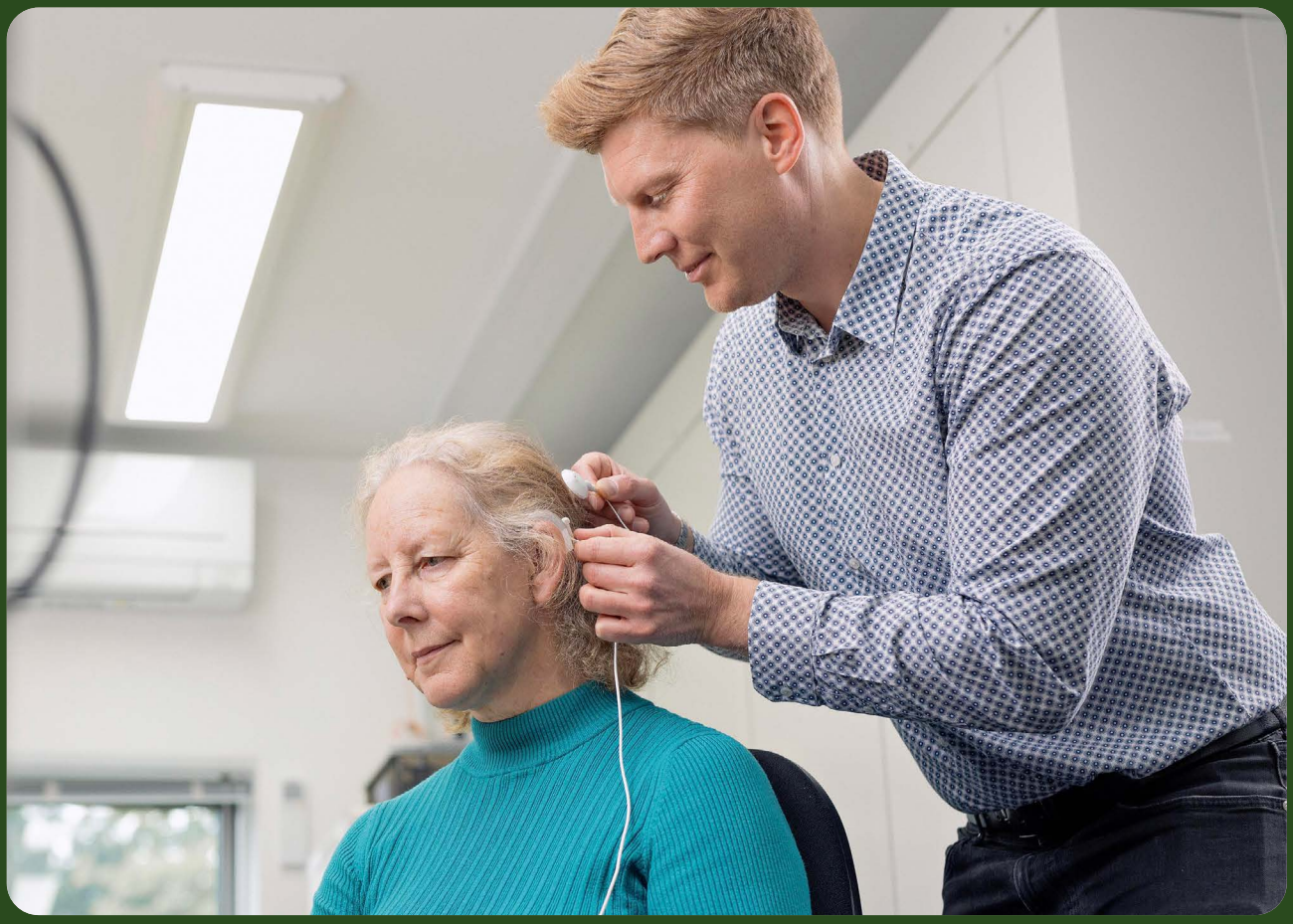
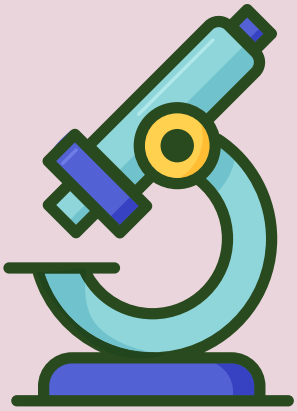


RESEARCH AT RNID

25 years of life-changing discoveries



RNID | Supporting people who are deaf, have hearing loss or tinnitus

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"RNID is the only charity in the UK dedicated to funding hearing research into preventing hearing loss, restoring hearing and silencing tinnitus. They have a unique role in bringing the most talented researchers together – I call it bringing the brains together."

"Research can take a long time to come to fruition and get to a stage where it can benefit a person with hearing loss. A lot of this research work happens behind the scenes and things don't always work but we learn from them. The learnings turn into things that RNID can implement – that's how progress is made. But it needs someone to make sure the right research gets funded and that's what I feel RNID do."

"RNID funds the most critical research work and aims to have therapies and treatments available to as many people as possible, as soon as possible. It's a really worrying thought that if funding were to dry up and RNID weren't able to continue their work, everything would stop. That's why I've included a gift to RNID in my will – because RNID is the charity doing the work that needs to happen to change the lives of people living with hearing loss."

