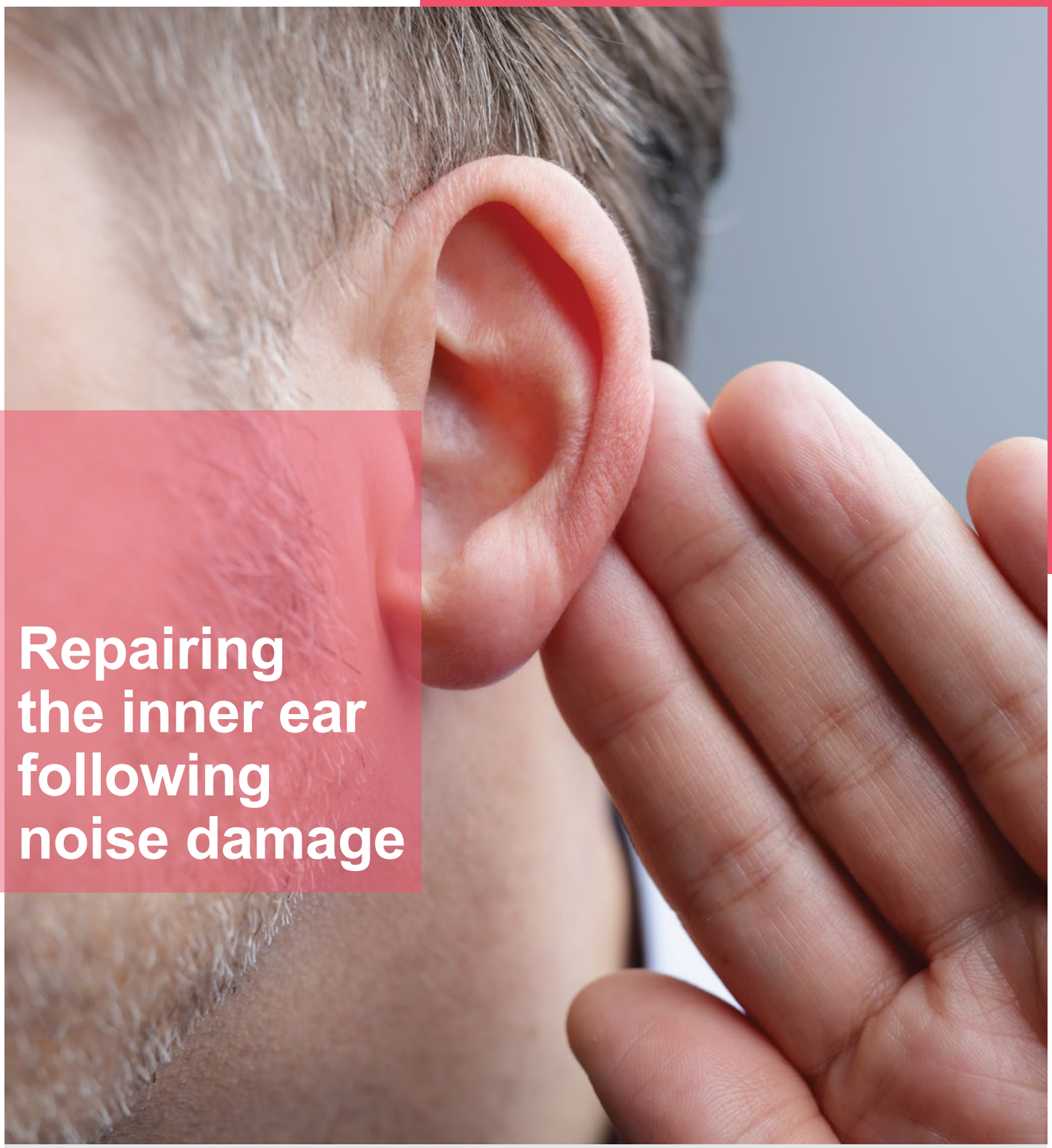

Repairing the inner ear following noise damage

Hearing loss affects 360 million people worldwide and is the most common disability in developed countries. Around one third of cases are related to noise exposure.

In Australia alone, the economic cost of hearing loss is estimated at $11.75 billion per year – a cost that is rising with the ageing population. Hearing loss not only impacts our ability to communicate with loved ones, but is associated with cognitive decline, social isolation, and depression. The need to develop a therapeutic intervention to treat hearing loss is a high priority and the most effective strategy would be to repair cochlear damage before it becomes a debilitating condition.

Bionics institute

The Bionics Institute is a not-for-profit, independent medical research institute working in the field of medical bionics – an exciting area of science where biology, engineering, and medicine intersect.

Our history

Led by Professor Graeme Clark AC, bionic ear research began in the late 1960s at the University of Melbourne and the first patient was implanted with this pioneering device in 1978. The (then) Bionic Ear Institute was established in 1984 by Professor Clark to ensure that research and development of this life-changing medical device continued. The success of the bionic ear (cochlear implant), and the subsequent establishment of Cochlear Ltd, is one of Australia's great medical research success stories: today, cochlear implants provide the gift of hearing to over 400,000 hearing-impaired people globally.

