

First human evidence that nasal vaccine could prevent type 1 diabetes

Professor Len Harrison (left pictured) and Dr Spiros Furlanos (pictured) have provided the first human evidence that a nasal insulin vaccine could prevent the development of type 1 diabetes.

Walter and Eliza Hall Institute and Royal Melbourne Hospital researchers have provided the first evidence in humans that a nasal spray vaccine which is being trialled at The Royal Melbourne Hospital could prevent the development of type 1 diabetes.



[Professor Len Harrison](#) from the institute's [Immunology division](#) and Professor Peter Colman and Dr Spiros Furlanos from the [hospital's Department of Diabetes and Endocrinology](#) have demonstrated that the nasal insulin vaccine desensitises the human immune system, suppressing its reaction against insulin. Their [research was published in the April issue of the journal *Diabetes*](#).

Their research provides proof-of-principle for the type 1 diabetes prevention trial, also called the [intranasal insulin trial II \(INIT II\)](#), which is being conducted in Australia and New Zealand and soon in Germany.

Previous research by Professor Harrison showed in laboratory mice that a nasal insulin vaccine was successful in preventing type 1 diabetes.

"These latest results encourage us that we are on the right track to finding a vaccine for type 1 diabetes," Professor Harrison said.

Type 1 diabetes occurs when the body's immune system attacks and kills beta cells - the cells in the pancreas that produce insulin. Crucially, insulin itself is a specific target of the immune attack that kills the beta cells. Insulin is a vital hormone that moves glucose from the blood stream into the body's cells, giving them the energy needed for daily life. Lack of insulin leads to serious health problems and people with type 1 diabetes require daily insulin injections.

The study reported in *Diabetes* involved 52 adults who had early type 1 diabetes. Although the participants were not at the stage of requiring insulin injections they had evidence of immunity to the insulin-producing beta cells in the pancreas. Participants were given either the nasal insulin vaccine or a placebo weekly for 12 months. "The results showed that the vaccine allowed the immune system to restore immune tolerance to insulin," Professor Harrison said. "When subsequently given insulin by injection, the participants who had received the nasal insulin vaccine were found to be desensitised to insulin."

The insulin vaccine is administered through the nasal passages so that it stimulates the immune system present in the mucosal linings. "The nasal insulin vaccine works to desensitise the whole immune system to insulin, so that the white blood cells of the immune system, called T cells, are prevented from attacking insulin in the beta cells," Professor Harrison said.

"The insulin vaccine is not administered orally because it would be broken down in the gut, making the concentration too low to be effective. This problem is not encountered with direct administration to the nose, and the nasal mucosal immune system has special properties that actively promote a protective immune response."

Professor Harrison said if the nasal insulin vaccine proved to be effective it would not only prevent many Australians from developing type 1 diabetes but would reduce the economic burden on the health system.

"The nasal vaccine approach, if shown to be successful in human type 1 diabetes, could also be tested with different vaccines for the prevention of other autoimmune diseases such as rheumatoid arthritis and multiple sclerosis," he said.

Note

The [INIT II trial](#) began in 2006 and is now halfway through the testing phase. The trial is sponsored by [Melbourne Health](#) and is funded by the [National Health and Medical Research Council](#) and the [Juvenile Diabetes Research Foundation](#), through the [Diabetes Vaccine Development Centre in Sydney](#).

More information about the trial can be found at www.stopdiabetes.com.au. People who are interested in participating can register their interest online or contact [Diabetes Australia Victoria](#) on 1300 138 712.