Fred Sims-Williams, legacy supporter

FOREWORD

1 in 3 adults in the UK have some form of hearing loss or tinnitus today. For many millions of us, hearing loss and tinnitus are permanent, and there is often no way that we can prevent it happening or stop it getting worse over time.

If you are not directly affected yourself, someone you love or care about will almost certainly have hearing loss or tinnitus. For many of us, losing our hearing or getting tinnitus can be deeply traumatic, and has a profound impact on every area of our lives.

RNID is the only charity in the UK dedicated to funding biomedical hearing research. We're creating the research environment needed to bring about medical treatments to prevent the onset of hearing loss, restore hearing and silence tinnitus.

Over the last 25 years, thanks to our incredibly generous supporters, we have funded over £28 million of research, which has supported 443 groundbreaking projects in leading research institutes around the world. We're extremely proud of the life-changing impact that our research is already having – and we're pleased to share some of those stories with you in this report.

Our funding is helping to establish a new generation of researchers, many of whom are successfully building new research teams, creating the capacity we need to discover and develop treatments faster.

As well as reflecting on the impact RNID has already had over the last 25 years, this report looks ahead to what we'll be working towards during the next 25 years of research. With the right investment, there will be a wider range of gene therapies to restore hearing for more children with genetic forms of deafness, and treatments to protect people's hearing from the major causes of hearing loss, such as ototoxic (ear-toxic) medicines, noise and age. There will be major advances in hearing aid and cochlear implant technology so that people can experience high quality hearing when using their devices, even in noisy situations. And finally, there will be treatments that can silence tinnitus permanently.

It has been a privilege to witness the remarkable progress we have made over the last 25 years. Together we can create a future where losing hearing is no longer inevitable or permanent.

Dr Ralph Holme, Director of Research

IN 25 YEARS OF RESEARCH:

WE'VE FUNDED

443

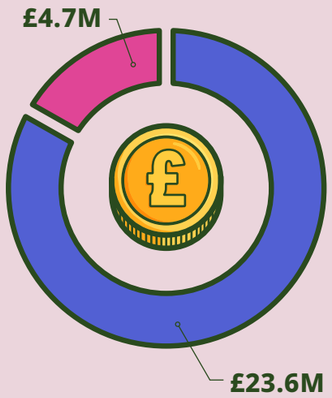
RESEARCH PROJECTS,

INVESTING OVER

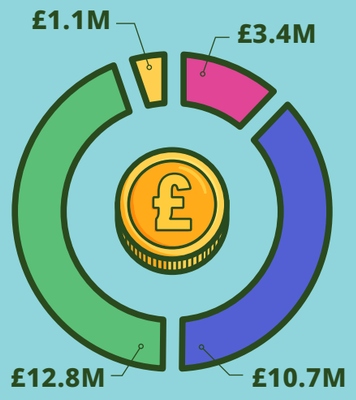
£28M

INTO HEARING RESEARCH

We've funded **BASIC RESEARCH** to generate new knowledge about hearing loss and tinnitus, and **TRANSLATIONAL RESEARCH** to help researchers turn that knowledge into new treatments:



We've funded research into **PREVENTING HEARING LOSS, IMPROVING HEARING, SILENCING TINNITUS,** and understanding the link between **DEMENTIA** and hearing loss



Researchers have published **724 RESEARCH ARTICLES** which have gone on to support and inform other research studies more than 35,000 times

We've invested over **£7 MILLION** into people, including 15 fellowships, 65 PhD studentships, and 76 undergraduate summer studentships

We've funded research at

264 LABS IN 18 COUNTRIES

around the world

We've supported **124** research partnerships and collaborations

For every £1 we invest in hearing research, researchers obtain an additional **£2.74 OF FUNDING**

OUR RESEARCH INTO:
ADULT HEARING LOSS

THE CHALLENGE

Find effective treatments for hearing loss that develops in adulthood

OUR IMPACT

We've kick-started the development of a stem cell treatment for hearing loss that could restore hearing

WHAT WE'RE DOING NOW

Supporting research to prevent hearing loss caused by ototoxic ('ear-toxic') medicines

THE FUTURE

Treatments that protect people's hearing or repair damage to the hearing system

"I believe that the next 25 years will allow scientists and clinicians to join forces to provide a wide range of effective diagnostic tools and treatment approaches to tackle progressive hearing loss."

– Professor Walter Marcotti, University of Sheffield

There are many factors that can cause hearing loss – ageing, exposure to loud noise and as a side effect of certain life-saving medicines, among others. These factors damage the delicate sound-sensing cells in the inner ear, the hair cells, or the nerve cells that carry information about sound to the brain, leading to hearing loss. As these cells can't be replaced this hearing loss is permanent.

Of the 18 million adults in the UK with some degree of hearing loss, most of them will have developed it as an adult.

We want to find ways to protect people's hearing and repair damage to the hearing system to restore hearing.

