Pediatric Endocrinology Fact Sheet

Type 2 Diabetes: A Guide for Families

What is type 2 diabetes?

Diabetes is diagnosed when a high level of sugar is detected in the blood. Although there are other types of diabetes, including type 1 diabetes and gestational diabetes, type 2 diabetes is the most common form overall. It is less common in children, but it is occurring more frequently, typically among those who are overweight or obese as young as age 10 years and in teenagers.

It is estimated that more than 29 million people in the United States have diabetes. This is 1 in every 11 people. About 30% of these people do not know that they have diabetes. About 3,700 children in the United States are diagnosed with type 2 diabetes each year.

What causes type 2 diabetes?

Nutrients in food are broken down into a simple sugar called *glucose,* which is an important source of energy for the body. Glucose enters the cells in the body to become energy with the help of a hormone (a special messenger compound) called *insulin.* Insulin is made by cells (called *beta cells*) in an organ located behind the stomach called the *pancreas.* Muscle, fat, and the liver require insulin to take up glucose from the bloodstream and convert it to energy for the body.

Diabetes can occur if the body is unable to make insulin (type 1 diabetes) or if the body continues to make insulin but is unable to respond to the insulin (type 2 diabetes). As type 2 diabetes develops, the muscle, fat, and liver cells do not respond to insulin normally and become *insulin resistant.* Over time, the pancreas tires out and is not able to make enough insulin to keep typical blood sugar levels, and diabetes develops.

What are the symptoms of type 2 diabetes?

- Weight loss occurring without much change in diet
- Increased thirst
- Increased urination
- New-onset bed-wetting
- Fatigue
- Blurry vision
- Frequent infections
- Sores or cuts that are slow to heal
- Tingling or numbness in hands or feet

How is type 2 diabetes diagnosed?

The diagnosis is made when a person has a blood sugar level greater than 200 mg/dL at any time with symptoms of diabetes or if the following test results occur:

- Fasting blood sugar level equal to or greater than 126 mg/dL
- A blood glucose level equal to or greater than 200 mg/dL during an *oral glucose tolerance test*

Diabetes can also be diagnosed by a blood test that measures what percentage of the hemoglobin in the blood has glucose attached to it and reflects what the average blood sugar level has been in the blood over the prior 3 months. This test is called *hemoglobin* A_{1c} (HbA_{1c}), and a result that is equal to or greater than 6.5% is suggestive of diabetes. Before the development of full-blown type 2 diabetes, there can be a phase of prediabetes that is called *impaired glucose tolerance* (if the blood sugar level after eating is between 140 and 199 mg/dL) or another form of prediabetes called *impaired fasting glucose* (if the fasting blood sugar level is between 100 and 126 mg/dL).

Which children are at risk of type 2 diabetes?

Some people with high blood sugar levels do not have symptoms of diabetes; therefore, the American Diabetes Association recommends that children at high risk should be screened for diabetes when puberty starts, or by age 10 years, and then every 3 years thereafter. Children at high risk include those who are overweight and who also have any 2 of the following characteristics:

- First- or second-degree relative (mother, father, sister, brother, aunt, uncle, or grandparent) with type 2 diabetes
- Belong to one of the following groups:
  - American Indian
  - African American
  - Hispanic
  - Asian or Pacific Islander
- Signs of insulin resistance or conditions associated with insulin resistance
  - Acanthosis nigricans (darkening/thickening of the skin, usually on the back of the neck)
  - High blood pressure
  - Atypical blood cholesterol levels
  - Polycystic ovary syndrome (with irregular menstrual periods) in girls

How is type 2 diabetes treated?

- Increased exercise
- Healthy diet
- Metformin
- Insulin

Other medications to lower blood sugar levels might be used but have not been approved for use in children yet.

Lifestyle changes (modest weight loss and increased exercise) are a very central part of treating type 2 diabetes. For people at risk of the disease, lifestyle changes can prevent disease development. For those with newly diagnosed diabetes, lifestyle changes can produce a *remission* (temporary cure) of diabetes in some people. Metformin helps the liver, fat, and muscle cells respond to insulin better and lower the blood sugar level. If the blood sugar level remains high or increases after your child has been on an optimized dose of metformin, your child's doctor may start injections with insulin. In general, children with type 2 diabetes should strive to keep their HbA_{1c} result less than 7.5%.

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