

Diabetic Problems: Family of Diabetes and Genetic Mutations

Abstract

Diabetes mellitus refers to a group of diseases that affect how the body uses blood sugar (glucose). Glucose is an important source of energy for the cells that make up the muscles and tissues. It's also the brain's main source of fuel.

The main cause of diabetes varies by type. But no matter what type of diabetes you have, it can lead to excess sugar in the blood. Too much sugar in the blood can lead to serious health problems. Chronic diabetes conditions include type 1 diabetes and type 2 diabetes. Potentially reversible diabetes conditions include prediabetes and gestational diabetes. Prediabetes happens when blood sugar levels are higher than normal.

Consuming a healthy diet throughout the life-course helps to prevent malnutrition in all its forms as well as a range of non-communicable diseases (NCDs) and conditions. However, increased production of processed foods, rapid urbanization and changing lifestyles has led to a shift in dietary patterns. People are now consuming more foods high in energy, fats, free sugars and salt/sodium, and many people do not eat enough fruit, vegetables and other dietary fibre such as whole grains.

A healthy diet may contain fruits, vegetables, and whole grains, and may include little to no processed food or sweetened beverages. The requirements for a healthy diet can be met from a variety of plant-based and animal-based foods, although a non-plant source of vitamin B12 is needed for those following a vegan diet. But the blood sugar levels aren't high enough to be called diabetes. And prediabetes can lead to diabetes unless steps are taken to prevent it. Gestational diabetes happens during pregnancy. But it may go away after the baby is born.

Introduction

Diabetes is on the rise worldwide, and is a serious, lifelong disease that can lead to heart disease, stroke, and lasting nerve, eye and foot problems. Let's talk about diabetes and the difference between the three types of diabetes [1]. So, what exactly is diabetes and where does it come from? An organ in your body called the pancreas produces insulin, a hormone that controls the levels of your blood sugar [2]. When you have too little insulin in your body, or when insulin doesn't work right in your body, you can have diabetes, the condition where you have abnormally high glucose or sugar levels in your blood. Normally when you eat food, glucose enters your bloodstream. Glucose is your body's source of fuel. Your pancreas makes insulin to move glucose from your bloodstream into muscle, fat, and liver cells, where your body turns it into energy. People with diabetes have too much blood sugar because their body cannot move glucose into fat, liver, and muscle cells to be changed into and stored for energy. There are three major types of diabetes [3]. Type 1 diabetes happens when the body makes little or no insulin. It usually is diagnosed in children, teens, or young adults. But about 80% of people with diabetes have what's called Type 2 diabetes. This disease often occurs in middle adulthood, but young adults, teens, and now even children are now being diagnosed with it linked to high obesity rates. In Type 2 diabetes, your fat, liver, and muscle cells do not respond to insulin appropriately. Another type of diabetes is called gestational diabetes. It's when high blood sugar develops during pregnancy in a woman who had not had diabetes beforehand. Gestational diabetes usually goes away after the baby is born [4].

Genes and family of Diabetes

As in type 1 diabetes, certain genes may make you more likely to develop type 2 diabetes. The disease tends to run in families and occurs more often in these racial/ethnic groups: African Americans, Alaska Natives, American Indians, Asian Americans, Hispanics/Latinos, Native Hawaiians, and Pacific Islanders

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Genes also can increase the risk of type 2 diabetes by increasing a person's tendency to become overweight or have obesity [4].

Genetic mutations

Monogenic diabetes is caused by mutations, or changes, in a single gene. These changes are usually passed through families, but sometimes the gene mutation happens on its own. Most of these gene mutations cause diabetes by making the pancreas less able to make insulin. The most common types of monogenic diabetes are neonatal diabetes and maturity-onset diabetes of the young (MODY). Neonatal diabetes occurs in the first 6 months of life. Doctors usually diagnose MODY during adolescence or early adulthood, but sometimes the disease is not diagnosed until later in life [5].

Cystic fibrosis NIH external link produces thick mucus that causes scarring in the pancreas. This scarring can prevent the pancreas from making enough insulin.

Hemochromatosis causes the body to store too much iron. If the disease is not treated, iron can build up in and damage the pancreas and other organs [6].