What we've done

We've kick-started the development of a stem cell treatment for hearing loss

Sensorineural hearing loss is caused by damage to the sound-sensing hair cells in the inner ear or the nerve cells that carry information about sound from the ear to the brain. To restore hearing, we need to find ways to re-grow these cells. One approach could be to use stem cell technology to replace lost auditory cells.

We funded several research projects at the University of Sheffield, led by Professor Marcelo Rivolta, to develop a stem cell treatment to restore hearing. He was able to restore hearing to deafened gerbils using stem cells, showing that it is technically possible.

From the research we funded, Professor Rivolta was able to secure several million pounds of additional funding from other funders and investors to develop the treatment further. A company called Rinri Therapeutics has been set up to develop and test the treatment in clinical trials – which should begin soon.

"The early support provided by RNID was fundamental to this project, allowing us to take it off the ground and obtain great initial data. This was instrumental to us being able to leverage further funding from the Research Councils and other bodies, expanding our understanding of the technology and de-risking it for clinical use."

– Professor Marcelo Rivolta, stem cell researcher at the University of Sheffield

OUR RESEARCH INTO: ADULT HEARING LOSS

What we're doing now

We're supporting research to prevent hearing loss caused by ototoxic medicines

Ototoxic ('ear-toxic') medicines damage hearing as an unwanted side-effect, usually by damaging hair cells in the inner ear. The most common ototoxic drugs are the anti-cancer drug cisplatin and antibiotics called aminoglycosides. Both drugs save lives, but their ototoxicity limits their use. Aminoglycosides are not widely used in the UK because of this – one exception is to treat persistent lung infections in people with cystic fibrosis, where other antibiotics do not work. People with cystic fibrosis therefore often develop hearing loss because of these drugs. Finding ways to protect people's hearing when they take these drugs would allow us to use them more widely.

We're currently funding several projects looking into this. We're funding research at Stanford University in partnership with the Cystic Fibrosis Trust which aims to develop new aminoglycoside antibiotics that do not damage the sound-sensing hair cells. This research could lead to new highly effective aminoglycoside antibiotics which do not cause hearing loss as a side effect.

We're also funding research at University College London to understand how cellular structures called stress granules (part of a cell's response to danger) are involved in aminoglycoside damage to cells in the inner ear and therefore hearing loss. This research could lead to a protective treatment that targets stress granules and prevents ototoxicity.

What will research bring in the next 25 years?

We're working towards:

- Treatments to protect people's hearing from ototoxic medicines like cisplatin and aminoglycoside antibiotics
- Treatments to prevent hearing loss caused by loud noise exposure or ageing
- Treatments that can repair damage to the auditory system and restore hearing

"Much hearing loss is permanent and requires devices such as hearing aids to mitigate its impact. There is hope that, in the next two decades, researchers will be able to repair the cellular damage, so that we can restore hearing, rather than just manage the effects of hearing loss."

- Professor Chris Plack, audiology researcher at the University of Manchester

"There's a lot of focus on funding research to find treatments, but not enough on ensuring those treatments are safe and free of serious side effects. For me, I had to choose between getting rid of the bug and having side effects such as hearing loss or keeping the bug which would have dramatically affected my health. It would have been much better not to have had to make a trade-off at all.

"Good biomedical research can help prevent side effects, so that people can get an illness treated without facing life-altering consequences. That's why funding for biomedical research is so important - so we can get to a point where treatments work without causing additional harm."

- Macauley (pictured below), who lives with cystic fibrosis and hearing loss

OUR RESEARCH INTO:
HEARING AIDS AND COCHLEAR IMPLANTS

THE CHALLENGE

Improve how well hearing aids and cochlear implants work so people who use them can hear as well as possible

OUR IMPACT

We've improved NHS hearing aids and hearing aid fitting so that people get the best out of them

WHAT WE'RE DOING NOW

We're funding research to make it easier for people with cochlear implants to follow conversations in noisy backgrounds

THE FUTURE

Next-generation cochlear implants that provide a more natural sensation of hearing

"I think that machine learning methods have a lot of potential to improve hearing aid and cochlear implant performance."

– Professor Steven Bell, University of Southampton

The standard treatments for hearing loss are medical devices like hearing aids and cochlear implants. Hearing aids use microphones to pick up sounds, making it easier for people to hear them. Cochlear implants provide a sensation of hearing to people with severe to profound deafness. They use electrical signals to directly stimulate the auditory (or hearing) nerve, which carries sound information from the inner ear to the brain. This bypasses damaged parts of the cochlea (the organ of hearing) that are not working.

We want to improve how well these devices work for the people who use them, so they can hear as well as possible.

What we've done

We've improved NHS hearing aids and hearing aid fitting using evidence from our research

The first research project we funded at the University of Southampton in 2000 compared the benefits of analogue and digital hearing aids. The research showed that people generally preferred digital hearing aids. Based on this and other evidence, in the mid-2000s, we persuaded the NHS to modernise audiology services and supply digital hearing aids to everyone.