The Bionics Institute today

…to research, innovate and deliver technologies that improve human health…

Many decades later, the Institute continues to pioneer new technologies to address otherwise untreatable, poorly treated or drug-resistant conditions of the nervous system. Using a multidisciplinary and collaborative approach, the Institute's research programs continue to diversify, and build on our experience and technological expertise in cochlear implants. We bring together researchers from a wide range of disciplines and collaborate with eminent clinicians from Melbourne's major hospitals to ensure that our work results in tangible clinical outcomes.

In 2011, we changed our name to the Bionics Institute to reflect fully the breadth of our research interests and clinical applications. Today, our work encompasses the development of technologies and therapies to address deafness, blindness, epilepsy, Parkinson's disease, stroke, and inflammatory bowel disease.

Get in touch

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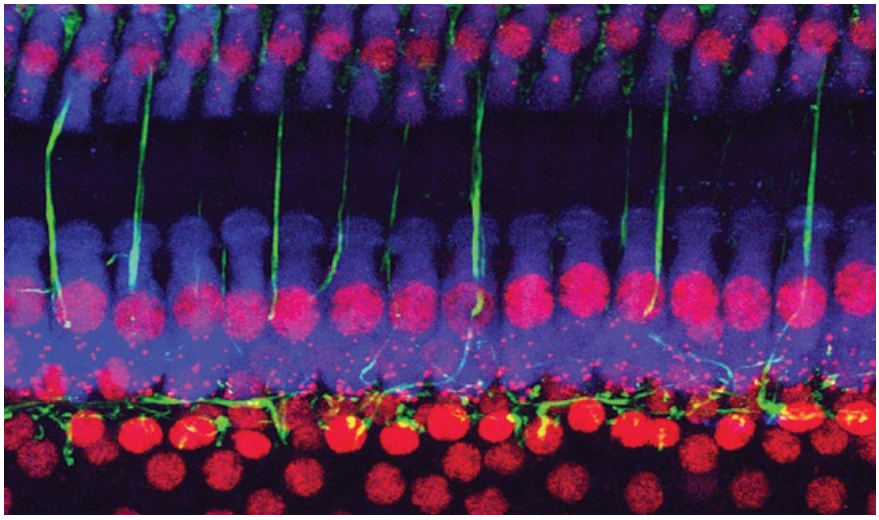

The inner ear, or cochlea, can sustain significant injury well before a person notices a change in hearing thresholds (e.g. a change in the softest sound that can be heard). It is becoming clear that most adults have damage to the connections (synapses) between the cochlea's delicate sensory (hair) cells and the auditory nerve cells that transmit sound information to the brain.

Inner ear damage is likely due to accumulated noise exposure throughout life and the consequence is typically noticeable in difficult listening conditions (e.g. at a noisy restaurant or party). Unfortunately, this condition is likely to worsen over time as more hair cells and their connections are lost: once established, hearing loss is a permanent impairment that places a continuing burden on the individual, the community and the healthcare system.

What if we could repair the lost connections in the cochlea?

Hearing aids and cochlear implants restore some hearing and are especially useful in quiet surroundings. Better outcomes could be achieved if we were able to repair lost connections in the cochlea. There is already compelling experimental evidence that delivering nerve survival factors (called neurotrophins) to the cochlea can restore synapses following noise exposure. However, in order to translate these experimental findings into a clinical treatment, we need to develop an effective and safe way to deliver neurotrophins into the cochlea over a long and clinically-relevant period of time.

Researchers at the Bionics Institute have been working on different drug delivery methods for several years and we have made significant advances. We have developed a novel way to deliver neurotrophins by "loading" them into particles created through nanoengineering. There are two possible routes for delivering these particles to the inner ear, and we now need to use an experimental model to determine which is best. We also need to know how drugs disperse in the inner ear and whether therapeutic amounts of neurotrophins are reaching the cells that will benefit.

These experiments will bring us a critical step closer to a clinical trial of a safe and effective drug treatment for noise-induced hearing loss.

To transform an idea into a therapy that will change people's lives takes years of research and development.

And, of course, funds. The Bionics Institute's reputation for research excellence and innovation means we are often successful in attracting grants from government agencies. However, these grants cover only two-thirds of the cost of carrying out our work, and funding rates are falling as government budgets tighten.

This project has been supported by the NHMRC, but this funding is coming to an end. Our donors play a vital role in allowing us to continue our ground-breaking work and transforming our research into clinical reality.

Supporting our research

There are many ways you could help us deliver improved health and quality of life to those living with chronic and disabling conditions. If you are interested in supporting our research – either a specific project or a general donation – please contact Helen Woods on 0419 565 537. *The Bionics Institute is endorsed as a deductible gift recipient (DGR). All donations over $2 are tax deductible.*