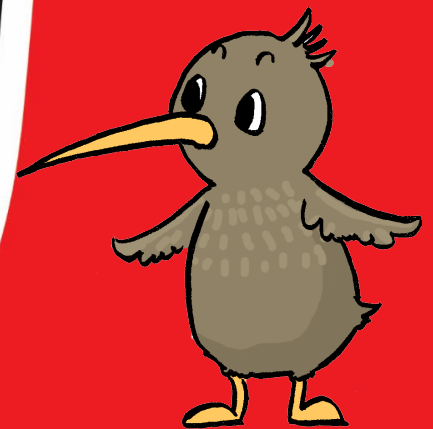
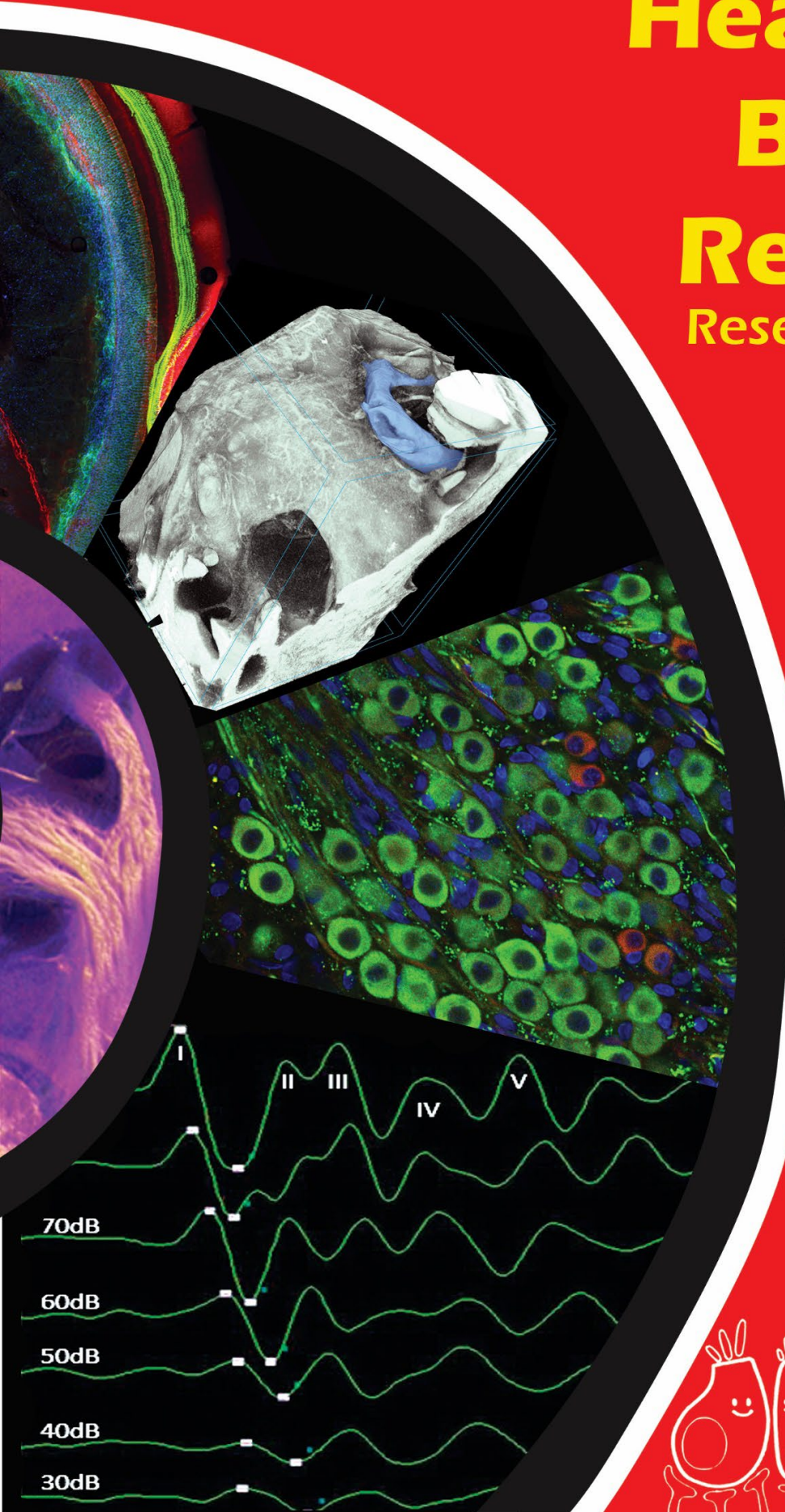


Hearing & Balance

Research

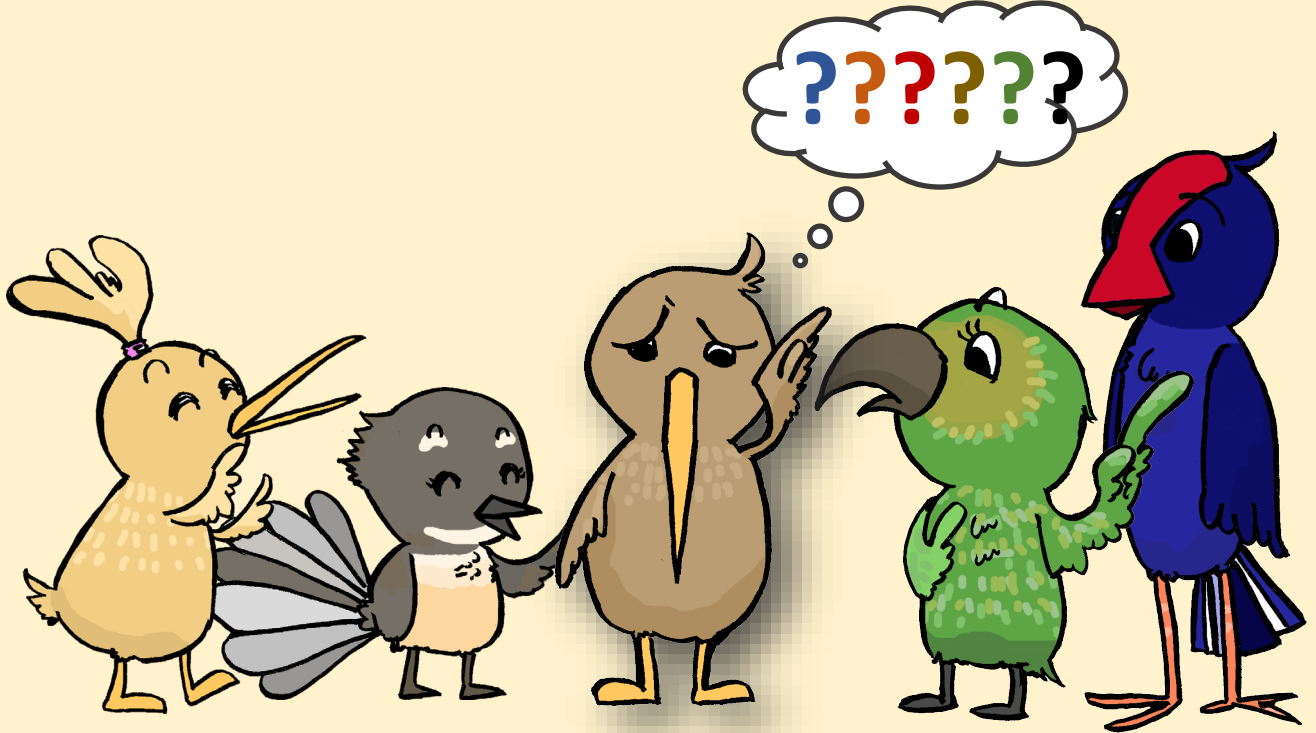
Research Towards
Inner Ear
Therapeutics



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1 in 5 have **HEARING LOSS** that may cause communication difficulties.



