

Immunisation: Myths and Realities supplement

Diabetes and Vaccines

What is diabetes?

Diabetes is a disorder of the pancreas, the gland that produces insulin. Diabetes occurs when levels of insulin in the blood stream are too low or absent. Insulin is required to absorb sugar from the blood into the body's cells. Without insulin, sugar levels in the blood become very high, and cause serious health problems.

There are two types of diabetes:

- Type 1 diabetes (also known as insulin-dependent diabetes, IDDM or juvenile onset diabetes), which occurs when the pancreas stops producing sufficient insulin.
- Type 2 diabetes (also known as non-insulin-dependent diabetes, NIDDM), which occurs when the body becomes less sensitive to the effects of insulin.

Information in this fact sheet refers to type 1 diabetes. Type 1 diabetes is thought to be an autoimmune disease, where the immune system malfunctions to cause destruction of the insulin-producing cells in the pancreas. This is the usual type of diabetes in children, and requires treatment with insulin injections. Without insulin, people with Type 1 diabetes will die. Type 1 diabetes is thought to be due to an interaction between inherited and environmental factors, not all of which have been identified.

Is the incidence of diabetes increasing?

There appears to be an unexplained trend towards increasing rates of diabetes in many countries, including Australia. Some countries, however, have shown no rise.

Do genetic or environmental factors (such as infections or medication) cause diabetes?

There is a marked variation in the rates of diabetes in different countries, with higher rates in people of northern European descent. Rates

are much lower in Asian and African people. This is thought to be due to genetic factors.

The impact of various environmental factors on the incidence of diabetes, including breast-feeding, infections, immunisation, nitrates and vitamin D, have been studied. Breast-feeding is shown to protect children against developing diabetes, while giving cows milk to infants may increase the risk. High levels of nitrates in drinking water have also been shown to increase the risk of diabetes. There are few infectious diseases that have been directly proven to cause diabetes, although indirect evidence suggests infections may have a role in causing diabetes. There is a seasonal variation in the incidence of diabetes, with an increase in late Autumn and early Winter. This suggests that viral infections may play a part in triggering diabetes in genetically susceptible people. Some medications, such as certain drugs used for the treatment of people with cancer, may also cause or hasten the onset of diabetes.

Do vaccines cause diabetes?

There is no evidence to suggest that vaccines cause diabetes. There have been a number of studies that have searched for links between diabetes and immunisation. The only study suggesting a possible increase in risk has come from Dr John B Classen, who found that if the first vaccination in children is performed after two months of age, there is an increased risk of diabetes. His laboratory study in animals also found that certain vaccines, if given at birth, actually decrease the risk of diabetes. This study was based on experiments using anthrax vaccine, which is very rarely used in children or adults. Dr Classen also compared diabetes rates with vaccination schedules in different countries, and interpreted his results as meaning that vaccination causes an increased risk of diabetes. This conclusion has been criticised because the comparison between countries included vaccines that are no longer used or used rarely, such as smallpox and the tuberculosis vaccine (BCG).

The study also failed to consider many reasons other than vaccination that could influence rates of diabetes in different countries.

Other researchers who have studied the issue have not verified Dr Classen's findings. This includes a group from the highly respected international Cochrane Collaboration, which reviewed all the available studies and did not find an increased risk of diabetes associated with vaccination. Expert groups such as the National Institutes of Health in the USA have also reviewed the evidence and concluded that there is no link between vaccines and diabetes.

Which vaccines have been linked to diabetes?

The debate about the relationship between vaccines and diabetes has centred mainly on *Haemophilus influenzae* type b (Hib) vaccine, BCG (the TB vaccine) and hepatitis B vaccine.

Do vaccines provide protection against diabetes?

Because diabetes is caused by abnormal immune mechanisms, and vaccines act by creating immunity to various diseases, some vaccines (particularly BCG) have been studied to see if they offer protection against diabetes. In animal experiments, BCG does seem to be protective against diabetes, but researchers have not been able to translate this benefit to humans. This research is ongoing. A new initiative of the Commonwealth Department of Health and Aged Care and the International Juvenile Diabetes Foundation will see the establishment of a centre in Australia to develop a vaccine to prevent diabetes.

Should there be any changes to the vaccine schedule?

Expert bodies around the world have addressed this question, and concluded that there is no evidence to support any changes to vaccination schedules. This issue will be reviewed on a regular basis in a number of countries, including Australia.

For information on the Immunise Australia program:

Phone the Immunisation Infoline on 1800 671 811
Visit the Immunise Australia Website on
<http://immunise.health.gov.au>

Further reading

- US Centers for Disease Control and Prevention Information Sheet <http://www.cdc.gov/nip/vacsafe/concerns/Diabetes/>
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