We also funded research at the University of Cambridge, in the laboratory of Professor Brian Moore, to improve the diagnosis of hearing loss and the fitting of hearing aids to give better performance. One project focused on developing and evaluating a new method of adjusting a hearing aid quickly to give the best possible hearing, designed specifically for use in a busy audiology clinic. The method developed is especially suitable for fitting hearing aids that provide amplification over a wide range of frequencies (amplifying low- through to high-pitched sounds). The fitting method is now being used in audiology clinics and by hearing aid manufacturers all over the world to provide the best possible hearing outcomes for everyone who uses hearing aids.

"In the next 25 years, new clinical technologies will increase the precision of diagnosis and help to optimize the fitting of hearing devices for individual listeners.

"In the longer term, the big steps will be new medical treatments for hearing loss and combining hearing devices with these, for example to make cochlear implants that use precise light stimulation to achieve better sound quality."

- Dr Tobias Goehring, University of Cambridge

OUR RESEARCH INTO: HEARING AIDS AND COCHLEAR IMPLANTS

What we're doing now

We're funding research to improve cochlear implants, which is looking at:

- developing robotic surgical technology that can insert a cochlear implant with less damage to the cells in the inner ear (at Brunel University London)
- improving cochlear implant programming, especially so that they work better in background noise (at the University of Cambridge)
- improving how we can measure how well a cochlear implant works in babies and infants (at the Bionics Institute in Australia)

What will research bring in the next 25 years?

We're working towards:

- Next-generation cochlear implants that use light to stimulate the auditory nerve and provide a more natural sensation of hearing to those who use them
- Improvements in cochlear implant surgery meaning that even more people with hearing loss can benefit from this technology
- Hearing aids that work well in all situations allowing those who use them to hear well all the time

"RNID funding has allowed me to improve our understanding of the problems experienced by people with cochlear implants and to produce tools that have been used by clinicians, companies, and researchers.

It has also allowed me to train very bright young scientists who have proceeded to forge successful scientific careers both in academia and industry."

– Dr Bob Carlyon, cochlear implant researcher at University of Cambridge

"The day I went to have my hearing aid fitted I felt okay and to be honest was not expecting much in terms of what I'd be able to hear in my left ear. But my hearing went from 20/30% to 60/70% which is a huge difference. I walked outside and could hear things that I hadn't really heard in my bad ear like birds and planes in the sky.

"At home I can have my kids on either side of me when we are having a conversation or watching TV. When we are in the car, I can hear whoever is in the passenger seat or back, which is huge because I've never been able to do that before."

- Shakib (pictured below), who uses hearing aids

OUR RESEARCH INTO: DEMENTIA AND HEARING LOSS

THE CHALLENGE

Understand the link between hearing loss and dementia

OUR IMPACT

We've funded research that could improve how we diagnose dementia using measures of hearing in the brain

WHAT WE'RE DOING NOW

Funding research to define the processes underlying hearing loss and dementia so we can find the link

THE FUTURE

Better ways of measuring 'brain hearing' and 'smart' brain-friendly hearing aids

"The next 25 years of hearing research should bring the development of new hearing tests for better diagnosis of specific hearing conditions."

– Dr Nicolas Michalski, Institut Pasteur

Having mild hearing loss is thought to double your risk of developing dementia, and the risk increases the more severe your hearing loss.

The Lancet Commission on dementia has identified hearing loss in later life as one of the biggest risk factors for dementia that is, potentially, modifiable – that is, we might be able to reduce someone's risk of developing dementia by addressing their hearing loss. But we don't have definitive proof, which is why more research is needed.

We also need to better understand the nature of the link between hearing loss and dementia so we can find better ways to treat and prevent both conditions.

What we've done

We funded research that could improve how we diagnose dementia

Research we supported at University College London, led by Professor Jason Warren and Dr Chris Hardy, showed that hearing processes in the brain that are important for understanding speech in challenging listening conditions are affected differently in certain types of dementia. These processes are affected to different degrees in Alzheimer's disease and primary progressive aphasia (a form of dementia that affects the ability to communicate through language). The researchers are now working to develop their findings into a way to better diagnose these conditions sooner, so that people can receive support earlier.

Worked in partnership with dementia charities

Since 2018, we've worked with the dementia research charity Alzheimer's Research UK to jointly fund research to better understand the link between the two conditions, and whether addressing hearing loss can slow or prevent the development of dementia. Together, we've invested nearly £1 million into this crucial area of research.

"I hope the next 25 years will bring a much greater understanding of the role our brains play in hearing – how protecting hearing may help protect the brain, and how hearing changes can be an early warning sign of a brain problem, such as dementia. We hear with our brains as well as our ears – particularly when we converse with friends and family socially, communicate over devices, listen to music or cherish the voices of loved ones.

- Professor Jason Warren, dementia researcher at University College London

OUR RESEARCH INTO: DEMENTIA AND HEARING LOSS

What we're doing now

We're funding research to understand how hearing loss and dementia are linked

Researchers have developed several ideas about what might underlie the link. One possibility is that hearing loss and dementia share disease-causing processes right down at the cellular level in the brain and the inner ear. This would suggest that the same processes lead to both conditions and hearing loss develops first, acting like a flag for dementia.

Another possibility is that hearing loss may cause changes to regions of the brain that receive and process information about sound. These changes then affect other regions of the brain, such as those affected in dementia. If this is the case, then hearing loss could be driving the development of dementia.

