

Comparing Type 1 and Type 2 Diabetes

Main Differences Between Type 1 and Type 2 Diabetes:

Both type 1 and type 2 diabetes involve a problem with the body's production of or use of the hormone insulin, however, many significant differences help differentiate between the two. The main difference between type 1 and type 2 diabetes is that type 1 diabetes is a genetic autoimmune condition that frequently shows up early in life (with most cases diagnosed between the ages of 4 and 14), while type 2 is predominantly lifestyle-related and develops over time. Another difference is that people with type 1 diabetes have issues creating insulin due to their beta cells being destroyed by their own immune system, while those with type 2 diabetes create insulin at a normal rate. However, those with type 2 have bodies that are resistant to using it efficiently, leaving glucose in the bloodstream that can cause damage to numerous body organs and systems over time. Type 1 diabetes is not curable when type 2 can sometimes be reversed if caught early. A quick summary comparing type 1 and type 2 diabetes follows. Type 1 comes on fast and is mostly diagnosed at a young age while type 2 takes time to develop and is often diagnosed mid-life. Type 1 requires insulin to manage while type 2 is managed through diet, exercise, or injectable medications. Finally, type 1 diabetes is relatively uncommon (1.9 million people in the U.S.) while type 2 diabetes is increasingly common (35.4 million people in the U.S.).

Type 1 Diabetes	Type 2 Diabetes
Genetic	Predominantly Lifestyle Based
Diagnosed earlier in life	Diagnosed later in life
Can't produce insulin	Produces insulin, but the body won't use it
Not curable	Sometimes can be reversed
Relatively uncommon	Increasingly common

Symptoms:

There are many symptoms when it comes to type 1 and type 2 diabetes. The main symptoms of type 1 diabetes include excessive thirst, extreme hunger, weight loss or inability to gain weight in infants and toddlers, frequent urination (in young children shown by bedwetting or accidents after being potty-trained), yeast infections, disruption of menstrual cycles, miscarriage (in adults), restless sleep, fruity breath, confusion/ irritability, frequent headaches, nausea, vomiting, and diarrhea. On the other hand, the main symptoms of type 2 diabetes include weight loss when you aren't trying to lose weight, excessive hunger and thirst, frequent urination, blurry vision, tingling feet/ hands, genital yeast infections, frequent headaches, and bleeding gums when brushing your teeth. Of course, many of these symptoms are very common among the

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general public, which is why official diagnosing can only be done by a medical professional. For type 1 diabetes, diarrhea can simply be an outcome of not being able to process food properly in the digestive system, while for type 2, bleeding gums when brushing teeth can be a result of not taking care of dental hygiene.

Risk Factors:

Like many other medical conditions, many risk factors are involved with type 1 and type 2 diabetes that can increase the chance of developing them. It has been discovered that risk factors for type 1 diabetes are less clear than risk factors for type 2 diabetes. There really are only two main risk factors for type 1 diabetes. The first is family history, as people with a parent or sibling with type 1 diabetes have a higher risk of developing it themselves since it is a genetic condition. Another risk factor includes age because although type 1 diabetes can appear at any stage of life, it is most common among children and adolescents. There is a much longer list of risk factors for type 2 diabetes, however. They include having prediabetes, slightly elevated blood sugar levels, are carrying excess weight or being obese, being physically inactive, over the age of 45, having ever had gestational diabetes (diabetes during pregnancy), having given birth to a baby weighing more than 9 pounds, have an immediate family member with the condition, have polycystic ovary syndrome, or are Black, Hispanic/ Latino, American Indian, or Alaska Native due to structural inequities.

