

**Conference: Frontiers 2023**  
**The Art, Science and Future of Otolaryngology, Head and Neck Surgery**  
**Passe & William Foundation**  
**26 - 28 October 2023**  
**Barossa Valley, SA26**

There was a 2hs session dedicated to Meniere's disease with 6 speakers presenting their perspective according to their profession, followed by round table with Q&A.

Invited speakers were: Prof Charles Della Santina (USA), Dr Danial Brown (Curtin University, WA), Prof Jose Antonio Lopez-Escamez (Sydney Uni), Dr Mohsen Asadnia (Macquarie Uni), Dr Celene McNeill (Healthy Hearing & Balance Care, NSW) and a male patient with MD

Session overview:

### **The surgeon's perspective**

**Speaker: Dr Charles Della Santina, MD, ORL**

**John Hopkins Hospital**

**Baltimore USA**

**Abstract:** not provided.

### **Who is Dr Charles Della Santina**

Dr. Della Santina earned his PhD in Bioengineering in 1994 from the University of California at Berkeley and UC San Francisco. While there, he developed and applied micro-machined silicon microelectrodes for chronic single-unit recording from multiple axons in the auditory/vestibular nerve. He earned his MD from the University of California at San Francisco in 1997 and then completed residency training in the Department of Otolaryngology – Head & Neck Surgery at the Johns Hopkins School of Medicine, where he performed post-doctoral research on human vestibular physiology. He later joined the faculty in the department's Division of Otology, Neurotology & Skull Base Surgery, in which he founded the Johns Hopkins Vestibular NeuroEngineering Laboratory and practices as a board-certified otologist and neurotologist.

### **The physiologist's perspective**

**Speaker: Dr Daniel Brown, PhD**

**Curtin University**

**Abstract:** Meniere's disease has no known cause, and no cure, but does have a common histopathological feature in the form of endolymphatic hydrops, which is an enlargement of the endolymphatic space. The development of treatments is made difficult by the lack of animal models that accurately mimic the disease, by the waxing and waning of symptoms, by the lack of objective tools for monitoring disease progression, and by the likely multifactorial nature of the disease, with few methods for accurately differentiating Meniere's patients. Over the last decade my research has focused on developing A) tools to objectively measure endolymphatic hydrops, B) new animal models of hydrops, and C) new treatments for hydrops. Within this research, we provided new evidence to support suggested roles of the endolymphatic sac and the valve of Bast, which has gained significant

interest of late. Moving forward, with new therapies being developed, there is a need to examine the likely application of these therapies, which may require long-term delivery over the lifetime of the disease.

#### **Who is Daniel Brown?**

Dr Daniel Brown is a hearing and balance physiologist, with particular focus on Meniere's disease. After being awarded a PhD in Auditory Neuroscience from the University of Western Australia in 2007, he undertook a two year fellowship at Washington University Saint Louis, before returning to start up a new laboratory at Sydney University in 2009. During this time, he developed new methods of objectively diagnosing Meniere's disease, new animal models of Meniere's, and new approaches to quantifying functional and morphological changes in the inner ear. He was awarded the Barany Society Award for Best Mid-Career Researcher in 2018. In 2019 he moved to Curtin University to start up a new Hearing and Balance laboratory, and began working on new therapies for treating inner ear disorders. In 2020, as a team of 4, he was awarded the overall Curtin Innovation award, for the investigation of re-purposing an anti-hyperlipidemic drug to prevent ototoxicity, which the team has subsequently patented. At Curtin, he is the Discipline Lead for Human Biomedicine, and the Course Coordinator for Human Biology.

#### **The geneticist's perspective**

**Speaker: Prof Jose Antonio Lopez-Escamez, ENT**

**University of Sydney, Kolling Institute**

**Abstract:** Meniere disease (MD) is an inner ear syndrome defined by sensorineural hearing loss (SNHL) associated with vertigo episodes and tinnitus. It is associated with other comorbidities such as migraine, respiratory allergies, and autoimmune disorders. Multiomic human studies support a systemic inflammatory response with four molecular subtypes: autoinflammatory MD (14%), defined by high levels of IL1b, allergic MD (24%), associated with type 2 inflammation (IgE, IL4, IL5, IL8, IL13), autoimmune MD (19%) with high levels of TNFa and familial MD (10-20%). Familial cases can show an autosomal dominant or recessive pattern of inheritance, the most common genes being OTOG, MYO7A and TECTA, previously associated with SNHL. These findings suggest that proteins involved in the tectorial membrane and stereocilia links could be critical and focal detachment of the otolithic, or tectorial membrane may cause opening of mechano transduction channels with random depolarization of hair cells that explain changes in tinnitus loudness or vertigo attacks. Genetic and immunological testing should be implemented in the diagnosis and management of patients with MD.