We're funding researchers at the Università Cattolica del Sacro Cuore in Rome, Italy, led by Dr Fabiola Paciello, to search for evidence that supports either of these ideas. The findings from their research should shed some light on which explanation, if either, is correct.

What will research bring in the next 25 years?

We're working towards:

- A better understanding of the link between hearing loss and dementia leading to better treatments and diagnosis for both hearing loss and dementia
- Knowledge of whether addressing hearing loss e.g. through using hearing aids can delay or prevent the onset of dementia

"If researchers can find the link between hearing loss and dementia for sure, then they can develop treatments or earlier tests. I'd like to see more research done so that people know what to look out for, what to do sooner rather than later."

- David, who has hearing loss and dementia

Sue (pictured below), who has vascular dementia and hyperacusis, took part in a James Lind Alliance Priority Setting Partnership around hearing loss and dementia, providing insight into what research questions matter most to people living with these conditions. We worked with Alzheimer's Research UK to fund the partnership. Sue, an ARUK ambassador and RNID supporter, says:

"Researchers are now discovering that there are so many different things that are linked to dementia, like hearing loss. Being involved in the project was helpful because I was made aware of things around dementia that I hadn't thought about before. The research into both dementia and hearing loss is hugely complex because of the different types of dementia and the different types of hearing loss, so the work that researchers are doing is absolutely vital."

OUR RESEARCH INTO:
SILENCING TINNITUS

THE CHALLENGE

Develop better treatments for tinnitus that can silence it permanently

OUR IMPACT

We've helped increase understanding of what happens when someone develops tinnitus

WHAT WE'RE DOING NOW

Funding trials of new brain stimulation treatments for tinnitus

THE FUTURE

Ground-breaking treatments for tinnitus and ways to protect people's hearing from damage

"There have been significant advances in understanding the genetics of hearing loss and tinnitus. These provide a solid scientific foundation for developing new treatments for a variety of hearing disorders that affect millions."

– Professor Richard Salvi, University at Buffalo

Tinnitus is a sound heard in one or both ears or in the head which has no external source. It is commonly described as a ringing, buzzing, hissing, whistling or humming sound. It is very common – around 1 in 7 adults in the UK live with persistent tinnitus. It is most frequently associated with exposure to loud sounds that damage the ear.

Tinnitus can have a severe impact on someone's quality of life, causing anger, frustration, problems sleeping, depression and anxiety. It is also one of the main disabilities reported by military veterans.

There is no cure for tinnitus, and to date, no treatment that achieves a consistent long-term reduction of the tinnitus sensation.

We want to develop better treatments for tinnitus that can silence it permanently.

What we've done

We've helped increase understanding of what happens when someone develops tinnitus

We still don't fully understand the mechanisms and processes in the inner ear and brain that underlie tinnitus.

Through our funding, researchers have discovered that noise damage to the inner ear causes changes in the activity of the parts of the brain that are involved in hearing, causing them to become hyperactive. A particular area of the brain that is involved in tinnitus is the inferior colliculus, which is involved in processing sound information from the inner ear. Our research showed that it acts like a volume control, increasing its activity when the sound signal is weak to boost it and reducing its response when the signal is strong. If cells of the inner ear are damaged by loud noise and send less information to the brain than usual, the brain 'turns up' the volume in response, becoming hyperactive. In people with tinnitus, the 'volume' has been turned up, and hence their sensitivity to sound is increased. This could explain why people with tinnitus hear sound that isn't there – it's like the static you hear on a speaker when the volume is turned right up, but there's no music playing.

Further research we funded at the University of Western Australia led by Dr Helmy Mulders showed that tinnitus seems to have two stages of development – an early stage where blocking damage-related signals from the inner ear can prevent tinnitus from becoming established and a later stage, when it has become permanently established in the brain.

These findings are now being built on by other research groups to further our understanding of tinnitus and develop treatments.

"Thanks to RNID funding, we have been able to investigate the idea that tinnitus may have its origin in excess activity in the nerves of the inner ear. There is still a long way to go before treatments could reach human patients, but this is a very promising start."

- Professor Peter McNaughton, tinnitus researcher at King's College London

OUR RESEARCH INTO: SILENCING TINNITUS

What we're doing now

We're funding trials of new brain stimulation treatments for tinnitus

We're currently funding two studies testing different approaches to using non-invasive brain stimulation to silence tinnitus.

We're funding researchers at Flinders University in Australia led by Professor Raj Shekhawat to test whether a type of brain stimulation called High-Definition transcranial direct current stimulation (or HD-tDCS) can suppress tinnitus over a long period of time, and not just while the stimulation is occurring. Their results will help to establish whether this method could be used in the clinic to effectively treat tinnitus.

We're also funding researchers at Trinity College Dublin in Ireland led by Professor Sven Vanneste to test their treatment, based on re-training the brain of someone with tinnitus so they don't 'hear' it anymore. This involves listening training where the person is asked to pay attention to sounds that aren't their tinnitus (which distracts them from it) combined with a type of electrical brain stimulation that is thought to promote learning and memory creation. The idea is that by combining these two methods, the brain stimulation will reinforce the learning from the listening training, creating long-lasting suppression of tinnitus.

