

DIABETES

What Is Diabetes?

Diabetes is a disorder associated with a high sugar level in the blood. Normally, insulin moves the sugar from the blood into tissues where it is used for energy. In type 1 Diabetes Mellitus, there is a deficiency of insulin due to a disease of the pancreas. In type 2 Diabetes Mellitus, the body is resistant to the effect of insulin. In either case, because the sugar cannot go into the tissues, it stays in the blood and results in a high “blood sugar.” High blood sugar is defined as a fasting blood sugar (a sugar done after not eating for 8 hours) of 126 mg/dl or greater or a random blood sugar over 200 mg/dl. (mg/dl refers to the number of milligrams of sugar dissolved in a certain volume of blood -- either whole blood, or the liquid part of blood, plasma or serum)

TYPE 1 DIABETES

Some people simply can't make enough insulin. This is called type 1 diabetes. It usually sets in before age 20. People with type 1 diabetes must take daily doses of insulin to remain healthy. They should also eat a healthy diet, exercise, and avoid harmful habits such as smoking.

TYPE 2 DIABETES

Much more common is type 2 diabetes. People with type 2 diabetes can only make some insulin and the cells in their bodies don't respond to insulin any more. Type 2 diabetes usually develops later in life, but it can affect all ages – even children. People of every race can get type 2 diabetes. African Americans, Hispanics, and American Indians are more likely to have the disease than Caucasian Americans.

Signs & Symptoms

Prevention is a major component to detouring diabetes; however, it is also important to recognize the signs and symptoms of the disease.

TYPE 1 DIABETES

People with type 1 diabetes usually feel symptoms such as tend to urinate often, feel thirsty all the time, and feel hungry even when they eat.

TYPE 2 DIABETES

People with type 2 diabetes may have symptoms like those caused by type 1 diabetes. But symptoms can also be mild. Many people with type 2 diabetes don't realize they have a problem until the disease has taken root.

If you think you may have diabetes or exhibit the symptoms of diabetes, please visit your doctor to be tested for diabetes.

Conditions

DIABETES

What problems does a high blood sugar cause?

High sugar passes through the kidneys and causes an increased volume of urine. This can lead to increased thirst. Although the sugar is high in the blood, it cannot be used for energy by the body and people with out of control diabetes may lose weight (“starvation in the midst of plenty”). The high sugar can also damage parts of the body, either directly by combining with tissues in the body or indirectly by changing the chemistry of the body. By causing tissue damage, high sugar can lead to nerve damage, heart attacks, strokes, peripheral vascular disease (causing pain in the legs and ulcers in the feet), cataracts, loss of vision, and kidney damage.

Why do diabetics have an elevated fasting blood sugar if they have not been eating all night? Doesn't sugar in the blood come from carbohydrates in the diet?

The rise in sugar after meals does come from carbohydrates in the diet. However, the fasting blood sugar (the sugar which is measured first thing in the morning before breakfast) comes from another source. The liver stores sugar in the form of starch (glycogen). The liver normally releases sugar (which becomes available when the starch is broken down in the liver) during the night normally to prevent the blood sugar from going too low during sleep. However, just like a diabetic cannot control the rise in blood sugar after meals, a person with diabetes cannot control the rise in sugar which occurs at night from sugar released from the liver. There are medications (pills or insulin), which control the rise in sugar after meals and also the release of sugar from the liver.

OTHER RELATED CONDITIONS

What other conditions do diabetics need to be concerned about?

Type 2 diabetics are often (but not always) overweight, and they can have other conditions such as high blood pressure and high cholesterol. These conditions can also lead to strokes and heart attacks as well as peripheral vascular disease. The combination of uncontrolled diabetes, along with poorly controlled hypertension and high cholesterol, greatly increases the risk of vascular damage and the complications just mentioned. Cigarette smoking, which is also associated with vascular damage is bad for everyone and even more so for diabetics.

Prevention

Implementing physical activity into your daily routine can help prevent or delay type 2 diabetes among adults at high-risk of diabetes. Developing a lifestyle that incorporates healthy eating and nutrition choices can also help prevent type 2 diabetes and manage prediabetes.