Diagnosing Process:

Type 1 diabetes is commonly diagnosed through a combination of blood sugar tests and antibody tests. First, blood sugar tests are used to measure the level of glucose in the blood. Two of the most common blood sugar tests include the Fasting Plasma Glucose (FPG) test and the Glycated Hemoglobin A1c (A1c) test. The FPG test is used after an overnight fast, and it measures the blood sugar level. A fasting glucose level of 126mg/dL or higher on two separate occasions typically results in a diabetes diagnosis. The HbA1c test measures the average blood sugar level over the past 3 months. An HbA1c level of 6.5% or higher typically means a diabetes diagnosis. These 2 tests can't differentiate between type 1 and type 2 diabetes, so knowing which you have is important. Type 2 diabetes is typically diagnosed with the A1C test. However, if this test isn't available, or an individual has certain conditions that won't allow the test, other tests like the random blood sugar test (measures blood sugar whenever without the need to fast), the fasting blood sugar test (measures blood sugar after an overnight fast), and the oral glucose tolerance test (measures body's reaction to glucose). The insulin sensitivity test (IST) is also used to diagnose type 2 diabetes. IST involves IV infusion of a defined glucose load and a fixed-rate infusion over approximately 3 hours. Somatostatin may be infused simultaneously to prevent insulin secretion, inhibit hepatic gluconeogenesis, and delay the secretion of counter-regulatory hormones— particularly glucagon, growth hormone, cortisol, and catecholamine. Fewer blood samples are required for this test, compared to clamp techniques. The mean plasma glucose concentration over the last 30 minutes of the test reflects insulin sensitivity. Although lengthy, IST is less labor-intensive than clamp techniques and the FSIVGTT. Along with IST, ITT is also used, being the simplified version. ITT measures the decline in serum glucose after an IV bolus of regular insulin (0.1 to 0.5 U/kg) is administered.

Several insulin and glucose levels are sampled over the following 15 minutes (depending on the protocol). The ITT primarily measures insulin-stimulated uptake of glucose into skeletal muscle. Because this test is so brief, there's little danger of counter-regulatory hormones interfering with its results. The hyperinsulinemic-euglycemic clamp technique is the most scientifically sound technique for measuring insulin sensitivity, and it's against this standard that all other tests are usually compared. Because this and similar "clamp" techniques are expensive, time-consuming, and labor-intensive, they are not very practical in an office setting. To overcome these obstacles, alternative tests have been developed, including the frequently sampled IV glucose tolerance test (FSIVGTT), insulin tolerance test (ITT), insulin sensitivity test (IST), and continuous infusion of glucose with model assessment (CIGMA). Unfortunately, all of these methods require IV access and multiple venipunctures, making them relatively impractical for office assessment. The oral glucose tolerance test (OGTT) does not require IV access but does involve several venipunctures and 2 to 4 hours of patient and technician time. Each of these tests has been shown to correlate reasonably well with dynamic clamp techniques.

Management & Treatment Methods:

Although there is no cure for diabetes, there are many different strategies available for people with a diabetes diagnosis to stay healthy. For type 1 diabetes, management methods include: taking insulin as prescribed, eating a healthy, balanced diet with accurate carbohydrate counts, checking blood sugar levels as prescribed, and getting regular physical activity. People with type 1 diabetes must take insulin as part of their treatment because their bodies can't make insulin anymore. Keeping the right amount to keep their blood sugar levels in a healthy range is crucial. This can be done by injection with a needle or with an insulin pump. Taking insulin in pill form wouldn't work because the digestive juices in the stomach and intestines would break it down. People with type 1 diabetes have to pay a little more attention to their meals and snacks than people who don't have diabetes. They also need to eat a balanced, healthy diet and pay closer attention to what they eat and when they eat it. This is because the food they need to balance the food they eat with the amount of insulin they take and their activity level. The three main types of nutrients found in foods are carbohydrates, protein, and fats, which an individual's healthcare team will make a balanced meal plan out of. Checking blood sugar levels is also part of managing type 1 diabetes, as it lets you know if the other parts of treatment are working. This can be done with a continuous glucose monitor (CGM), which is a wearable device that measures blood sugar every few minutes. Finally, exercise is also a crucial part of treating diabetes. This is because regular physical activity like walking a dog or playing a team sport can help keep blood sugar levels in a healthy range. Looking forward, there has been some progress made with the discovery of stem cell therapy for people with type 1 diabetes. The use of stem cells in treating diabetes has been shown to improve blood sugar control and potentially restore the function of insulin-producing beta cells in the pancreas. This is particularly important for patients with type 1 diabetes who depend on insulin injections for their entire lives. Type 2 diabetes has similar treatment methods, like taking medications like insulin, eating a healthy and balanced diet, regular physical activity, and monitoring blood sugar levels with a monitor, however, additional methods include aiming for healthy body weight and managing stress effectively. Aiming for a healthy body weight is crucial because the