What will research bring in the next 25 years?

We're working towards:

- Better treatments that can silence tinnitus permanently
- Better ways to protect people's hearing from the damage that leads to tinnitus

"The project we have funded in tinnitus is a good example of a condition that is poorly understood but affects over 7 million people in the UK. It has a huge impact on quality of life and if over the coming years we can find an answer to this debilitating condition, we have the chance to enhance many millions of lives."

– Richard Miller, Rosetrees Trust

"I've had tinnitus for three years now. I woke up one day and had a constant, high-pitched noise in my head. It felt like the tinnitus I'd noticed in the past when I'd been to a gig or somewhere loud. But what concerned me is that I hadn't been to a gig or festival or anything else which could have triggered it. On top of that, I started to feel some dizziness, even when I was sitting or lying down; feeling a bit seasick, a bit 'off'.

"I think it's reassuring to know that researchers are looking into tinnitus. Even though they can't predict if something they're developing will work as a treatment or not, at least we know we're not alone and there is work going into it."

- Max (pictured below), who has tinnitus

OUR RESEARCH INTO: CHILDREN'S HEARING LOSS

THE CHALLENGE

Find ways to prevent children from losing their hearing and lessen the impact it has on them

OUR IMPACT

We supported the development of a rapid genetic test used in the NHS to identify babies at risk of hearing loss

WHAT WE'RE DOING NOW

Funding research to develop gene therapies to treat inherited hearing loss

THE FUTURE

Improved treatments for middle ear infections so fewer children develop hearing loss

"Hearing loss can have a devastating effect on a young life, which is why Freemasons are proud to support the RNID's three-year PhD research programme focussing on Perrault syndrome. This could be the first step towards a breakthrough for treatment for this rare but very serious condition."

- Les Hutchinson, Chief Executive of the Masonic Charitable Foundation

Over 50,000 children are deaf or have hearing loss in the UK. Half of these children were born deaf, usually because of a genetic cause, and half lost their hearing in childhood because of an infection like meningitis or being treated with medicines that can cause hearing loss as a side effect. Many more children will acquire temporary hearing loss because of middle ear infections. This hearing loss affects children at a crucial time in their development, making it more difficult for them to develop language and communication skills, particularly if they are not identified quickly and given the assistance they need.

We want to find ways to prevent children from losing their hearing and lessen the impact it has on them.

What we've done

We supported the development of a rapid genetic test used in the NHS to identify babies at risk of hearing loss

Newborn babies, especially premature babies, are particularly vulnerable to developing life-threatening infections such as sepsis, as their immune system isn't fully developed. Babies admitted to intensive care with these infections are usually treated with an antibiotic called gentamicin within 1 hour of admission. However, gentamicin is a type of antibiotic called an aminoglycoside that can cause hearing loss as a side effect. Several hundred babies each year develop hearing loss because they're treated with gentamicin.

Around 1 in 500 babies have a version of a gene that makes them especially vulnerable to hearing loss if treated with gentamicin. The new test, made by Genedrive, can analyse babies' DNA and identify babies with this version of the gene in just under 30 minutes. This enables rapid identification of babies that are at particular risk of hearing loss from gentamicin, so they can be given a different antibiotic. The test has been approved for use across the NHS, and it has been estimated that it could save the hearing of 200 babies in England alone every year.

We helped kick-start this breakthrough by funding a pilot project in Professor Bill Newman's lab at the University of Manchester in 2016.

"The RNID funding acted as a catalyst to allow us to develop the prototype point of care genetic test. As this type of testing was so novel, RNID's support was vital to giving other research funding organisations the confidence that we could generate a genetic result at the patient bedside within minutes. This was key to us securing the money that has allowed us to implement the test into routine care of babies on neonatal units."

– Professor Bill Newman, clinical genetics researcher at the University of Manchester

OUR RESEARCH INTO: CHILDREN'S HEARING LOSS

What we're doing now

We're funding research to develop gene therapies to treat hearing loss

Gene therapies have the potential to offer life-changing treatments for hearing loss, particularly inherited forms of hearing loss. By directly targeting changes in genes that lead to hearing loss, gene therapies may be able to correct the underlying genetic cause, rather than merely managing the symptoms, as hearing aids do. Gene therapies show promise in both preventing hearing loss and restoring lost hearing, offering hope to children and their parents.

Norrie disease is a genetic condition which causes both vision and hearing loss. Children with Norrie disease are born blind, and many will also begin to lose their hearing from around the age of 12. Currently, children with Norrie disease are offered hearing aids once they develop hearing loss, and cochlear implants once their hearing loss becomes severe. However, these devices have limitations, especially given the children's blindness, and do not fully restore natural hearing. Through research, we are passionate about finding the breakthroughs that can mean that hearing loss is not an inevitability for these children.

We're funding researchers at University College London, led by Dr Jane Sowden, who are working to develop a gene therapy that can prevent the hearing loss in Norrie disease. This work will provide supporting evidence for the researchers to gain approval to test their new gene therapy in clinical trials.

