

World-first insulin technology will provide better diabetes care

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Distinguished Professor Geoff Chase is working on world-first insulin sensor technology for those managing type 2 diabetes. Credit: University of Canterbury

Distinguished Professor Geoff Chase, from the University of Canterbury (UC) College of Engineering, is working on world-first insulin sensor technology to enable 'right now' measurement for those managing type 2 diabetes.

The development of insulin measurement technology will allow doctors and patients to make better informed decisions on treatment immediately, Distinguished Professor Chase says. People can find their [blood sugar level](#) from the well-known finger stick test and a glucometer, however, insulin can currently only be measured in a lab.

"What makes Point-of-Care insulin testing difficult is there is no known chemical reaction to test for. Unlike glucose, insulin has no polarised charge, it doesn't carry voltage or respond to magnetic fields, [radio frequency](#) or microwaves." Thus, it is something of a "stealth" molecule in terms of making it easy to detect, he says.

Distinguished Professor Chase is working with Director of UC's Biomolecular Interaction Centre Dr. Volker Nock and postdoctoral fellow Dr. Rebecca Soffe from Electrical and Computer Engineering and Mechanical Engineering Senior Lecturer Dr. Stefanie Gutschmidt to develop Lab-on-a-Chip technology using micro-fluidics, specialised bio-receptors, and novel micro-electro-mechanical-system (MEMS) technology modelling to detect insulin in a sample fluid.

"The fixed volume of the liquid will stick to the microchip allowing the rest to run off. This changes the mass and thickness of the MEMS array elements which in turn lets us 'see' that mass of insulin by the way it changes the dynamic properties of the MEMS device arrays. That is the hope anyway with the patent that's being filed."

Funded by the National Science Challenge: Science for Technological Innovation, finding a key measurement of insulin in the body at Point-of-Care is part of a suite of technologies being developed for the management of type 2 diabetes.

Currently, insulin measurement requires lab processing of a blood sample, which takes 1-3 days for a result. The process and delay makes the test only beneficial to initially diagnose type 2 diabetes, not managing continued care.

"When you don't know insulin levels you have to guess. Patients tend to run into problems and will often give up on treatment because the risk of injecting too much insulin is too high," Distinguished Professor Chase says. "With this sensor, you could know what your [insulin](#) level is and safely dose, reducing that risk."

Distinguished Professor Chase has 19 years' experience working with medical practitioners. His areas of research include diabetes, modelling of [human metabolism](#) and hypoglycaemia, and he enjoys seeing the real-world impact of his work. In

2018 he was awarded the MacDiarmid Medal by Royal Society Te Apārangi for physiological modelling of human metabolism used for 'in-silico' testing, which has been used to treat intensive care patients in New Zealand and overseas.

"I like the opportunity to see the work I do broadly have an impact. The ultimate accolade is to see something get taken up and see the science applied to human benefit."

Provided by University of Canterbury

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