Please be mindful of everyone's needs.



Speak slowly and clearly.



Rephrase or repeat, if necessary.



Use an app that can translate speech into text or writing tools.



Wear a clear mask so your lips are visible, if possible.

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To hear for life,
listen with care!



World Hearing Day 2022 (3 March)



ALERT! YOUR **EAR** MIGHT BE TIRED!

You get sore legs and tired eyes when you use them too much.

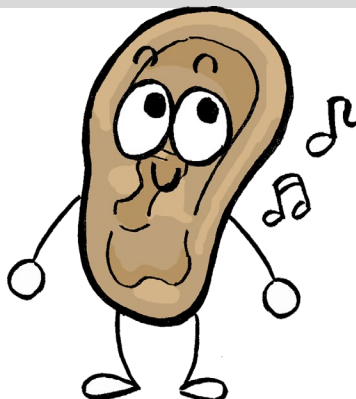
- Our ears get tired, if you listen to a sound that is too loud or for too long.

Avoid TOO Loud



- Loud sound will hurt your ears.
- Use earplugs or earmuffs to protect your ears.

Listen with Care



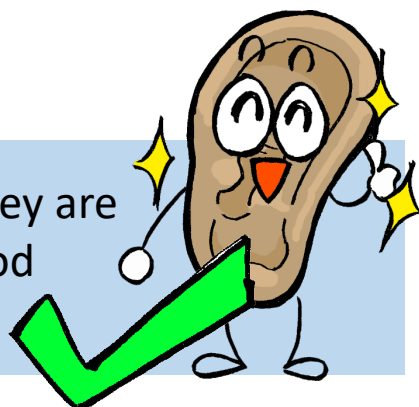
- Turn the volume down.
- We can enjoy TV and music without high volume.

Have a Break



- Rest your ears
- Have a break from leisure music.

Our hard working ears don't tell you when they are tired. Take care of your ear, so you have a good hearing for life!



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Hearing Loss and Our Whānau

Let us think:

- How is this relevant to you?
- What does it mean to have hearing loss?
- Do you know of anyone with hearing loss?
 - What can you do to help?

Activity: Put on ear plugs for 30 minutes, and experience what it is like to have your hearing affected.

1. What activities in your daily life are affected?

2. Can you communicate with your friends?

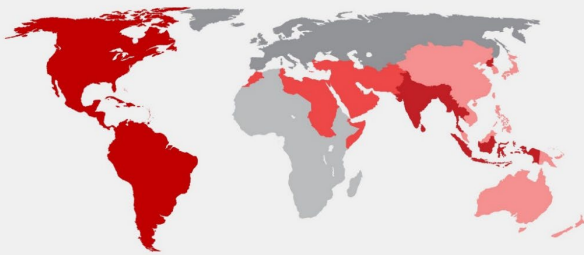
3. What can you do to help if you know someone has a hearing problem?



“World Report on Hearing”

Over
1.5
billion people affected by hearing loss

Of them, nearly 1 out of 3 need hearing care
80% live in low- and middle-income countries



#hearingcare



“World Hearing Report (2021)” is the first official report released by WHO on hearing loss.

- Hearing loss is very common.
- 1.5 billion people are affected by hearing loss across the globe.
- 430 million people need rehabilitation services for hearing loss across the globe.
- Hearing loss is on the rise. We estimate that 2.5 billion people will be affected by hearing loss in 2050.



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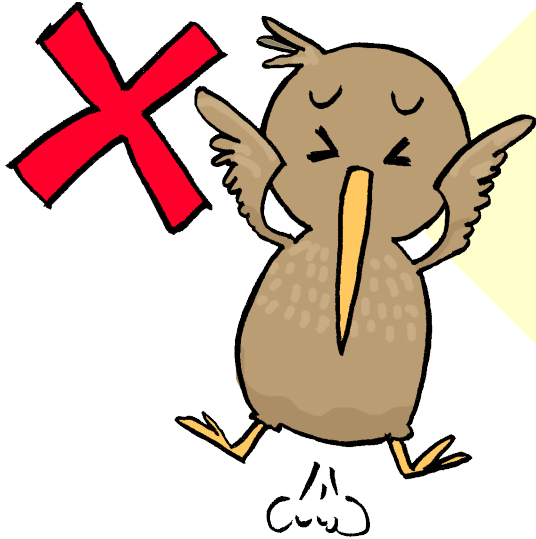
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What can you do to protect your hearing?



Our ears get tired when we listen to a sound that's too loud or for too long. When ears get unwell, it becomes hurt, and you will start to develop hearing loss.

If you work in a noisy environment, like using a machine that produces a loud sound, please use earmuffs or earplugs to protect your ears.



Don't overuse your ear. Earphones and headphones, be careful with the volume and don't listen all day.

What can you do to protect your hearing?

Our hearing is very precious.
To have a good hearing for
life, we have to take good
care of our ears.



