

## **Oticon Foundation Hearing Education Centre, Section of Audiology, University of Auckland**

### **Report on activities in 2013**

The Oticon Foundation Hearing Education Centre was active hosting research seminars and the annual Spring Symposium. Funding from the Centre also supported a tutor in the Master of Audiology programme, book purchases for the Section of Audiology and hosting several visitors. These activities are highlighted below.

#### **1. Seminar programme for 2013**

##### ***a. OFHEC Hearing Research Seminars***

These seminars were held at the School of Population Health, University of Auckland Tamaki Campus. They are popular and well received by the research and clinical communities and have about 30-50 regularly attending. They not only provide an opportunity for the community to hear from various speakers but also the chance to network with each other.

##### **Wednesday 15th May 2013**

##### **Gwen Carr: The Evolution and Experience of the UK New Born Hearing Screening Programme.**

Gwen Carr is Deputy Director of the National Health Service Newborn Hearing Screening (NHSP) and the NHS Newborn Infant and Physical Examination (NIPE) Programmes in England. She is also Deputy Director of the MRC Hearing and Communication Group, which hosts the two NHS Programmes, based at the Royal Free Hospital NHS Trust in London and is an Honorary Senior Research Associate at the University College London Ear Institute. Gwen was visiting New Zealand for the Australasian Newborn Hearing Screening Conference and we were pleased to host her for this public talk. She provided an overview of the England newborn hearing screening programme from implementation to maturity over the previous ten years (they screened their 5millionth baby in 2012). She talked about the programme from the hearing screen through the care pathway to early intervention, and discussed both the successes and the enduring challenges. The talk was to a large mixed audience and provided an opportunity for discussion on comparisons with the NZ Newborn Hearing Screening Programme.

##### **Wednesday 19th June, 2013**

**Professor Sven Vanneste. Neuroimaging and Neuromodulation: Complementary Approaches for Identifying the Neural Correlates of Tinnitus.** Professor Sven Vanneste is from the Department of Translational Neuroscience at the University of Antwerp. He is a neuroscientist whose research focuses on how an auditory conscious percept is generated. He makes use of different neuroimaging methods and techniques to visualize how the auditory brain functions and makes use of different non-invasive (eg transcranial magnetic stimulation, transcranial direct current stimulation) and invasive neuromodulation (cortical and deep brain stimulation) to modulate auditory phantom percepts. In this talk he discussed some of the recent views on the sources of tinnitus. Functional imaging reveals that tinnitus is related to alterations in neuronal activity of central auditory pathways. Modulation of neuronal activity in auditory cortical areas can reduce tinnitus loudness and, if applied repeatedly, exerts therapeutic effects, confirming the relevance of auditory cortex activation for tinnitus generation and persistence. Imaging also indicates involvement of non-auditory brain areas, such as the frontoparietal "awareness" network and the non-tinnitus-specific distress network consisting of the anterior cingulate cortex, anterior insula, and amygdala. Involvement of the hippocampus and the parahippocampal region suggests the relevance of memory mechanisms in the persistence of the phantom percept. Preliminary studies targeting the dorsolateral prefrontal cortex, the dorsal anterior cingulate cortex, and the parietal cortex with rTMS and tDCS confirm the relevance of non-auditory networks. These indicate the importance of brain

stimulation as a complementary approach to neuroimaging for identifying neuronal correlates of clinical aspects of tinnitus.

#### **Thursday 8th August 2013**

**Professor Dirk De Ridder, How and Why the Brain Generates Subjective Tinnitus (with and without hearing loss).** Professor De Ridder is a leading Neurosurgeon from Belgium who has recently been appointed as the Inaugural Neurological Foundation Professor of Neurosurgery at The University of Otago. He spoke on his research into the mechanisms of tinnitus. A fundamental question in tinnitus is whether there is only one mechanism or one final common pathway in the brain that can be held responsible for this condition. This question is answered by two studies; one that looks at the neural correlates of subjective tinnitus loudness as described by a simple numeric rating scale and a more objective tinnitus-matched loudness, and another study that looks at the neural correlates of tinnitus in patients with and without hearing loss. Results show that the brain only holds a template for subjective tinnitus loudness and not for a more objective loudness measurement, suggesting there could be only one mechanism involved. However, increasing hearing loss is associated with decreasing auditory cortex involvement and increasing parahippocampal (contextual auditory memory) involvement, already demonstrating that there is more than one generator possible. A relatively simple predictive brain model can explain the results of both studies.