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more excess weight you have, the more resistant your muscle and tissue cells become to your own insulin hormone. Studies show that more than 90% of people with type 2 diabetes are overweight. Stress alone doesn't cause diabetes, however, there may be evidence of a link between the two. Researchers think that high levels of stress hormones might stop insulin-producing cells in the pancreas from working properly.

Prevention Factors:

Currently, no one knows how to prevent type 1 diabetes, but it can be treated by the methods stated before. On the other hand, type 2 diabetes can be prevented by keeping weight under control, exercising more, eating a healthy diet, and not smoking.

References

- Bialo, S. R. (n.d.). *Type 1 Diabetes: How Is It Treated? (for Teens)* - Nemours KidsHealth. Kids Health. Retrieved March 18, 2023, from <https://kidshealth.org/en/teens/treating-type1.html>
- Christofides, E. (2022, November 18). *Type 1 vs Type 2 Diabetes*. EndocrineWeb. Retrieved March 18, 2023, from <https://www.endocrineweb.com/conditions/diabetes/diabetes-type-1-vs-type-2>
- Christofides, E. (2022, November 18). *Type 1 vs Type 2 Diabetes*. EndocrineWeb. Retrieved March 18, 2023, from <https://www.endocrineweb.com/conditions/diabetes/diabetes-type-1-vs-type-2>
- Diabetes Tests | CDC*. (n.d.). Centers for Disease Control and Prevention. Retrieved March 18, 2023, from <https://www.cdc.gov/diabetes/basics/getting-tested.html>
- Differences between type 1 and type 2 diabetes*. (n.d.). Diabetes UK. Retrieved March 18, 2023, from <https://www.diabetes.org.uk/diabetes-the-basics/differences-between-type-1-and-type-2-diabetes>
- Excess Weight and Type 2 Diabetes*. (n.d.). HonorHealth. Retrieved March 18, 2023, from <https://www.honorhealth.com/medical-services/bariatric-weight-loss-surgery/patient-education-and-support/comorbidities-type-2-diabetes>
- Glucose tolerance test*. (2022, March 24). Mayo Clinic. Retrieved March 18, 2023, from <https://www.mayoclinic.org/tests-procedures/glucose-tolerance-test/about/pac-20394296>
- Stress and diabetes | The impact on your wellbeing*. (n.d.). Diabetes UK. Retrieved March 18, 2023, from <https://www.diabetes.org.uk/guide-to-diabetes/emotions/stress>
- Type 1 Diabetes - NIDDK*. (2017, July 18). National Institute of Diabetes and Digestive and Kidney Diseases. Retrieved March 18, 2023, from <https://www.niddk.nih.gov/health-information/diabetes/overview/what-is-diabetes/type-1-diabetes>

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Type 2 diabetes - Diagnosis and treatment. (2023, March 14). Mayo Clinic. Retrieved March 18, 2023, from <https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/diagnosis-treatment/drc-20351199>

Type 2 treatment. (n.d.). Diabetes Canada. Retrieved March 18, 2023, from <https://www.diabetes.ca/about-diabetes/type-2/treatment>

What Is Type 1 Diabetes? | CDC. (2022, March 11). Centers for Disease Control and Prevention. Retrieved March 18, 2023, from <https://www.cdc.gov/diabetes/basics/what-is-type-1-diabetes.html>