If you want to check your hearing, check out
the website or app below:

<https://www.who.int/health-topics/hearing-loss/hearwho>

<https://www.who.int/publications/i/item/9789241515276>



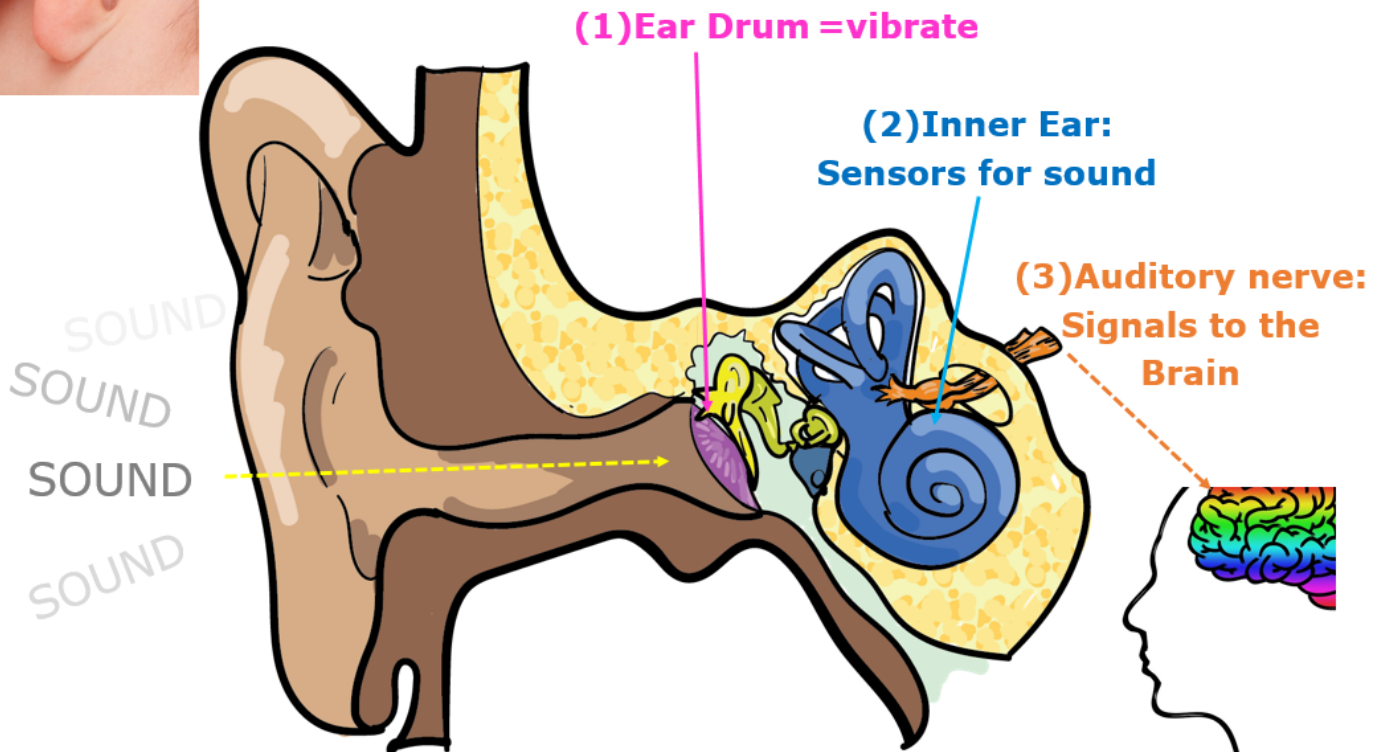
Download the app



Science Behind Hearing and Hearing Loss



Our “Hearing” System **Auditory Neuroscience**

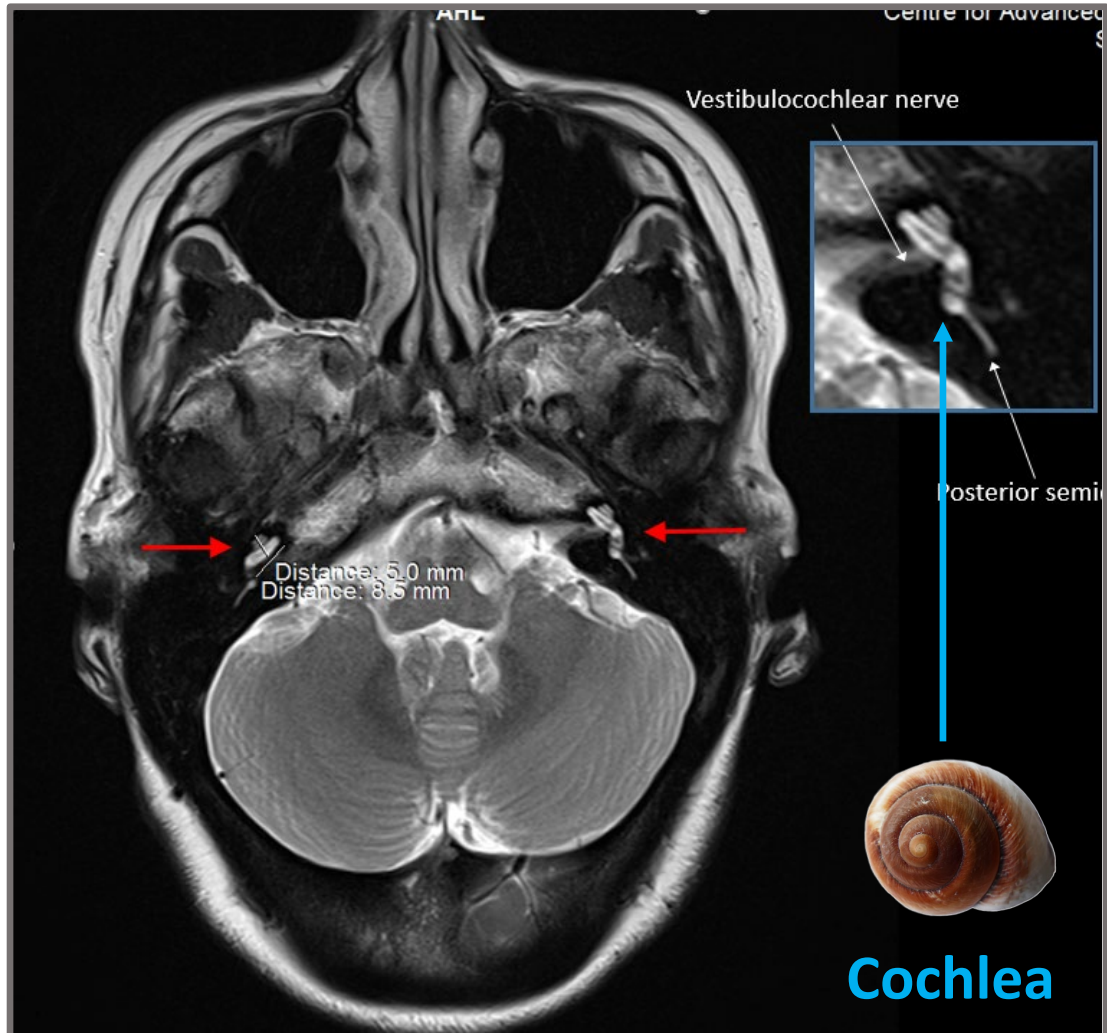


- (1) Sound is a vibration that travels through the air. They reach your ear and vibrate little bone inside your ear.
- (2) Vibration reaches the inner ear. The inner ear contains special cells that act as “sensors” of sound waves.
- (3) Sound information is sensed and carried to the brain by a nerve.



Where is the Inner Ear?

This is an MRI image of a human head. Deep inside our head, next to the brain, are our inner ear organs for hearing called “cochlea.”