#### **Who is Prof Jose Antonio Lopez-Escamez**

Prof Lopez-Escamez's research involves the combination of human multi-omic data and disease models to reveal the molecular mechanisms leading to Meniere's disease and severe tinnitus and get a better understanding to find a cure. He was the founder of the Otology and Neurotology Group in Spain, an international leader in neurotology and genetics of Meniere's disease/tinnitus and inspired the Meniere's Disease Research Consortium. His research has been disseminated through 170 Conferences at the major international meetings including the Association for Research in Otolaryngology, Barany Society, European Society of Human Genetics, European

Confederation ORL-HNS and International Federation ORL Societies. He was the recipient of several prestigious Awards including the Frontiers Spotlight 2018 Award. Currently, Prof Lopez-Escamez is ranked in the Stanford World Top 2% Scientists in 2021-22 and has published over 160 papers in top scientific journals in several categories including audiology, genetics and heredity, medicine, clinical & experimental and otorhinolaryngology with > 7200 citations in Google Scholar. He has been granted > 7 million in international competitive funding in Europe and selected to lead the Meniere's disease Neuroscience Research Program at the University of Sydney, where he has opened a new laboratory at The Kolling Institute. Prof Lopez-Escamez has successfully supervised over 10 International PhD and 25 Master students at the Universidad de Granada and Centre for Genomic and Oncological Research (Genyo) with successful completions. His mentees are enrolled as postdoctoral researchers in top ranked Universities including the University of Edinburgh and the University of Cambridge.

### **The engineer's perspective**

**Speaker: Dr Asadnia, PhD**

**Medical Engineer - Macquarie University**

**Abstract:** In this presentation, I will discuss into the intersection of Biomedical Engineering and Nanoenergy approaches in the for Meniere's disease management. The focus of this seminar is to discuss our recent findings regarding the development and implantation of miniaturized chemical sensors and ion-selective nanochannels. These advancements hold the potential to facilitate real-time monitoring of critical ions, such as potassium and sodium in the middle ear, and their potential link to the pathophysiology of Meniere's disease. Chemical sensors offer valuable insights into the disease's dynamics, contributing to early diagnosis, personalised treatment plans, and the potential development of interventions aimed at restoring the inner ear's fluid balance, thus alleviating Meniere's disease symptoms. Furthermore, ion extraction nanochannels can effectively regulate ion levels, selectively extracting or releasing ions as necessary. I will also briefly address the challenges, opportunities, and the transformative potential of these technologies, illuminating the promising future of personalised, data-driven treatment strategies for Meniere's disease patients.

### **Who is Mohsen Asadnia?**

Dr Mohsen Asadnia is a well-respected and accomplished biomedical and mechanical engineer currently serving as a full professor at the School of Engineering at Macquarie University. His expertise in the fields of smart materials, biomedical engineering, micro/nano fabrication and mechatronics has earned him an international reputation as a leading researcher in the field. He has published 120 research papers and articles in top-tier journals, seven patents and four books. His research interest in the field of biomedical engineering focuses on developing innovative devices to help patients with inner ear disorders (with a particular emphasis on Meniere's disease).

## **The audiologist's perspective**

**Speaker:** Dr Celene McNeill, PhD

### **Audiologist/Director Healthy Hearing and Balance Care**

**Abstract:** The audiologist is an allied health specialist in diagnostic tests and rehabilitation of auditory and vestibular disorders. Meniere's disease (MD) affects hearing and balance function; hence audiologists are closely involved in the assessment and rehabilitation of sufferers. This presentation will focus on the symptom of hearing loss in MD which is progressive and has the unique characteristic of fluctuating. Hearing loss in MD can be controlled with appropriate management but it is usually the last to be addressed, giving priority to vestibular symptoms which are perceived as more disruptive. Hearing rehabilitation using hearing aids and sometimes cochlear implants if appropriate, has shown to improve hearing and communication plus reducing tinnitus perception. Bilateral hearing symmetry also helps to improve overall balance by providing more accurate awareness of the surroundings, decreasing stress, and enhancing quality of life. Despite our research showing the benefits of hearing aids to this population, there is still misconceptions that amplification is not useful to patients with MD mostly due to distorted hearing as detected by speech perception tests. The author however argues that the main factor affecting hearing aid results is in fact the ongoing hearing thresholds fluctuation that adds an extra layer of complexity to the hearing rehabilitation process. Self-hearing tests and self-programmable hearing aids have proven effective to address hearing fluctuation in the rehabilitation of these patients giving them more control over their own symptoms. At this stage, however, more streamlined technology is still lacking, and further research is warranted to facilitate the hearing rehabilitation process of MD patients.

### **Who is Celene McNeill?**

Dr Celene McNeill is an audiologist holding a Bachelor of Applied Sciences in speech and hearing from PUCC Brazil, a Masters of Audiology in the topic of perilymph fistula and a PhD in Meniere's disease from Macquarie University. Celene has been working in Australia since 1989 and has a broad professional experience as a clinician, researcher, speaker, advisor, and board member of several professional and charity associations related to hearing and balance disorders. Celene has extensive experience assessing and managing hearing and balance of patients with Meniere's syndrome and has developed a unique protocol to fit hearing aids to those with fluctuating hearing losses.

## **The patient's perspectives**

**Speaker:** A doctor with a diagnosis of MD

**Abstract:** A perspective on Meniere's disease given from the view point of a clinical doctor who's specialist training, education and experience in no way prepared him to face this challenging and unpredictable disease.