What causes type 1 Diabetes?

Louise Granlund
Popular scientific summary of the Degree Thesis in Biology in 2015
Department of Biology Education, Uppsala University

The reasons behind the common and increasing disease, type 1 diabetes have long been an unsolved mystery. Diabetes, which usually affects children at a young age, means a life dependent on daily insulin injections and fears of a variety of future complications such as blindness and an increased risk of heart diseases. However, researchers are now on their way to find an explanation for the origin of the disease. New information are emerging which are of great importance in order to shed light on the otherwise foggy understanding of the emergence of diabetes. It has long been known that it is a mixture of genetic and environmental factors that cause the disease, but our genome is large and the amount of possible circumstances in the environment that could affect the disease is almost incalculable. In spite of this, researchers have now succeeded to identify almost all of the genes linked to type 1 diabetes as well as a few viruses which are possible environmental factors with big influence on whether a person gets the disease or not.

Type 1 diabetes is an autoimmune disease

Psoriasis, rheumatoid arthritis and type 1 diabetes are all classified as autoimmune diseases which mean that the immune system has attacked the body's own tissues. In diabetes, this attack is directed specifically against a specific part of the pancreas called the islets of Langerhans. These islands contain a type of cells, beta cells, which are responsible for the production of the hormone insulin that regulates our blood sugar levels. When you suffer from type 1 diabetes, the beta cells have been broken down with the result that they can no longer produce insulin, leaving the patient dependent on insulin injections. The body's immune system is designed to protect us against external threats such as viruses and bacteria, but when failure occurs in this system, it turns against its own body which is exactly what happens at the onset of diabetes.

The interplay between genetic and environmental causes

That our genes are responsible for how we look and how our body works is something most people are aware of. However, to locate and understand exactly which genes control what and how they do this is more complicated. Despite this, researchers have now localized a group of genes on chromosome six which appears to be closely linked to the development of diabetes. Nevertheless, most people who carry the genes which make them more likely to get the disease need an environmental trigger to start the autoimmune attack. Therefore, it is also vital to understand how the surrounding environment can affect the expression of these genes. Many possible environmental factors have been discussed over the years, among them viruses

which appear to be one of the most likely triggers.

Which gene variations you carry influence the risk of developing the disease
Our genome has been examined in the search for genes that may be linked to type 1 diabetes. The genes identified on chromosome six with connections to diabetes do mostly control our immune system in different ways. Since it is errors in the immune system that causes diabetes it is not hard to understand how genes controlling the development and appearance of the immune system may have an impact on diabetes. These genes have been named human leukocyte antigen complex, in short called HLA, and are thought to be the most important region in our genome regarding defence against infections and autoimmunity. As well as this, big differences in this HLA-region have been observed between people, there are many variations in the genes and some types seem to express a greater vulnerability to developing the disease. This can somewhat explain why some people are at greater risk of getting type 1 diabetes than others.

How does a virus give rise to an autoimmune attack?
Many viruses are not as common today as they were before (for example viruses from the family enterovirus). This means that our immune system doesn't recognize them if it were to encounter them. Some viruses that give rise to common colds have been associated to type 1 diabetes. It is thought that these viruses mimic the looks of the beta cells, which confuses the immune system who have not encountered these viruses before. This could then lead to a misplaced attack upon the beta cells which are mistaken for being a part of the virus. The immune system effectively destroys what it believes is a threat to the body, rendering the body deprived of the only cells capable of producing insulin. The symptoms of the disease, such as weight loss and constant thirst, often appear only after 70 – 80 % of the beta cells have already been destroyed.

People with the specific variations of the HLA-genes that convey higher susceptibility to the disease are more likely to get an autoimmune reaction as a result of a virus infection. With more knowledge in this area, researchers hope to soon be able to predict who are at greater risk of becoming ill and develop new, better treatments. The solution to the mystery of the cause of type 1 disease is within reach.

More information

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Granlund L. Independent Project in Biology 2015. Vad orsakar diabetes typ 1?