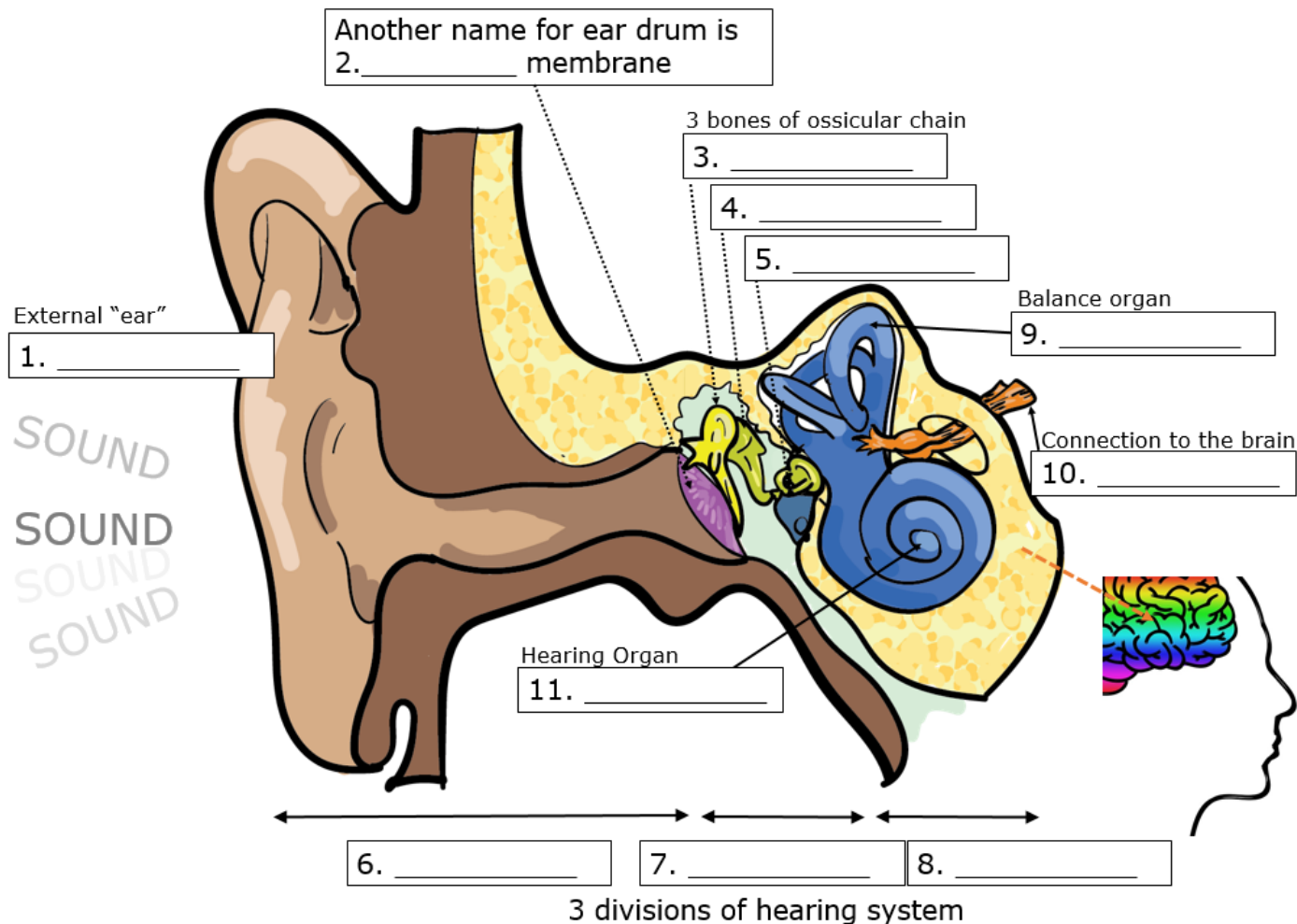


Question:

- How big is the cochlea? Can you guess from the image?
- Do you think it is easy to access the cochlea for medical intervention?



Activity: Anatomy of Our Hearing System



HINT Glossary to choose from:

Cochlea, Stapes, Vestibulocochlear nerve, Pina, Middle Ear, Outer Ear, Inner Ear, Semicircular canals, tympanic, incus, malleus Hair Cells (red)

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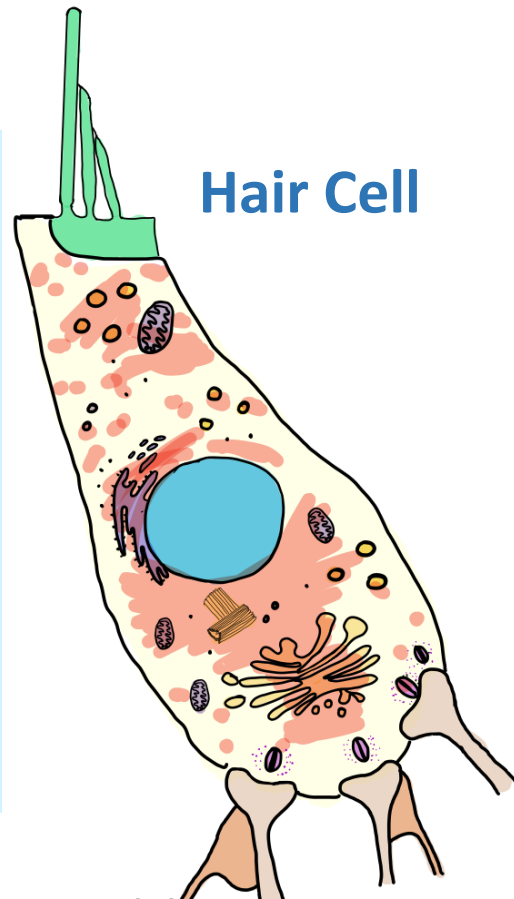
**To hear for life,
listen with care!**



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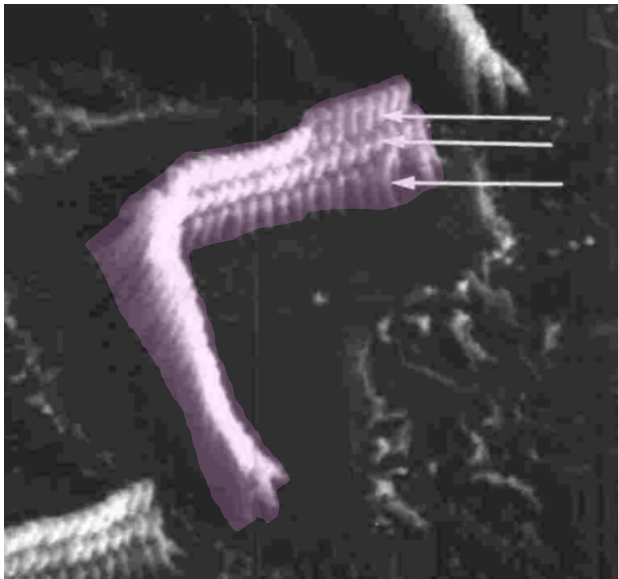
What happens when there is “hearing loss?”