What will research bring in the next 25 years?

We're working towards:

- Improved treatments for middle ear infections that reduce the amount of time children have hearing loss because of them and reduce the number of grommet surgeries
- New gene therapies to treat hearing loss for some types of genetic hearing loss – for those who want them

"I hope that gene therapy will in the future make a difference for people who have hearing loss, and that my lab's research will provide the foundation for a first gene therapy clinical trial for deafness in Norrie disease."

- Professor Jane Sowden, gene therapy researcher at University College London

"Cameron was only three years old when I noticed he was becoming more frustrated and scared. We found out that he'd completely lost his hearing on his right-side. At five years old, his hearing on the left side also began to deteriorate.

"I can't imagine being blind and then losing another vital sense which connects me to the world.

"Thankfully there is a ray of hope for my son, and other children with Norrie disease too."

- Carla, whose son Cameron has Norrie disease (pictured below)

OUR FUTURE HEARING RESEARCH LEADERS

Hearing research is a small field compared to other areas of research, so it's not surprising that it attracts a disproportionately low amount of funding relative to the scale of the issue (18 million adults in the UK have some degree of hearing loss and over 7 million adults have tinnitus). For the field to grow and attract more funding, and thus speed up the development of effective treatments, we need to increase the number of hearing research leaders in the UK. We hope these leaders will go on to build research teams to attract increasing amounts of public funding and people into hearing research, creating the capacity needed to develop treatments.

Members of the Hearing Research Group at the University of Sheffield. We have supported many early-career researchers at Sheffield.

Dr Zoe Mann

Dr Zoe Mann is a Senior Lecturer at King's College London who studies the role of cell metabolism (the chemical processes happening continuously inside cells as part of normal cell functioning) in the development of the inner ear. She hopes her research will help remove some of the roadblocks to developing biological treatments for hearing loss. Zoe was one of the first PhD students we funded in 2004 and also received one of our earliest Pauline Ashley Fellowships in 2017.

"It was never my plan to be a hearing researcher, but my PhD got me hooked; I wanted to understand everything to do with how the cochlea works, how it develops, and how it gets damaged. As a system, the inner ear is one of the most incredible examples in biology of cells developing and specialising to do something as complex as hearing. The fact that cells in your inner ear can tell the difference between the sound of a mosquito buzzing and a clap of thunder is amazing. I think children and young people should be taught to value and take care of their hearing.

"In my lab, we work on cell metabolism in the inner ear. We study the role of mitochondria (small structures in cells that provide the cell with energy) in different metabolic processes and different cells and look at what happens if you change their or aspects of their biology – how do those changes affect how cells in the inner ear develop or function?

"Following my RNID-funded PhD, I moved to the US to work as a post-doctoral researcher for several years. I then wanted to move back into UK research, so I returned to the UCL Ear Institute (where I'd done my PhD). While I was there, I was awarded a Pauline Ashley Fellowship from RNID. The Fellowship was the springboard I needed to help me become an independent researcher – it allowed me to gather preliminary data for my own ideas which then led to me applying for larger grants. It was a real turning point for me – without RNID's support at that point, I probably wouldn't have been able to get to where I am today."

OUR FUTURE HEARING RESEARCH LEADERS

Dr Emma Holmes

Dr Emma Holmes is an Associate Professor at University College London who studies the brain processes that people use to understand speech in noisy environments with the aim of improving how we treat hearing loss and help people manage it. Emma is one of our early-career Fellows; we funded her in 2019.

"I study how people understand speech in noisy environments when multiple conversations are going on. I look at the brain processes that people use to focus on someone's voice in these challenging environments and how those processes are different in people who have hearing loss.

"I hope my research will help us better understand the underlying causes of difficulty with hearing for people with hearing loss and lead to better treatments. I can imagine a hearing aid of the future that can take into account a person's individual strategies for listening in noisy environments. Such a hearing aid would capitalise on aspects of listening that they're already very good at and support aspects of listening that they struggle with.

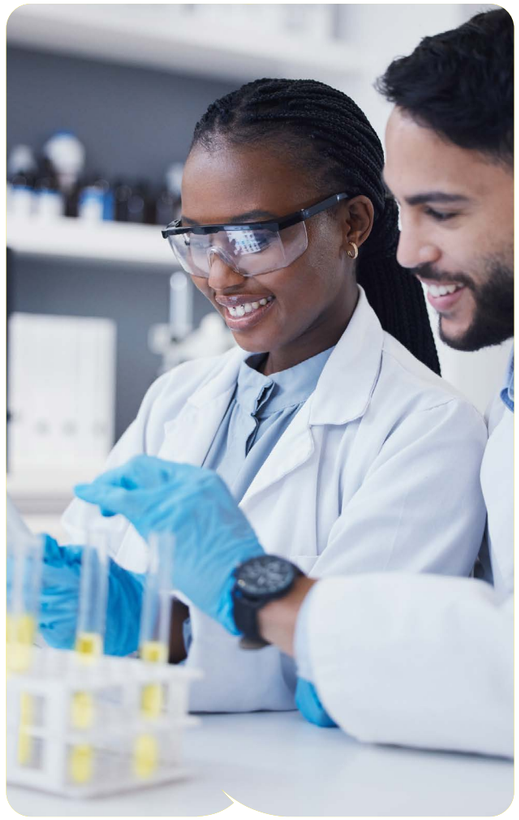
"I want to make a real difference to people's lives. In the future, it would be amazing to be able to point to something and say 'that's helping people to hear better and my research contributed to that'. That's my ultimate goal.

