

# Diabetes and the Insulin Pump

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Diabetes is a disease that affects how your body uses blood glucose. About 10-15% of Americans have some form of diabetes. There are two kinds of diabetes that one can have: Type 1 or Type 2. Type 1 diabetes is when the body's own immune system destroys the insulin producing cells of the pancreas (Beta Cells). This occurs for an unknown reason. However, this results in one having a complete deficiency of the insulin hormone. On the other hand, Type 2 diabetes is the most common form of the diabetes. Unlike Type 1 diabetes, people with Type 2 actually produce insulin. However, either their pancreas does not produce enough insulin or their body cannot use the insulin adequately. This usually occurs within people who are overweight or over the age of 45. With victims of diabetes in general, insulin builds up within the blood stream instead of going into the cells that does not let the body's cells function properly. This inevitably leads to death.

Studies have shown that genetics do play a role in diabetes (More within Type 2 than Type 1). However, how this occurs is still unknown. Nevertheless, enough diet and exercise can help keep you away from being diagnosed with diabetes.

For those with Type 1 or Type 2 diabetes, the immediate goal is to treat and control the blood glucose levels within the body. This is done through diet, exercise, and most importantly, insulin injections. Usually the injections are done before a meal in case their blood glucose becomes too high but they are needed at least one to four times a day. However, this can be a real inconvenience when one is at a restaurant, work, or even on vacation. Thus, an alternate to insulin injections would be a convenience to diabetics.

Researchers are making progress with different kinds of alternatives. One alternative that is on the fast track is an implantable insulin pump that produces insulin and releases it into the bloodstream. It contains insulin-secreting cells that borrow

nutrients from the body to keep producing insulin indefinitely. Biomedical researchers from the University of Illinois developed a pump in a capsule containment that has been able to fight biocompatibility problems, which has been an obstacle to other implantable devices. Using microchip technology, they have created a capsule that won't be attacked and damaged by the body's immune system.

The way the insulin pump works is that it would be surgically implanted in individuals with diabetes (Usually placed within the left side of the abdomen). A continuous basal dose of insulin is delivered through a catheter into the patient's abdominal peritoneal cavity. The disk-shaped pump is about the diameter of a hockey puck but much thinner and usually weighs from five to eight ounces when filled. It holds up to several months of insulin and is refilled afterwards by an injection through the abdominal tissue into the pump. Depending on the dosage of the insulin, the battery in an implanted pump lasts about eight to thirteen years.

Unfortunately, in the United States the pump is still classified as an investigational device and are only accessible in clinical trials. However, they appear to have been encouraging as patients have less episodes of hypoglycemia from the pump. On the other hand, there have been complications to the pump such as infections or blockage to the catheter or skin conditions at the site of the implantation. Researchers are working to fix these complications and are hoping that within the decade the pump can be implanted within patients in hospitals and used for general use.

## WORK CITED:

<http://www.diabetes.org/>

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