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My46 Trait Profile

Type 2 diabetes

Other Names: Adult-onset diabetes, Non-insulin-dependent diabetes

Type 2 diabetes is the most common form of diabetes. It develops when cells in the body do not respond to insulin, which results in high levels of sugar (glucose) in the blood. It is caused by a combination of genetic and environmental risk factors.

Characteristics of Type 2 diabetes

The food we eat must be broken down into glucose and other sugars so we can use it for energy. Insulin is a hormone that helps cells take in the glucose from the blood. Cells will either use the glucose or store it for later use. When the body cannot produce insulin or use the produced insulin properly, this leads to high levels of sugar in the blood. This condition is called diabetes mellitus. There are two main forms of diabetes mellitus: type 1 diabetes mellitus and type 2 diabetes mellitus (T2DM).

In T2DM, the body either does not make enough insulin or the body does not respond properly to the insulin that is made. We do not fully understand the reason why this happens in some people and not others. However, we do know some risk factors -- an unhealthy diet, lack of exercise, and obesity can increase the chance that someone will develop diabetes. Women are more likely to have diabetes than men. Ethnicity can also be a risk factor, as T2DM is more common in African Americans, Native Americans, and Latinos. Age is also important; the chance of developing diabetes increases as a person gets older. Researchers have also found variations in more than 50 genes that can affect the risk of developing T2DM. Each of these genes has a small effect on risk individually. Most of the genetic variations involved in inherited risk for diabetes have not been discovered yet.

Glucose builds up in the blood of people with T2DM. This can cause problems in many different areas of the body, including the eyes (cataracts, glaucoma); ears (hearing loss); feet (numbness); emotions (depression); and skin (infections). People who have T2DM can also have high blood pressure and elevated fats in the blood. They are at risk for heart attacks, strokes, and kidney disease if their blood sugar levels are not controlled.

Diagnosis/Testing

T2DM is diagnosed from a blood test that checks the sugar levels in the blood after either fasting or eating a specific amount of sugar. People whose blood sugar is above a certain level are diagnosed with diabetes. A genetic test is not needed to diagnose diabetes. Currently there is no genetic test that can give a yes or no answer about whether someone will develop T2DM in the future.

Specific changes or variants in certain genes, such as TCF7L2, PPARG, KCNJ11, TCF7L2, and CDKAL1 are associated with T2DM. This means that they are found more often in people with T2DM than in people without T2DM. Having any one of these variants increases the chance that a healthy individual will develop T2DM by a small amount. For example, people with a certain variant in the TCF7L2 gene are about 1.5 times more likely to have T2DM than those who do not have the variant. It is important to remember that most of the known risk factors for T2DM can be controlled by eating a healthy diet and by exercising on a regular basis. This lifestyle will decrease the risk of T2DM in both people who do and do not have genetic variants associated with T2DM. Likewise, people who have no or few genetic variants associated with diabetes can develop diabetes, especially if they do not engage in healthy lifestyle practices.

Management/Surveillance

Some people with T2DM can control their blood sugar with diet and exercise alone. Others will need medications or insulin. People with T2DM should work with their doctor to come up with an appropriate treatment plan. Blood glucose levels need to be checked on a regular basis with a finger stick blood test. Individuals with T2DM should have regular eye and foot exams, as well as tests to make sure their kidneys are working properly.

Mode of inheritance

T2DM is a complex condition, which means that it is caused by a combination of many different factors. These factors can be genetic or non-genetic (such as environmental factors and lifestyle choices). Complex conditions are inherited in a multifactorial pattern. This means that the chance for an individual to develop T2DM is influenced by the number and type of genetic and non-genetic factors that occur together to which an individual is exposed. In other words, no single gene, and no single environmental factor cause T2DM. However, not all of these genetic factors and environmental factors are known.

Risk to family members

Complex conditions, like T2DM, tend to recur in families, because they are partly influenced by genetic variants. If an individuals parent or siblings has T2DM, he/she has a higher chance to develop T2DM. The risk for developing the disease cannot be predicted from genetic factors alone.

Special considerations

None

Resources

American Diabetes Association
http://www.diabetes.org
National Diabetes Information Clearinghouse
http://diabetes.niddk.nih.gov/dm/pubs/type2_ES/
Mayo Clinic: Type 2 diabetes
http://www.mayoclinic.com/health/type-2-diabetes/DS00585

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Created by: Kristin Maloney, MS, MGC, Stephanie Stein, MD, Toni Pollin, MS, PhD, CGC
Edited by: Seema Jamal, MSc, LCGC