- Our special sensor for sound in the ear are called “hair cells”.
- Hair cells have “hairs” that can detect very tiny motion from vibrations of sound.
- When these hair cells become unhealthy, they lose their hairs. They cannot detect sound waves anymore, and you develop hearing loss.

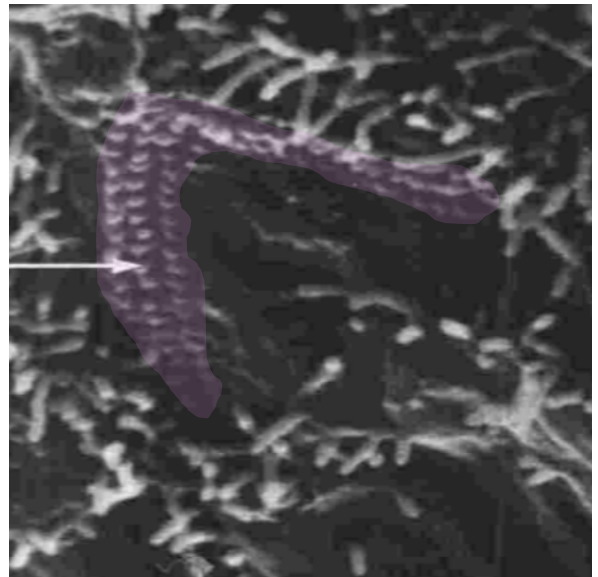


Hair Cell

Healthy hair



Damaged hair

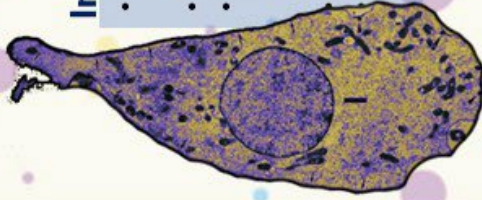


Which Cochlear Cell Are You?

Our cochlea has many different living cells. Which type are you?

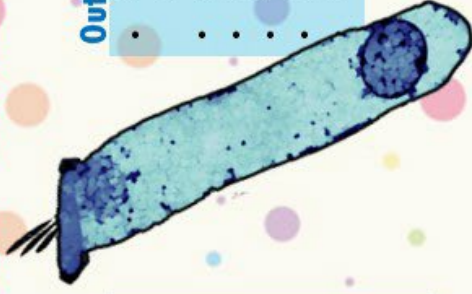
Inner Hair Cell

- Quick to get excited or calm down.
- Great communicator.
- Talks to the neighbouring neurons a lot.
- Tough and resilient.
- Worried about pear-shaped body.



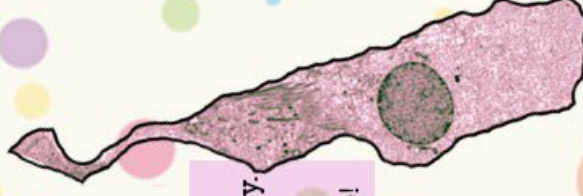
Outer Hair Cell

- Toughness is not my thing. Pass out first.
- I cannot stop moving!
- Party time!
- Totally dependent on his friend.
- Hate feeling lonely.
- Proud of nicely combed hair.



Deiter Cells

- Support friends physically and mentally.
- Team player.
- Charming.
- Obsessive-compulsive!



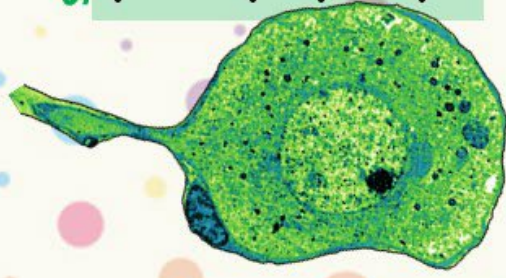
Pillar Cells

- Tall, strong and silent.
- May appear rather dull.
- Taken for granted by their peers.
- Team work between the like-minded is powerful.



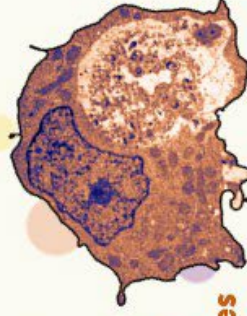
Spiral Ganglion Neurons

- Have broad connections with many people near and far.
- Tough guy.... very resilient.
- Stop communicating quickly when under stress, and go quiet.
- Cute and round with smart long arms.



Residential Macrophages

- Hard to find.
- Always running late but stays late to clean up everyone's mess.
- Once upset, stays upset for a long time!
- Likes eating & eat a lot!

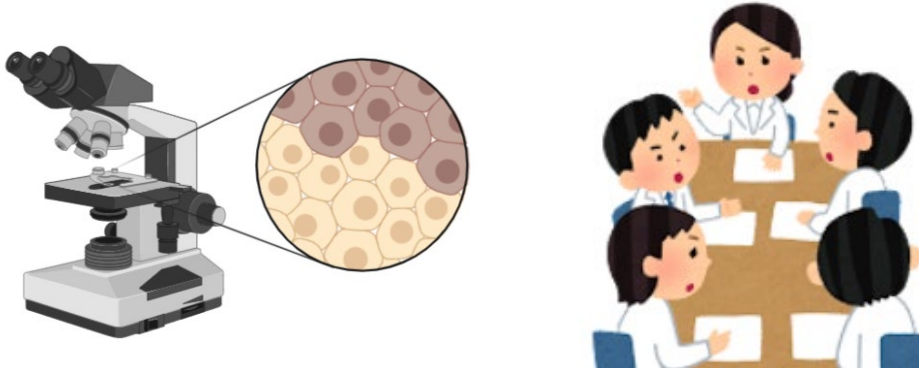


Mesothelial cells

- Scattered all over the place.
- Very mysterious.
- Mind own business.
- Low maintenance.
- Calm all the time.



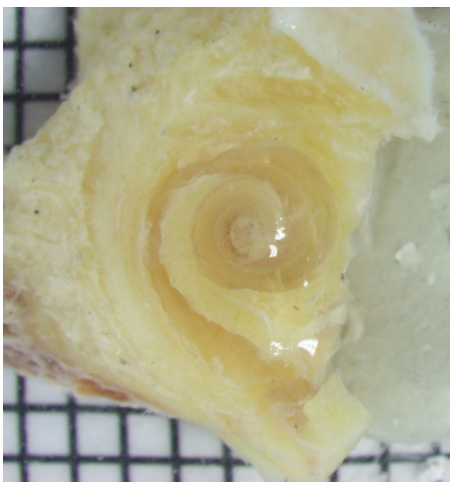
Innovation, Technology and Future of Treating Hearing Loss



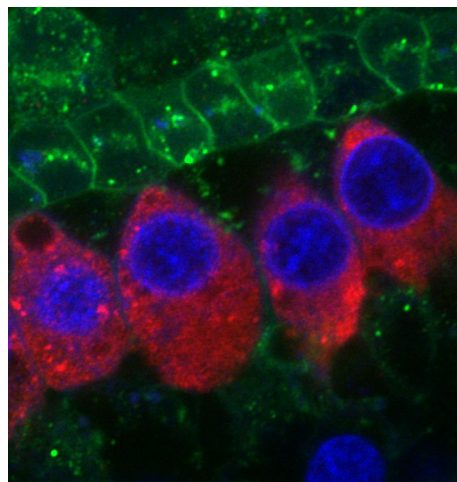
What are we doing as biomedical researchers??