**Thursday 15th August 2013. Professor Fan-Gang Zeng. Cochlear Implants: New Horizons** Fan-Gang Zeng is a Professor of Anatomy and Neurobiology, Biomedical Engineering, Cognitive Sciences, and Otolaryngology and Director of Center for Hearing Research at the University of California Irvine. He is a leading researcher in auditory science and technology, unraveling brain mechanisms in loudness coding and speech recognition while translating research into two commercial products in deafness and tinnitus treatment (Nurotron and SoundCure). As the most successful neural prosthesis, the cochlear implant has allowed more than 300,000 hearing-impaired people to restore useful functional hearing. He provided an overview of cochlear implants and examined how and why this success has been achieved, and then discussed what are its current limitations and where new developments will occur. In the latter he discussed the incremental technologies such as convergence of cochlear implants and hearing aids as well as disruptive technologies such as the use of evoked potentials to make a closed loop cochlear implant, intraneural stimulation and other forms of stimulation.

#### ***b. Oticon Foundation Hearing Education Centre Spring Symposium***

The 7th Oticon Foundation Hearing Education Centre Spring Symposium was held on Monday 2nd September 2013 at the Tamaki Campus of the University of Auckland, and was yet again a very successful meeting. The subject this year was **“Global Hearing Health: Towards the Development of Hearing Services in the Pacific”**. The idea of the meeting was to consider what was needed to see the establishment of sustainable services for people with hearing loss and ear disease in Pacific Island countries, and how New Zealand audiology and ORL communities could support such in-country service development. Presentations covered what we know about the nature and extent of ear disease and hearing loss in the Pacific region; the services that currently exist or are being planned and what approaches are needed to ensure sustainable service development.

In opening the meeting Peter Thorne, from the University of Auckland, described the almost total lack of services for hearing-impaired people within the Pacific region. Most of those that are available are provided by visiting ENT and audiologists, although there are some small service providers in Fiji and Samoa. In a later talk, Michael Sanders, also from the University of Auckland showed that there is almost no epidemiological data on the extent of hearing impairment in Pacific

countries, but his estimates, based on data from the WHO, indicate a very high percentage of the child and adult population have ear disease and hearing loss. According to research by Suzanne Purdy, from the University of Auckland, Pacific children in New Zealand have a high prevalence of auditory processing disorder, which may be a consequence of or exacerbated by persistent middle ear disease. Although it needs to be confirmed by further research, there is probably no reason to believe that children in Pacific countries would not also have a high level of such processing disorders. These reports collectively indicate that the prevalence of hearing loss, ear disease and hearing disability are high in Pacific island nations, and services are needed to provide assess, treat and prevent these conditions in the population. On behalf of Louise Carroll, from the National Foundation for the Deaf, Peter Thorne, presented a description of the United Nations Convention on the Rights of Disabled Persons and briefly discussed its implications for Pacific communities. This is a very important document as it requires signatories to respect and support people with disability and governments of countries which adopt the Convention can be held accountable. Obviously Pacific countries that are or become signatories to the Convention will need to recognise hearing disability and the needs of hearing-impaired people, including the provision of services, and this could provide the necessary catalyst for service development.

Donna Lene, the Director of SENESE Inclusive Education in Samoa, provided a keynote address. Donna has led a team that has worked tirelessly over a long time to develop and provide hearing services for young Samoan children. But more recently she has been leading the development and implementation of a national Hearing Service in Samoa which will support children and adults. Donna gave an excellent talk, outlining the services they have already developed, mainly for children with severe or profound loss and talked about where they are heading with the national plan. She talked about the challenges, particularly around the lack of a workforce, funding, facilities and resources and highlighted the need for partnerships within the local communities as well as international agencies and universities. To highlight this she talked about the support from Cochlear in Sydney and the Royal Institute for Deaf and Blind Children to provide cochlear implants and hearing aids for young Samoan children. With backing from AusAID and other international agencies, there is now a plan to establish an integrated national hearing service, with newborn and childhood hearing screening and intervention services, as well as ENT services and adult hearing services. It is an inspirational story and offers a great example to follow.

