

Diseases & Conditions

# Prediabetes

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## Overview

### What is insulin resistance? A Mayo Clinic expert explains

Learn about insulin resistance from Eleanna De Filippis, M.D., Ph.D., an endocrinologist at Mayo Clinic.

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Prediabetes means you have a higher than normal blood sugar level. It's not high enough to be considered type 2 diabetes yet. But without lifestyle changes, adults and children with prediabetes are at high risk to develop type 2 diabetes.

If you have prediabetes, the long-term damage of diabetes — especially to your heart, blood vessels and kidneys — may already be starting. There's good news, however. Progression from prediabetes to type 2 diabetes isn't inevitable.

Eating healthy foods, making physical activity part of your daily routine and staying at a healthy weight can help bring your blood sugar level back to normal. The same lifestyle changes that can help prevent type 2 diabetes in adults might also help bring children's blood sugar levels back to normal.

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## **Symptoms**

Prediabetes doesn't usually have any signs or symptoms.

One possible sign of prediabetes is darkened skin on certain parts of the body. Affected areas can include the neck, armpits and groin.

Classic signs and symptoms that suggest you've moved from prediabetes to type 2 diabetes include:

- Increased thirst
- Frequent urination
- Increased hunger
- Fatigue



- Blurred vision
- Numbness or tingling in the feet or hands
- Frequent infections
- Slow-healing sores
- Unintended weight loss

## When to see a doctor

See your health care provider if you're concerned about diabetes or if you notice any type 2 diabetes signs or symptoms. Ask your health care provider about blood sugar screening if you have any risk factors for diabetes.

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## Causes

The exact cause of prediabetes is unknown. But family history and genetics appear to play an important role. What is clear is that people with prediabetes

don't process sugar (glucose) properly anymore.

Most of the glucose in your body comes from the food you eat. When food is digested, sugar enters your bloodstream. Insulin allows sugar to enter your cells — and lowers the amount of sugar in your blood.

Insulin is produced by a gland located behind the stomach called the pancreas. Your pancreas sends insulin to your blood when you eat. When your blood sugar level starts to drop, the pancreas slows down the secretion of insulin into the blood.

When you have prediabetes, this process doesn't work as well. As a result, instead of fueling your cells, sugar builds up in your bloodstream. This can happen because:

- Your pancreas may not make enough insulin
- Your cells become resistant to insulin and don't allow as much sugar in

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## Risk factors

The same factors that increase the odds of getting type 2 diabetes also increase the risk of prediabetes. These factors include:

- **Weight.** Being overweight is a primary risk factor for prediabetes. The more fatty tissue you have — especially inside and between the muscle and skin around your abdomen — the more resistant your cells become to insulin.
- **Waist size.** A large waist size can indicate insulin resistance. The risk of insulin resistance goes up for men with waists larger than 40 inches and for women with waists larger than 35 inches.
- **Diet.** Eating red meat and processed meat, and drinking sugar-sweetened beverages, is associated with a higher risk of prediabetes.
- **Inactivity.** The less active you are, the greater your risk of prediabetes.

- **Age.** Although diabetes can develop at any age, the risk of prediabetes increases after age 35.
- **Family history.** Your risk of prediabetes increases if you have a parent or sibling with type 2 diabetes.
- **Race or ethnicity.** Although it's unclear why, certain people — including Black, Hispanic, American Indian and Asian American people — are more likely to develop prediabetes.
- **Gestational diabetes.** If you had diabetes while pregnant (gestational diabetes), you and your child are at higher risk of developing prediabetes.
- **Polycystic ovary syndrome.** Women with this common condition — characterized by irregular menstrual periods, excess hair growth and obesity — have a higher risk of prediabetes.
- **Sleep.** People with obstructive sleep apnea — a condition that disrupts sleep repeatedly — have an increased risk of insulin resistance. People who are overweight or obese have a higher risk of developing obstructive sleep apnea.
- **Tobacco smoke.** Smoking may increase insulin resistance and can increase the risk of type 2 diabetes in people with prediabetes. Smoking also increases your risk of complications from diabetes.

Other conditions associated with an increased risk of prediabetes include:

- High blood pressure
- Low levels of high-density lipoprotein (HDL) cholesterol, the "good" cholesterol
- High levels of triglycerides — a type of fat in your blood

## Metabolic syndrome

When certain conditions occur with obesity, they are associated with insulin resistance, and can increase your risk for diabetes — and heart disease and stroke. A combination of three or more of these conditions is often called metabolic syndrome:

- High blood pressure
  - Low levels of HDL
  - High triglycerides
  - High blood sugar levels
  - Large waist size
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## Complications


Prediabetes has been linked with long-term damage, including to your heart, blood vessels and kidneys, even if you haven't progressed to type 2 diabetes. Prediabetes is also linked to unrecognized (silent) heart attacks.

Prediabetes can progress to type 2 diabetes, which can lead to:

- High blood pressure
  - High cholesterol
  - Heart disease
  - Stroke
  - Kidney disease
  - Nerve damage
  - Fatty liver disease
  - Eye damage, including loss of vision
  - Amputations
- 

## Prevention

Healthy lifestyle choices can help you prevent prediabetes and its progression to type 2 diabetes — even if diabetes runs in your family. These include:



- Eating healthy foods
- Getting active
- Losing excess weight
- Controlling your blood pressure and cholesterol
- Not smoking

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By Mayo Clinic Staff

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