- We study what's inside the ear to find new ways to prevent hearing loss and improve people's hearing.
- We investigate how we can deliver drugs inside the ear.
- We are also trying to develop a new way to diagnose hearing loss.

Cochlea

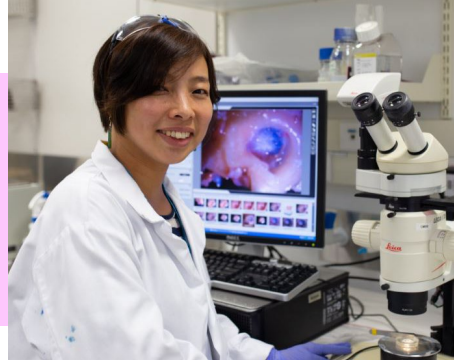


Hair Cells (red)



Meet the Auditory Scientist!

Dr. Haruna Suzuki-Kerr



Q: Who are you?

A: I am a researcher at the University of Auckland.

Q: Where do you work?

A: I work in the Grafton campus of the University of Auckland.



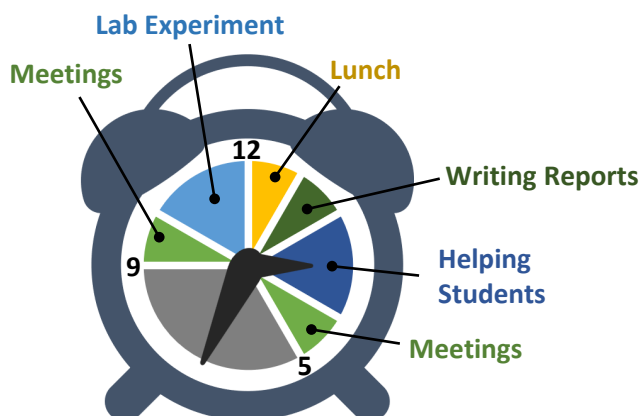
Q: Why did you become an auditory neuroscience researcher?

A: I was always interested in human biology. Special senses like eyes & ears are really amazing. I became fascinated by how complex it is, but also how beautiful the our inner ear looks.

Q: How did you become an auditory neuroscience researcher?

A: I graduated from the university of Auckland with bachelor of science. Then I did a postgraduate degree at the University of Auckland. After getting a PhD, getting a research job at the university was the start of my career as an auditory neuroscience researcher.

Q: How does your "average day" look like from 9-5?



Q: What do you do in your daily life as a researcher?

A: I spend time in the lab, preparing material for research. I use microscope a lot to study the ear and what cells in the ear are doing. I also help postgraduate students at the University, so I often teach students on how to use microscope, and have meetings to discuss their research projects.

Q: What do you enjoy about being a researcher?

A: Research is all about discovering new facts. Studying a question no one else in the world know the answer to, is really exciting. You also get to use highly specialized, really expensive research equipment like top-of the world class microscopes. As a researcher, you meet and work with other researchers in different countries, which is also exciting.

Q: What's tough about being a researcher?

A: Sometimes you don't discover anything after putting many hours of work. Work opportunity is limited.

Q: What is your current research interest / goal?

A: I am interested in how our hearing develop when you are growing baby, and how this could get affected.



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Meet the Auditory Scientist!

Associate Professor Srdjan Vlajkovic



Q: Who are you?

A: I am a neuroscientist and Associate Professor in Physiology at the University of Auckland.

Q: Where do you work?

A: I work in the Department of Physiology at the University of Auckland.

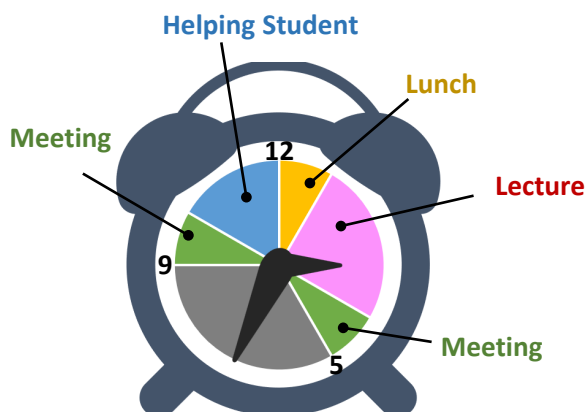
Q: Why did you become an auditory neuroscience researcher?

A: My interest in hearing research has a lot to do with my father's illness called Meniere's disease. This disease affects hearing and balance and reduces the quality of life.

Q: How did you become an auditory neuroscience researcher?

A: I graduated in Medicine at the University of Belgrade (Serbia). After that, I did postgraduate studies to receive a Master's degree and Ph.D. I worked in Belgrade for a few years before moving to New Zealand. I've been working at the University of Auckland since 1994.

Q. How does your "average day" look like from 9-5?



Q: What do you do in your daily life as a researcher?

A: It is a mixture of many activities. Writing research publications, writing research funding applications, providing support to students, doing laboratory experiment, teaching small and large classes at the university, research planning, meetings, and a lot of administration.

Q: what do you enjoy about being a researcher?

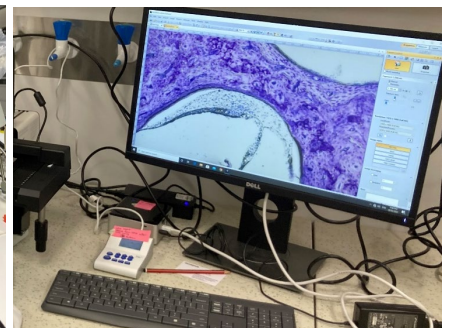
A: I decided very early after graduating from Medicine to become a researcher rather than a practicing clinician. Finding new, original solutions for medical problems excited me, and I like to read and learn new ideas. I also enjoy working with students as their enthusiasm for research keeps me motivated. My goals haven't changed over time – I am still excited to investigate disease mechanisms and look for new treatments for hearing disorders.

Q: What's tough about being a researcher?

A: It is very competitive to get research funding and publishing research findings. It is very rewarding when you are successful but sad when your projects doesn't go very well. One has to accept both success and failure as parts of research life.

