

Blood testing, mosquito style

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A skin patch could one day provide a less-invasive alternative for diabetics who need to take regular samples of their own blood to keep glucose levels in check. The common method of drawing blood from fingertips and using glucose testing strips and metres can be painful, inconvenient and time-consuming.

Electrical engineers at the Schulich School of Engineering at the University of Calgary have patented a device called the Electronic Mosquito. The patch is approximately the size of a deck of cards and contains four micro-needles that "bite" sequentially at programmed intervals. The needles are electronically controlled to penetrate the skin deep enough to draw blood from a capillary, but not deep enough to hit a nerve. This means patients would experience little or no pain. The patch could be worn anywhere on the body where it could obtain accurate readings of capillary blood.

A sensor in each cell of the e-Mosquito measures sugar levels in the blood. This data can then be sent wirelessly to a remote device such a computer or a monitoring instrument worn on the wrist. The system could even be connected to an alarm to alert patients or doctors when [blood sugar levels](#) enter the danger zone.

"This is a dramatic improvement over manual poking, particularly for children and elderly patients," says Martin Mintchev, director of the Low Frequency Instrumentation Lab at the Schulich School of Engineering. "Our approach is radically different and offers a reliable, repeatable solution with the minor inconvenience of wearing something similar to

an adhesive bandage."

Mintchev spent three years designing the e-Mosquito along with Karan Kaler, director of the Schulich School's Bio-Micro Electromechanical Systems (MEMS) Laboratory. Their next step is to make the components of the e-Mosquito smaller to fit more needles on the patch. Currently, there are four needles, so the patch would need to be changed at least once a day. Adding more needles would allow patients to wear the patch for longer periods of time or test their [blood](#) more frequently, even while they're asleep.

Eventually, Mintchev and Kaler hope to integrate a pump system so insulin injections can also become autonomous based on data from the e-Mosquito, thus converting the device into an external artificial pancreas.

"It's important to find an industry partner for this project," says David Reese, project manager with University Technologies International, the university's technology transfer, commercialization and incubation centre that works with U of C researchers to commercialize their technologies. "Industry has the resources and expertise to speed up the process of product development and bring this technology to market for the benefit of patients."

Diabetes has been described as a global epidemic. Approximately 246 million people around the world are affected by the disease. More than two million Canadians have diabetes, a number that is increasing because of the aging population and rising obesity rates, according to the Canadian Diabetes Association.

Source: University of Calgary ([news](#) : [web](#))

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