Symptoms

Diabetes symptoms depend on how high your blood sugar is. Some people, especially if they have prediabetes or type 2 diabetes, may not have symptoms. In type 1 diabetes, symptoms tend to come on quickly and be more severe [7]. Increased thirst, frequent urination, increased hunger, Unintended weight loss, Fatigue, Blurred vision, Slow-healing sores, frequent infections, Numbness or tingling in the hands or feet.

Areas of darkened skin, usually in the armpits and neck

Some of the symptoms of type 1 diabetes and type 2 diabetes are:

1. Feeling more thirsty than usual.
2. Urinating often.
3. Losing weight without trying.
4. Presence of ketones in the urine. Ketones are a byproduct of the breakdown of muscle and fat that happens when there's not enough available insulin.
5. Feeling tired and weak.

6. Feeling irritable or having other mood changes.
7. Having blurry vision.
8. Having slow-healing sores.

Causes of Diabetic problems

Diabetes occurs when your immune system, the body's system for fighting infection, attacks and destroys the insulin-producing beta cells of the pancreas. Scientists think type 1 diabetes is caused by genes and environmental factors, such as viruses, that might trigger the disease. Studies such as Trial Net External link are working to pinpoint causes of type 1 diabetes and possible ways to prevent or slow the disease [8].

Risk Factors of Diabetic problems

Weight: Being overweight or obese is a main risk.

Fat distribution: Storing fat mainly in your abdomen rather than your hips and thighs indicates a greater risk. Your risk of type 2 diabetes rises if you're a man with a waist circumference above 40 inches (101.6 centimeters) or a woman with a measurement above 35 inches (88.9 centimeters).

Inactivity: The less active you are, the greater your risk. Physical activity helps control your weight, uses up glucose as energy and makes your cells more sensitive to insulin [9].

Family history: The risk of type 2 diabetes increases if your parent or sibling has type 2 diabetes.

Race and ethnicity: Although it's unclear why, people of certain races and ethnicities including Black, Hispanic, Native American and Asian people, and Pacific Islanders are more likely to develop type 2 diabetes than white people are.

Blood lipid levels: An increased risk is associated with low levels of high-density lipoprotein (HDL) cholesterol the "good" cholesterol and high levels of triglycerides.

Age: The risk of type 2 diabetes increases as you get older, especially after age 35.

Prediabetes: Prediabetes is a condition in which your blood sugar level is higher than normal, but not high enough to be classified as diabetes. Left untreated, prediabetes often progresses to type 2 diabetes [10].

Pregnancy-related risks: Your risk of developing type 2 diabetes increases if you developed gestational diabetes when you were pregnant or if you gave birth to a baby weighing more than 9 pounds (4 kilograms).

Polycystic ovary syndrome: Having polycystic ovary syndrome a common condition characterized by irregular menstrual periods, excess hair growth and obesity-increases the risk of diabetes.

Areas of darkened skin, usually in the armpits and neck: This condition often indicates insulin resistance.

Conclusion

Diabetes mellitus is growing to epidemic proportions, leading to devastating complications if not treated well. There are many challenges in the successful treatment of diabetes mellitus because of personal and economic costs incurred in diabetes therapy. Its long-term consequences translate into enormous human suffering and economic costs. However, comprehensive diabetes care can delay the progression of complications, maximize the quality of life, and minimize healthcare expenditure. Monogenic diabetes is caused by mutations, or changes, in a single gene. These changes are usually passed through families, but sometimes the gene mutation happens on its own. Most of these gene mutations cause diabetes by making the pancreas less able to make insulin. The most common types of monogenic diabetes are neonatal diabetes and maturity-onset diabetes of the young (MODY). Neonatal diabetes occurs in the first 6 months of life. Doctors usually diagnose MODY during adolescence or early adulthood, but sometimes the disease is not diagnosed until later in life.

Insulin is indicated for all types of diabetes mellitus. However, diet, exercise, and diabetes education remain the essential components of diabetes management. The issue of obesity should be addressed aggressively and lifestyle changes should be emphasized. GLP-1 analogs and DPP-4 inhibitors are relatively new additions to oral pharmacotherapy and a reasonable option in obese subjects. Although current therapeutic modalities are unable to cure diabetes, we hope for a better future for

diabetics, as new technologies are emerging to cure diabetes mellitus.

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Conflict of Interest

None

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