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Research to help hearing loss

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Research at Victoria University aims to improve the diagnosis and treatment of hearing defects.

Paul Teal, a Senior Lecturer in the School of Engineering and Computer Science, is investigating whether new technologies can be used to more accurately assess hearing loss.

Dr Teal's research is focused on new ways of measuring the cochlea microphonic signal. The cochlea is a spiralling, snail-like chamber embedded inside bone which turns sound vibrations into electrical signals that travel along nerves to the brain and allow us to hear.

A healthy cochlea provides compression which amplifies quiet sounds more than loud sounds. In the most common form of hearing loss, this compression is degraded.

The current, standard test for hearing loss is an audiogram that Dr Teal says effectively measures the softest sounds people can hear but is less reliable in gauging how well they hear louder sounds.

"Modern hearing aids are capable of helping people to better hear both soft and loud sounds, but current tests don't define the full spectrum and prescriptions are based on population averages rather than an individual's condition.

"My vision is that we will one day be able to hook people up to a device that plays them tones and sounds and gives an automatic read-out on the

make-up of the hearing aid they need."

Dr Teal says the existing method of measuring the cochlea microphonic signal is invasive and audiologists tend to opt for other, non-invasive tests to diagnose a range of problems.

"The reason we've gone back to looking for ways of collecting an electrical signal directly from the cochlea is the huge advance in electronics in recent decades.

"The cochlea is buried deep inside the ear and the tiny signals coming from it are often masked by interference. Chips are so much more sophisticated these days that we hope to be able to single out the cochlea microphonic signal."

Dr Teal is experimenting with gold-plated foam ear plugs that have electrodes clipped on to them to harness signals from deep inside the ear.

But getting good sound from the cochlea is only one part of his research, which also involves collaborators from the University of Auckland. The other challenge is interpreting it.

One of Dr Teal's innovations has been to develop a model that combines understanding about both mechanical and electrical components in the way the cochlea behaves. His work in this area was recently presented to an international audience at the Mechanics of Hearing Workshop in Massachusetts.

It's an exciting field of research, says Dr Teal, because of the mysteries it holds.

"There is still a lot of dispute about how the cochlea even works. It's hard to study because of where it is in the body and because of the

complex processes at work.

"There is a lot yet to be learned and that has potential to deliver better treatments for hearing disorders."

Dr Teal is applying his expertise in signal processing into a range of other areas including less invasive ways of monitoring foetal heart beats and methods of detecting seizures in new-born babies.

Provided by Victoria University