What is prediabetes?

The good news is that people with prediabetes can reduce the likelihood of going on to diabetes if they control their carbohydrate intake and engage in regular physical activity. Although diabetes can appear without warning, most people go through “prediabetes” or “impaired glucose tolerance” before they develop overt diabetes (see question 1). This prediabetic state is defined as a fasting blood sugar between 100 mg/dl and 126 mg/dl, or a random blood sugar between 140 mg/dl and 200 mg/dl.

Who is at risk of developing diabetes?

People with a family history of diabetes are more likely to get this condition, but many people who have no family history get diabetes, and some people with a family history of diabetes never get the disease. Being overweight is associated with diabetes, and certain stresses such as infection, some endocrine disorders, and certain medications such as steroids have been associated with high blood sugar. It is likely that people who get diabetes under these conditions were “predisposed.” Pregnancy also is sometimes associated with the development of diabetes, but often the sugar returns to normal after delivery.

You may be more likely to get diabetes if one or more of the following risk factors are true:

1. You are 45 or older
2. You are overweight
3. You eat an unhealthy diet

4. You have a parent, brother, or sister with diabetes
5. Your family background is African American, American Indian, Asian American, Pacific Islander, or Hispanic American/Latino
6. You have had gestational diabetes
7. You have birth to at least one baby weighing more than 9 pounds
8. You have high blood pressure
9. Your cholesterol levels are higher than normal
10. You don't get enough exercise

Treatment

Diabetics should learn to count carbohydrates since carbohydrates in the diet contribute to high blood sugar. Physical activity is also important to diabetes treatment, because muscles that are put through regular exercise consume sugar more efficiently than muscles that are flabby.

What kind of medications are used to treat diabetes?

Type 1 diabetes, which is usually present in childhood but can first occur later in life, is caused by a lack of insulin. People with type 1 diabetes need to take insulin. Type 2 diabetes, which is usually present in adulthood, but is being seen more and more in children, is caused by resistance to the action of insulin. If physical activity and proper nutrition do not adequately control the blood sugar (good control is a fasting blood sugar less than 110 or an after meal blood sugar less than 140), then medication is needed. The type of medicine used depends on what is causing the diabetes. Medications used either increase the production of insulin from the pancreas or make the body more sensitive to insulin.

Why do some people with type 2 diabetes (see question 6) need to take insulin if they are able to make insulin in the first place?

Sugar is toxic to many things in the body (see question 2), including the pancreas, which makes insulin. If a person has long-standing, poorly-controlled diabetes with chronic elevation of the blood sugar, the pancreas cells, which make insulin are partly destroyed. This leads to insulin deficiency and the need to take insulin as a supplement to other diabetes medications (see question 6) or if the pancreas is making very little insulin, then insulin instead of pills is required (like a type 1 diabetic-see question 6).

What is new in the treatment of diabetes?

For diabetics who are dependent on insulin, pumps will be available that can read the blood sugar and pump in just the right amount of insulin. Researchers are look-

ing into ways to regenerate the cells in the pancreas that make insulin. Easier to use medications will allow the transplantation of insulin-producing cells to become more common than it is now. Certain drugs called incretins (already available) and another drug called Amylin (also available) work in complex ways to make the body respond better to the insulin that is available. Alternative ways of taking insulin are either available (inhaled insulin) or in development.

How can someone with diabetes know that everything is under control?

As already mentioned monitoring the sugar at home, as well as following the proper diet and engaging in regular physical activity, is important. At the physician's office another test called the A1c should be done. This test reflects the control of sugar over several months. A normal level is <6.0; a diabetic should aim for at least <6.5. Also, a test called micro albumin should be done. This screens for early kidney disease. Cholesterol and other fats, blood pressure, eyes, and feet should also be checked, and a simple nerve function test, called the monofilament test, should be performed.

REFERENCES

Rhoda H. Cobin, MD, MACE; Michael González-Campoy, MD, PhD, FACE; and Carol S. Guber, MS. *A Guide to Managing Diabetes*. 2007. American Association of Clinical Endocrinologists.

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