Q: What is your current research interest / goal?

A: My current research interest is in finding new treatments for hearing loss. That includes drugs that can prevent hearing loss or to correct genetic defects associated with hearing loss.



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Meet the Auditory Scientist!

Dr. Rachael Taylor



Q: Who are you?

A: I am a clinician (Audiologist) and scientist with an interest in people's hearing and balance.

Q: Where do you work?

A: At both a university and at a clinic that treats people with dizziness and balance problems.

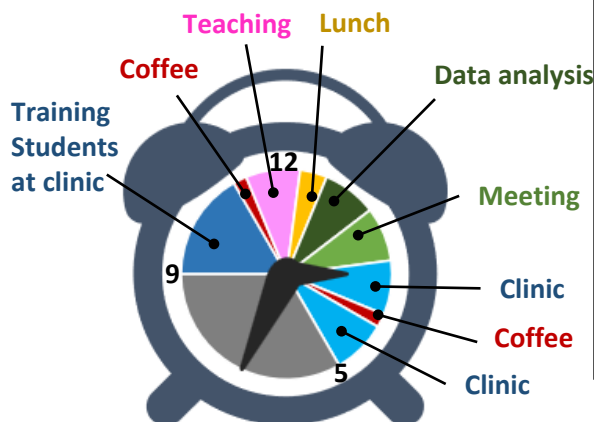
Q: Why did you become an auditory neuroscience researcher?

A: I left my high school in Whangarei without knowing what I wanted to do. I initially studied mathematics at the University of Waikato & bumped into neuroscience by chance. I enjoyed it so much that I decided to start a neuroscience degree at the University of Otago. There, I developed an appreciation for how important our vision and hearing are for us to communicate and make sense of the world around us.

Q: How did you become an auditory neuroscience researcher?

A: After Otago, I did Master of Audiology program at the University of Auckland because I knew that I was most interested in the sense of balance. I then worked as a clinical audiologist in hospitals in NZ, England and Australia. I became involved in research through jobs, and this is now a major focus for me.

Q: How does your "average day" look like from 9-5?



Q: What do you do in your daily life as a researcher?

A: Some days, I perform hearing and balance tests on patients for clinic and for research. Most days involve attending at least one meeting. I also support students, and preparing lecture material for students and presenting lectures, and marking student assignments are also parts of the job.

Q: What do you enjoy about being a researcher?

A: I enjoy working with other researchers who are passionate about what they do. I love analysing data. It is always with eager anticipation that I await the results of my statistical analysis to see if they support my idea. I also like the fact that there is still so much to learn. Unexpected findings that may not be in line with what I had thought/planned, force me to rethink my methods and ideas.

Q: What's tough about being a researcher?

A: It can be a challenge learning to juggle multiple things at once. Sometimes there are several deadlines to meet, and it feels like there are not enough hours in the day.

Q: What is your current research interest / goal?

A: Currently, I am interested in how our senses of hearing and balance work together to help us maintain a stable, upright posture and navigate our environment.



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Meet the Auditory Scientist!

Professor Peter Thorne



Q: Who are you?

A: I am an auditory neuroscientist and Professor at the University of Auckland

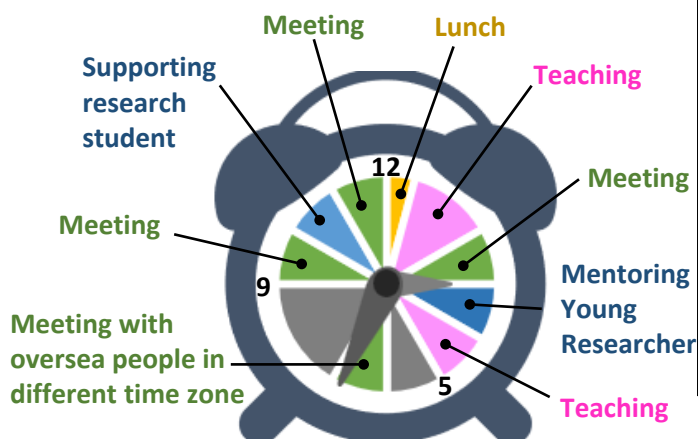
Q: Why did you become an auditory neuroscience researcher?

A: Honestly, I sort of fell into it, and pleased I did! I developed an interest in sensory biology and disorders at university and had always been keen on a career in medical research. I was later influenced by an Otology doctor to look at hearing and developing treatments for ear disease. And I haven't looked back!

Q: How did you become an auditory neuroscience researcher?

A: I did undergraduate and post-grad degrees in Physiology and a PhD in Pathology (=how disease develop). I then worked as a scientist at a major Hearing Research Institute at the University of Michigan in the USA. After this, I returned to NZ and continue to work as a scientist for years and set up my own research group. I was then offered a job as a permanent lecturer to set up a new Audiology degree programme and a research activity in audiology.

Q: How does your "average day" look like from 9-5?



Q: What do you do in your daily life as a researcher?

A: My time now is very much in leading programmes of research. So my day is made of many meetings with colleagues and students reviewing collaborative work, planning new studies and preparing manuscripts, and grant applications.

Q: What do you enjoy about being a researcher?

A: Many, many things. The people you work with and meet, discovering new things and the challenges of research, engaging with students and communities. Most of all, I get paid to do what I love!

Q: What's tough about being a researcher?

A: Tough question. Getting the funding for research is hard and very competitive. So even your best ideas may not be funded. But persistence pays off, and getting your work published and making advances in the field is rewarding. Juggling the demands of teaching, research, and administration as an academic can be difficult at times.

Q: What is your current research interest / goal?

A: I am working in a number of areas in collaboration with others in our group around developing therapies of ear disease and systems, delivering drugs to the ear, and preventing ear diseases using public health approaches. I also want to design ear and hearing care services in Pacific Island Countries.



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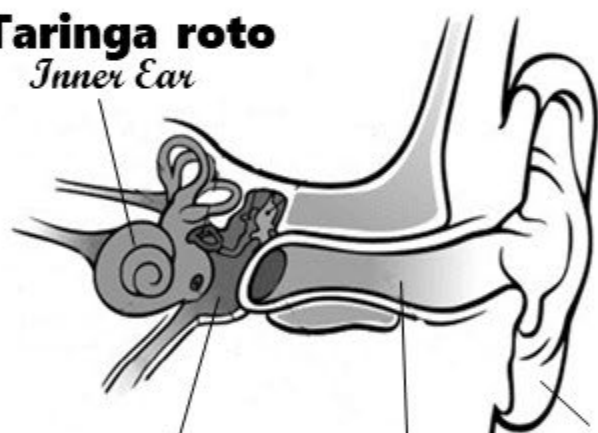
World Hearing Day 2022 (3 March)

Poutū-te-rangi Marama o Te Mātāu a-Rongo



Taringa *the Ear*

Taringa roto
Inner Ear



Taringa waenga
Middle Ear

Pokopoko/hoi
Ear lobe

Taringa waho
Outer Ear

Whakarongo!
Listen!

