



DISEASE FACT SHEET

Type 1 Diabetes

Type 1 Diabetes

Type 1 diabetes affects over 140 000 children and adults in Australia and over 16 million people worldwide. This type of diabetes generally develops in younger people and affects both sexes equally. Half of people with type 1 diabetes are diagnosed before their 18th birthday. Around one in every 700 Australian children has type 1 diabetes, which makes it one of the most common serious diseases amongst children.

People with type 1 diabetes produce very little or no insulin. Insulin is a hormone that regulates the body's use of glucose (sugar), which is a major fuel source for our bodies. Insulin is only produced by specific cells in the pancreas called beta cells. The release of insulin from the beta cells is triggered by a rise in blood sugar, for example following a meal. Insulin then travels through the blood and helps to get sugar from the blood into cells where it can be used for energy. Without insulin, blood sugar levels rise to dangerously high levels that can cause organ damage.

Life expectancy for patients with type 1 diabetes changed significantly when insulin was discovered in the 1920s. However, people with diabetes still have to monitor their blood sugar levels and take insulin by injection several times a day. Over ten years, a person with type 1 diabetes may have over 14 500 injections and 20 000 blood glucose tests. Life expectancy is still decreased in people with type 1 diabetes. It is thought that people diagnosed before the age of 30 years will lose more than ten years of life expectancy.

What causes type 1 diabetes?

Type 1 diabetes develops when the beta cells that make insulin have been destroyed by the body's own immune system. Like many complex human diseases we are not sure why this happens, but we know that it is caused by an interaction between genes and the environment. There is a genetic risk for type 1 diabetes, although 80% of people diagnosed with type 1 diabetes have no family history of the disease.

In people with type 1 diabetes, the immune system treats the beta cells like it would a bacteria or virus, and for this reason diabetes is called an autoimmune disease. Because type 1 diabetes is caused by an abnormal immune response, it is very different to the other form of diabetes, called type 2 diabetes. In type 2 diabetes, the beta cells are still present, however they do not function well enough to control blood sugar levels.

What are the symptoms?

The symptoms of diabetes include:

- Excessive thirst
- Frequent urination (especially at night)
- Hunger or loss of appetite
- Unexplained weight loss
- Fatigue, nausea and vomiting
- Itching skin, thrush or other skin infections
- Visual disturbances, such as blurred vision

Uncontrolled diabetes can severely damage many systems, organs and tissues of the body. Even with insulin treatment, a lifetime of diabetes can result in serious long term consequences. Complications include kidney damage; increased likelihood of infections, such as thrush; damage to the eyes (diabetic retinopathy and cataracts); poor blood circulation in the legs and feet, potentially leading to lower limb amputation; damage to the nerves of the feet and hands; increased likelihood of heart disease and stroke; and sexual impotence.



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What treatments are available?

While a great deal of research is being done, at this stage nothing can be done to prevent or completely cure type 1 diabetes, but the condition can be successfully managed.

Treatment options include:

- Self-monitoring of blood sugar levels by regularly testing droplets of blood in a glucose meter
- Self-testing to check for high levels of ketones in urine or blood
- Taking regular insulin injections
- Increasing the amount of 'slow' carbohydrates in the diet, such as beans and fruit, which take longer to be absorbed by the body (low GI foods)
- Regular exercise
- Regular medical checks, including eye checks

What research is Garvan doing in this area?

Garvan's Immunology and Inflammation Research Program has several teams of scientists who research different aspects of type 1 diabetes. They focus on understanding how and why an immune system turns on itself and destroys its insulin-producing beta cells, and on trying to create new beta cells from other cell types.

In early 2006, the Federal Government announced funding for an Islet Transplantation Program that will help take the transplantation of pancreatic islets from an experimental procedure to a viable clinical option for people with diabetes. Together with other research organisations, Garvan scientists are heavily involved in this nationwide initiative. Our scientists are developing tests to monitor the recipient's immune system for signs of rejection as well as genetic changes in the islet transplant. We are also using microarrays to find the markers to predict, before transplantation, how the islets will function after transplant - that is, to identify a molecular signature for a successful graft.

Garvan scientists are also aiming to identify potential points in the disease pathway to intervene and prevent the development of type 1 diabetes. One of the studies has led to the discovery of key factors that control the immune attack on insulin-producing cells. The next stage is to make or find compounds to block these factors, in the hope they will prevent type 1 diabetes.

In other studies, Garvan scientists have identified an unusual period of intense immune system activation, which occurs prior to the onset of diabetes. Using a new drug to target the immune system at this time, they can prevent diabetes in a pre-clinical animal model. This drug is now being prepared for phase 1 clinical trials for the treatment of diabetes in people. Probing the causes and mechanisms that lead to type 1 diabetes will eventually lead us to the discovery of new treatments to cure this disease.

Further sources of information

Diabetes Australia - NSW	www.diabetesnsw.com.au
Juvenile Diabetes Research Foundation	www.jdrf.org.au
International Diabetes Federation	www.idf.org

Garvan Institute of Medical Research – how you can get involved

The Garvan Institute of Medical Research was founded in 1963. Initially a research department of St Vincent's Hospital in Sydney, it is now one of Australia's largest medical research institutions with approximately 400 scientists, students and support staff. Garvan's main research programs are: Cancer, Diabetes & Obesity, Arthritis & Immunology, Osteoporosis, and Neuroscience.

Your support makes it possible for the Garvan scientists to continue their great work. You can help by making a donation or a bequest, holding a community fundraiser or volunteering your time for Garvan. For details on how to get involved, please visit www.garvan.org.au or contact our Supporter Services Manager on (02) 9295 8110.

Education is one of Garvan's top priorities. Our Public Awareness and Community Education (PACE) Manager can visit your community group or school to give a talk on a number of science and health related topics. Garvan also offers regular tours of our facilities. For further details, visit our website or call our PACE Manager on (02) 9295 8108.

Garvan Institute of Medical Research
384 Victoria Rd Darlinghurst NSW 2010
(02) 9295 8110 www.garvan.org.au

