statistics-report-2017.pdf. Accessed September 1, 2018.
4. Standards of medical care in diabetes—2017. American Diabetes Association website. https://professional.diabetes.org/sites/professional.diabetes.org/files/media/standardofcare2017fulldeckfinal_0.pdf. Accessed September 4, 2018.
5. Fung J, Berger A. Hyperinsulinemia and insulin resistance: scope of the problem. *J Insulin Resist.* 2016;1:a18.
6. National Diabetes Prevention Program. Centers for Disease Control and Prevention website. https://www.cdc.gov/diabetes/prevention/index.html. Updated August 10, 2018. Accessed September 6, 2018.
7. Abbasi F, Shiffman D, Tong CH, et al. Insulin resistance probability scores for apparently healthy individuals. *J Endocr Soc.* 2018;2:1050-1057.