Treating Diabetes: Examining the Options

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Home blood glucose monitoring has revolutionized glucose control for people with diabetes.

For people with Type 1 diabetes, or with Type 2 and an insulin requirement, the ability to maintain excellent glucose control is significant, since the condition requires as many as six to eight checks a day to determine the units of insulin needed.

CONTINUOUS GLUCOSE MONITORS

Substantial research has been conducted to find a better way for diabetes patients to monitor blood sugar. One prototype is the Continuous Glucose Monitor System (CGMS). The first generation of CGMS was introduced eight years ago. The device consists of a sensor injected into the skin that measures blood sugar in the fluid around the blood vessels every five minutes and sends a signal to a connected monitor. After 72 hours, a physician downloads the blood sugar readings from the monitor; the patient does not have access to the readings.

The second generation of CGMS may be the most exciting technology on the horizon. The injected sensor is still used to measure the blood sugar; however, the patient can now read the blood sugar on the monitor around the clock. As a helpful measure, the displayed blood sugars may be accompanied by an upward-pointing arrow, indicating a rise in blood sugar. The patient can intervene by injecting extra insulin. A reading with a downward-pointing arrow tells the patient when blood sugar is dropping, reaching hypoglycemic levels. In addition to the displayed blood sugar levels, the CGMS provides the patient with the trends of the glucose readings.

Three CGMS systems are currently approved by the Food and Drug Administration. The DexCom STS™ transmits data wirelessly to a handheld receiver, making it convenient to wear. The Guardian® REAL-Time System transmits real time blood sugar readings to a connected monitor and offers multiple alert options. The MiniMed Paradigm® REAL-Time System is the first to combine a continuous sensor and insulin pump. Its sensor displays blood sugar readings on the screen of the pump. This device is the closest to a fully automated “closed loop system” or artificial pancreas. NEW GENERATION INSULIN PUMPS The insulin pump system consists of a device the size of a pager where insulin is stored. Insulin is transported from the pump via tubing and a connected needle to the skin. The insulin pump can deliver insulin as a baseline dose that is infused continuously between meals and at night and as a bolus dose, which the patient administers before each meal or to correct a high blood sugar level.

New generation insulin pumps have a built-in system called the “wizard,” allowing the user to pre-program meal and insulin sensitivity information into the pump during set-up. Before each meal, the patient checks the blood sugar and enters the amount of carbohydrates in the meal into the pump. The “wizard” then displays the amount of insulin to be injected. MOVING FORWARD People with diabetes often ask when an artificial pancreas may be available. In order for that to occur, two important requirements exist: a continuous sensor transmitting blood glucose readings to the insulin pump and an insulin pump dispensing the insulin as programmed. Currently missing is a connecting system integrating the data and promoting the pump to inject insulin automatically without patient involvement, referred to as a “closed-loop system” or artificial pancreas.

While it will be years before this technology is available, new technologies linking the sensor with the insulin pump will be perfected, helping people with diabetes further optimize their control and enhance their lives.

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