

Numerous Non-Invasive Glucose Monitors under Development

Diabetics are still awaiting a reliable, non-invasive means of blood glucose monitoring – one that doesn't require breaking the skin or confirmation with a traditional monitoring method. The latest continuous glucose monitoring technology involves small sensors implanted in the skin that must be calibrated several times a day, and replaced every few days to a week to avoid infection. Because the blood sugar testers are implanted into the skin, the body sees the sensors as foreign objects, and frequently forms scar tissue around them.

The FDA approved one non-invasive monitor in the 2002 – the GlucoWatch Biographer. Worn on the wrist like a watch, the device used a small electric current to draw fluid through the skin, and a sensor to analyze the fluid's blood glucose levels. But at least half of the diabetics that used the product complained of skin irritation and sores, and the product was discontinued in 2007.

Despite the GlucoWatch disappointment, diabetics should not give up hope of being able to avoid multiple daily finger pricks to keep track of their blood sugar. Numerous non-invasive blood glucose monitors using different technologies are currently in development, including:

- 1) **GlucoTrack** – Integrity Application's GlucoTrack employs three different technologies: ultrasonic, conductivity and heat capacity. The device contains a main unit, a transmitter, a receiver and processor, and a sensor-containing ear clip. The main unit can support and store blood sugar readings for up to three users.
- 2) **Symphony** – Developed by Echo Therapeutics, Symphony is a biochemical sensor-based transdermal continuous glucose monitoring system with a wireless handheld device that reads the sensor's measurements.
- 3) **Multisensor Glucose Monitoring System** – Developed by Solianis Monitoring, this system delivers continuous information on glucose variations using impedance spectroscopy – a technology that uses frequencies to measure the effect of changes in blood glucose levels.
- 4) **Portable blood glucose meter** - Grove Instruments is working on miniaturizing a prototype blood glucose monitor which delivers a reading using Optical Bridge technology. The user

simply inserts his or her finger into a port to obtain an optically assessed blood sugar test reading in less than 25 seconds.

- 5) **Glucose Monitor Tattoo** - Researchers at the Massachusetts Institute of Technology are testing a continuous glucose monitoring "tattoo" in which fluorescent nanoparticle ink is injected under the skin. The ink fluoresces in response to glucose when an infrared light is shone on it, telling a small monitor how much it detected.
- 6) **Electronic thumb-pad sensor** - Texas' Baylor University researchers are testing an electronic thumb-pad sensor which detects blood glucose by measuring changes when electromagnetic energy waves pass through the skin.
- 7) **I-SugarX** - Freedom Meditech is pioneering the I-SugarX, an ophthalmic medical device which monitors changes in the eye to determine glucose levels. The user gazes into a handheld device which shines a light on the eye for less than a second, and then displays a digital blood glucose reading.
- 8) **Near infrared optical spectroscopy** - Inlight Solutions is developing devices that use near infrared optical spectroscopy and multi-variate analysis to measure blood glucose levels. The technology employs a light source, an optical detector, and a spectrometer.
- 9) **LighTouch Technology** - Uses a glucose test technology that projects a specific color of light onto a patient's finger, and analyses the different colored light that is "re-projected" back from the finger to measure blood glucose levels.