Te Rongo
hearing

Hou
sound

Whakarekareka
Pleasant sound

Waiata
Song

Kahaoro
Sound volume

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Kāmeameha
Hearing is precious.



Manaaki
Protect your hearing.



Tūhono
Stay connected.

Ko te rongo tō tātou tairongo puiaki.

- Hearing is our precious sense.

E whakareia ana tō tātou oranga e te rongo ki ngā oro huri noa.

- Hearing enriches our life with all sounds surrounding us.

Mā te rongo e taea ana te tūhono ki te hāpori.

- Hearing let us connect to the community.

Parea tō rongo me tērā o ō tamariki me tō whānau.

- Protect your hearing and of your children & family.

Whakamātauria, kia mātau hoki ki tō rongo.

- Test and be aware of your hearing.

Parea tō rongo me te noho tūhono tonu.

- Protect your hearing and stay connected.

Poutū-te-rangi
Marama o
Te Mātau a-Rongo

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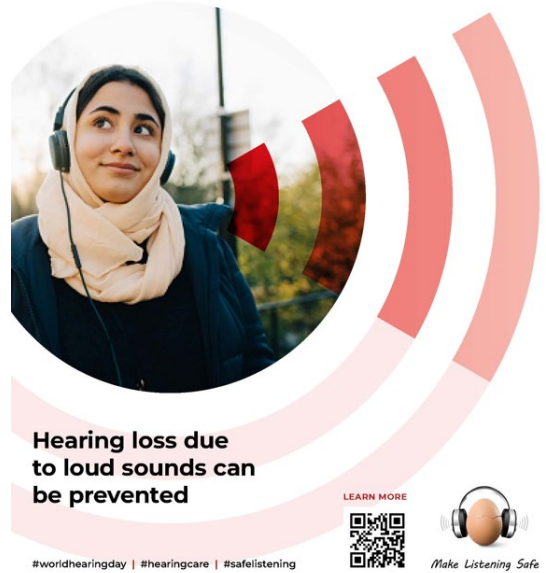


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Eisdell Moore Centre

Hearing and Balance Research at Auditory and Vestibular Translational Neuroscience Cluster

*We support world hearing day
2022!!*

**To hear for life,
listen with care!**



Who are we?

We are a group of scientist who study our senses of hearing and balance. We hope that our research will contribute to developing new treatments for hearing loss and balance disorders.



Prof. P Thorne



A/Prof. S. Vlajkovic



Dr. R. Taylor



Dr. R. Telang



Dr. H Suzuki-Kerr

For More information, feel free to contact us:

Facebook: <https://www.facebook.com/AVTNC1/>

Email: avtnc1@auckland.ac.nz

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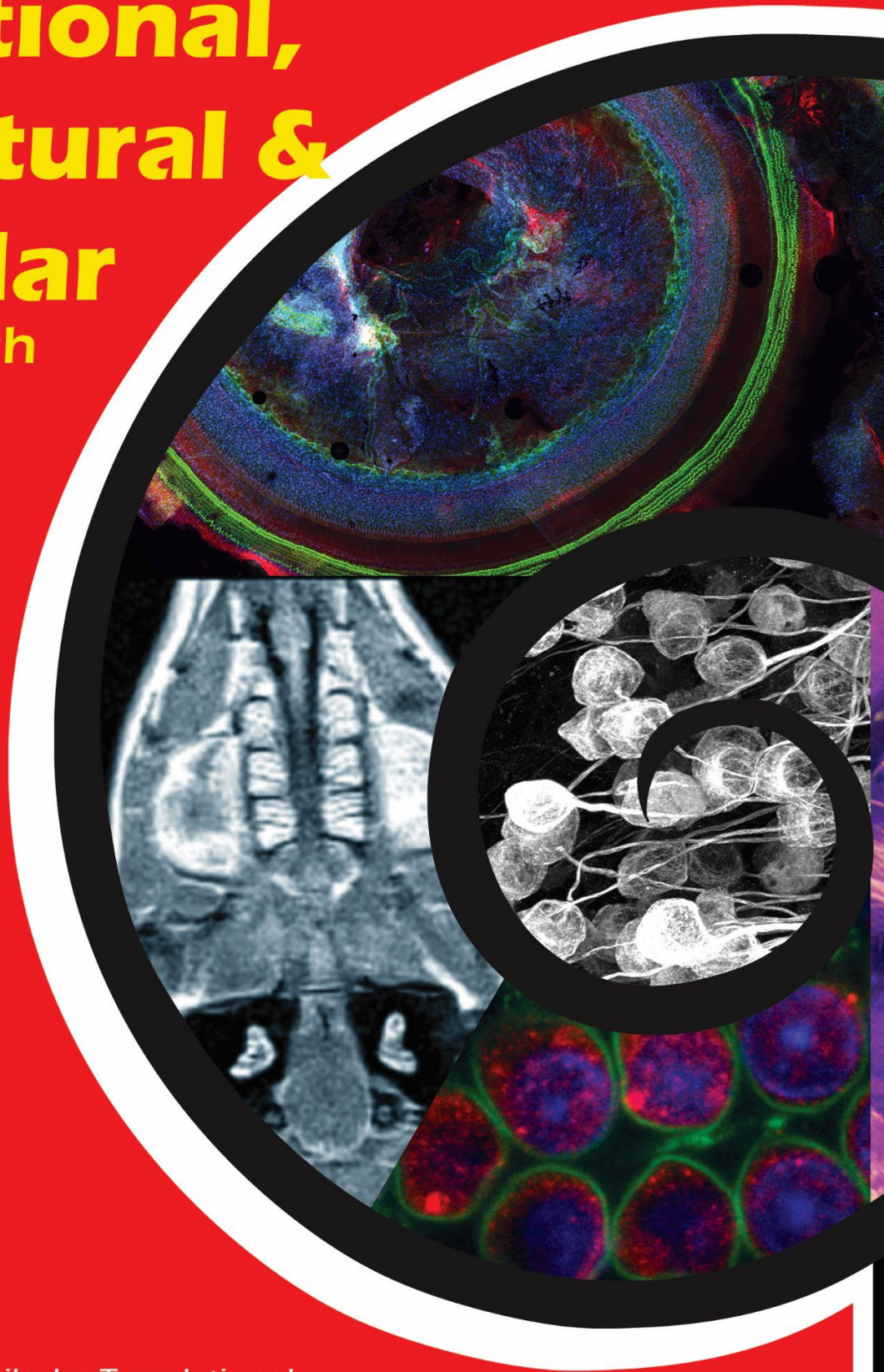
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Functional, Structural & Cellular

From Bench
to Clinic



Auditory and Vestibular Translational
Neuroscience Cluster,
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