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Artificial pancreas device system: A technological progress towards a cure

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 Insulin is a hormone produced by the cluster of cells in the pancreas known as the islets of Langerhans. It plays an important role in the regulation of the metabolism of carbohydrates, proteins and fats by helping in the absorption of glucose from the bloodstream into various cells like the liver, muscles and adipose tissue. Diabetes mellitus is a condition where the body is unable to control its blood sugar level. Type I diabetes is an autoimmune disease where the body’s immune system attacks its own cells, causing little or no insulin production. In type II diabetes mellitus, the pancreas is either unable to produce enough insulin or the body becomes resistant to the insulin already present. Type I diabetes mellitus patients have to regularly monitor their glucose levels using devices that require pricking of fingers many times a day. Also, the patient has to be dependent on exogenous insulin injections, lifelong, which could be a cumbersome process. Injecting the wrong dose of insulin at the wrong time can have adverse effects on the body. Scientists have developed an artificial pancreas device system that mimics the regulation of glucose like a normal functioning pancreas. It is an amalgamation of a continuous glucose monitoring system and an insulin infusion pump. It is a computerised automated system that helps in the communication between the continuous monitoring system and the insulin infusion pump. The continuous glucose monitoring system provides a continuous stream of information about the blood glucose levels, and whenever it detects an increased level of glucose, the computerised control algorithm in the external processor (like computers, mobile phones, smartwatches, etc.) sends the dosing information to the blood infusion pump. Based on the instructions received, the blood infusion pump delivers the required amount of insulin under the skin. So the artificial pancreas system not only continuously monitors blood glucose levels but also delivers the right amount of insulin at the right time. Even during the nighttime, when the patient is asleep, insulin is delivered by the system to prevent hyperglycemic (high sugar level) episodes. The artificial pancreas device system has shown positive results in clinical trials and has received Food and Drug Administration (FDA) approval to be made available to diabetic patients.

Keywords: Artificial pancreas, Insulin, Diabetes mellitus, Continuous glucose monitoring system

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