

Non Invasive Glucose Monitoring

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Diabetes is a condition which describes the bodies inability to produce/use insulin.

Hyperglycemia (elevated blood glucose levels) results from insufficient secretion of insulin by the pancreas, or inability of secreted insulin to stimulate the cellular uptake of glucose from the blood.

Hormone secreting cells of the Pancreas are known as the Islets of Langerhans. Beta cells within these cells are responsible for secreting insulin. In type 1 Diabetes, these beta cells are destroyed by the person's own body, an autoimmune response, the cause of which is unknown.

Removal of the beta cells causes hypoglycemia, and without insulin glucose cannot enter the adipose cells, causing the rate of fat synthesis to lag behind fat breakdown, which leads to large amounts of free fatty acids to enter the bloodstream.

This may ultimately result in ketoacidosis, and severe dehydration, which combined can lead to coma and death.

Traditional monitoring of blood glucose levels involve pricking the fingertip with a small needle, to obtain a sample of blood which is deposited onto a test strip. The test strip is then placed in a glucose monitor, which reads the strip and displays the result. Finger pricks can be painful, and must be done on a regular basis (often exceeds 4 times a day)

New advances in this technique involve alternate blood sampling sites such as the forearm which contains less nerve endings than the fingertips, combined with devices which require smaller volumes of blood.

One technique is to implant a small biosensor beneath the skin, and measure the glucose level of the interstitial fluid.

One Company, Medtronic markets its Minimed system which is an implantable biosensor which can monitor interstitial blood glucose for up to 3 days.

This system provides an average glucose measurement every 5 minutes, for a period of up to 3 days, for a maximum of up to 288 measurements.

These data points are then downloaded to a computer at the doctor's office and then analyzed. With this data the doctor can then recommend adjustments to diet, insulin doses, treatment times, etc.

On top of the greater convenience of testing that the new products will provide, frequent, automatic glucose monitoring holds the promise of improving diabetes care. This technology, ushered in by implantable and transdermal glucose sensors, can supply information on the effects of diet, insulin-dosing algorithms, and glucose-lowering medications on blood sugar levels that was previously unattainable. More information gives people with diabetes more power to fight their disease .