"My RNID Fellowship was a crucial stepping-stone for setting up my own research group at UCL. Being able to show that you've had funding in the past and you have some useful data from that funding, and that you managed the grant well, is very important for the people who are evaluating your next grant application. The Fellowship led to me obtaining a Wellcome Trust Career Development Award, an eight-year grant that funds me to conduct my research and supports my team as well. It allows me to employ other people in my lab – so far, it has funded a post-doctoral researcher and a PhD student as well as the costs of their research.

"I'm now seeking additional funding to expand my lab further. I'd really like to collaborate with industry to consolidate some of the knowledge from my research and drive forward those benefits for people through better hearing aids."

"For me personally, the Fellowship funding came at a pivotal point in my career just after my PhD where, very sadly, lots of excellent scientists have to leave research due to lack of funding. RNID's Fellowship enabled me to stay and pursue my ideas, and I'll forever be grateful for that."

– Dr Chris Hardy, dementia researcher at University College London



What we're doing now

We support researchers at the beginning of their careers by funding:

- Summer placements as part of in2scienceUK's In2Research scheme, providing opportunities for undergraduates from disadvantaged backgrounds to gain experience of working in a lab and to consider a career in hearing research
- PhD studentships to train the hearing scientists of tomorrow
- Fellowships to support post-PhD researchers as they begin to make the transition towards becoming an independent hearing researcher

What will research bring in the next 25 years?

We're working towards:

- More researchers working to find treatments for hearing loss and tinnitus in the UK and globally
- The first treatments to prevent hearing loss, restore hearing and silence tinnitus being available in the clinic where they can benefit those who want them

LOOKING TO THE FUTURE

"The next 25 years should see many new clinical trials of medical treatments aimed at the underlying disease process and some will be successful, giving people with hearing loss more options."

– Professor Karen Steel, King's College London

"In the next 25 years, a focus on personalised medicine will mean that we don't treat all people with hearing loss in the same way but use knowledge of genetics and environmental influences to create individual treatment plans."

– Professor Abigail Tucker, King's College London

"We have contributed to the funding of a variety of RNID's research initiatives, many with very promising results. RNID has been exemplary in maintaining a close liaison between the donor and the progress of the science. I am confident that the next decades will see a remarkable breakthrough in the treatment of hearing loss and tinnitus."

– RNID major supporter

"I think recent progress in research will lead to greater benefit for patients. Hearing aids will get better, there will be more hearing genes identified, therapies will start to be developed to prevent hearing loss."

– Professor Sally Dawson, University College London

"I'm hoping to see advances in how we programme or engineer hair cells and other structures of the ear to protect or repair themselves."

- Dr Emma Kenyon, Swansea University

THE DIFFERENCE YOU MAKE

"The advancements we've made, from enhancing cochlear implant outcomes to developing objective measures for speech recognition, have only been possible thanks to generous contributions from donors like you. By supporting RNID, you are investing in a future where hearing loss can be better understood, managed, and even prevented."

– Professor Doug Hartley, University of Nottingham

"Every contribution supports essential studies that could lead to better treatments and solutions, aiming for a future where hearing loss is better understood, managed, and potentially prevented. No donation is too small, and your support brings us closer to these goals, making a real difference."

– Dr Elisa Martelletti, King's College London

THANK YOU

Over the past 25 years we have achieved so much, and we couldn't have done any of it without your help and support.

Whether you have worked on our hearing research, donated to RNID, or shared your personal experience of hearing loss or tinnitus – you have helped to achieve life-changing breakthroughs.

We couldn't have made our research impacts alone, and together, we'll continue to support world-leading research to bring about new treatments for hearing loss and tinnitus.

Thank you for giving us your valuable time and donating so generously over the years. We are incredibly grateful.

To find out more about our research programme, visit our website. **rnid.org.uk/hearing-research**

We are RNID: the national charity supporting the 18 million people in the UK who are deaf, have hearing loss or tinnitus.

Together, we will end the discrimination faced by our communities, help people hear better now and fund world-class research to restore hearing and silence tinnitus.

If you or someone close to you are deaf, or have hearing loss or tinnitus and need free confidential and impartial information and support, contact RNID. We are open 8:30am to 5.00pm, Monday to Friday.

Chat to us on the RNID website: www.rnid.org.uk

Call: 0808 808 0123

Email: contact@rnid.org.uk

Book a BSL video call via our partners at Sign Live: create an account at the SignLive website or download the SignLive app for Android or the SignLive app for iOS

SMS/text: 07360 268988

Relay UK: 18001 then 0808 808 0123

Write: RNID, 126 Fairlie Road, Slough, Berkshire, SL1 4PY

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RNID Supporting people who are deaf, have hearing loss or tinnitus