Dr Judith McCool, a global health expert from the University of Auckland talked about overall global health approaches to improving the health of Pacific Island communities. Whilst her comments were directed more towards issues of tobacco control and other non-communicable diseases, such as diabetes, there was a lot of helpful information to consider for the prevention and treatment of hearing loss and ear disease. In particular, it is important to align with the interests and mandates of major NGOs and funding agencies and the need to partner with these organisations and to obtain government support to ensure that hearing health needs are embedded in government health policy. These points were also reiterated by Associate Professor Teuila Percival from the Pacific Health section of the University of Auckland, who talked about other paediatric services in Pacific islands. She described the significant challenges of health service provision in Pacific countries, with very distributed communities, small populations and lack of resources and pointed out that hearing loss whilst a very important area, has to also compete with serious health issues for limited health resources. Both pointed out that services need to reflect the local culture and their development must involve partnerships and involvement with communities. These were also points raised by Elaine Ballard from Speech Sciences at the University of Auckland, when she discussed a research project on early language development in Samoan speaking children. She reflected on some of the cultural issues that had influenced the research and the need to involve people who had knowledge of local culture.

Services and treatments for hearing loss include provision of hearing aids and audiological testing which are expensive and need specialised skills. Mike Sharp and Shanly Francis from Phonak (NZ) described some of the challenges that Phonak had faced in their regular visits Fiji to fit hearing aids to children, and identified the need to have in-country hearing aid services that provided a sustainable service that met the local needs, rather than relying on visiting services. Grant Searchfield of the University of Auckland gave an account of the changing hearing aid technology and how there is an increasing focus on developing countries and the design of good quality, well-priced hearing aids that were appropriate for the challenging environments of the Pacific (such as the high temperatures and humidity) and could be fitted without reliance on a highly skilled workforce. According to Ellen Giles from the University of Auckland, linking clinicians from other centres for diagnostic and rehabilitation support through “teleaudiology” can potentially solve some of the workforce and expertise issues and provide clinical support to remote Pacific communities.

Overall the meeting was a great success. It highlighted the enormous need for hearing-related services in Pacific countries and whilst the presenters exposed the many challenges to development of these services, they also provided ideas on how to overcome these through good planning, partnerships and long-term commitment.

## **2. Tutoring Support and other activities**

The OFHEC funding provided essential tutoring support to the Master of Audiology programme at the University of Auckland funding Dr Michael Sanders as a part-time tutor to provide clinical tutoring and supervision for students in the clinical papers within the programme. He also provided some teaching to the academic programme in the area of evoked potentials. The clinical training is an essential and key part of the Audiology programme, and access to highly qualified and experienced clinical teachers at the University is very important to provide good quality clinical instruction in a safe and supportive environment. This supplements the clinical instruction in private and public practice but having good tutors at the University offers a strong, consistent mentoring environment compared with the public and private clinics where there can be high staff turnover and lack of clinical time to provide feedback. Although some tutoring is supported by the university the funds are always limited and the opportunity to bolster this through OFHEC funding is greatly appreciated.

The OFHEC funding also provided textbooks and reference books for the Section library.

Staff in the Section were also engaged in community talks and seminars, to the public through the Hearing Association and National Foundation for the Deaf, tinnitus groups and University departments as well as participation in Brain Day, a hugely successful annual event for the public run by the Centre for Brain Research. The sponsorship of the Oticon Foundation Hearing Education Centre is recognised in all these talks. Staff are also engaged in community groups, such as the National Foundation for the Deaf, Hearing Association and tinnitus groups.

In summary, the year has been very busy for the Centre achieving its goals of public education and supporting the training of audiology professionals.

Peter Thorne  
Professor

On behalf of the OFHEC Management Group