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**Learning Objectives:** Patients with chronic inflammatory middle ear diseases can experience taste disturbance before surgery due to the degenerative capacity of the inflammatory process.

**Background:** The important nerve of taste, the chorda tympani nerve, runs uncovered through the middle ear. This location predisposes it to become affected by bacterial toxins, enzymes and mechanical damage in various forms of middle ear pathology, such as chronic otitis media and cholesteatoma. A difference between inflammatory diseases, such as chronic suppurative otitis media and cholesteatoma, and noninflammatory diseases, such as otosclerosis, regarding taste disturbance preoperatively and symptoms postoperatively have been noticed. The present study aims to investigate ultrastructural changes of chorda tympani in inflammatory middle ear disease as compared with normal.

**Methods:** Five chorda tympani specimens were collected from healthy middle ears of patients subjected to surgery for acoustic neuroma to be used as normal controls, and five from middle ears with chronic otitis media or cholesteatoma where the nerve could not be saved during the operation. Light microscopy and electron microscopy were used to identify signs of pathological processes.

**Results:** Ultrastructural changes that implicate inflammatory changes and degeneration were found in all five nerves from ears with chronic otitis media and cholesteatoma. There were signs of proliferation of connective tissue of the endoneurium, disorganization and demyelination of axons, vacuolar degeneration of the axons, myelin sheath disintegration and edema. As a sign of regeneration capacity there was occurrence of sprouting in CTN from ears with inflammatory diseases.

**Conclusion:** Chorda tympani nerves from ears with chronic inflammatory middle ear disease exhibit structural signs of deterioration that correlates well to taste disturbances.

There were signs of nerve regeneration that could explain the ability of taste recovery.

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## ID: IP016

### Use of Bioactive glass S53P4 in mastoid and epitympanic obliteration: our experience in 74 cases

Presenting Author: **Daniele Bernardeschi**

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**Learning Objectives:**

**Objective:** to present our experience with the use of Bioactive glass S53P4 in ear surgery

**Material and Methods:** Seventy-four cases (72 adult patients, 2 operated bilaterally) operated from May 2013 to December 2015 in a tertiary referral center. All but 10 cases were revision surgeries (mean previous operation = 2). The mean pre-operative hearing threshold was  $57 \pm 18$  and  $29 \pm 15$  dB for air conduction and bone conduction respectively. All patients underwent mastoid and epitympanic obliteration in a single stage CWD (n = 60) or CWU (n = 14) tympanomastoidectomy. Intraoperative bacteriological test was performed for all patients. Anatomical and functional results were evaluated 3 months and 1 year after surgery, and a CT scan  $\pm$  MRI was performed 1 year after surgery. Quality of life measured with the GBI and specific questionnaire was performed 1 year after surgery.

**Results:** Cholesteatoma was found in 48 cases; Bacteriological tests showed some bacteria and/or fungus in 43 cases. At 3 months all but 2 patients had a well-healed EAC and intact tympanic drum. Two cases of uncovered granules in the EAC underwent revision surgery for recovering of the granules with cartilage. At 1 year (n = 41), anatomical results remained stable with no cases of recurrent cholesteatoma. Regarding the hearing, one year after surgery (n = 41) the mean hearing threshold was  $46 \pm 22$  and  $27 \pm 17$  dB for air conduction and bone conduction respectively. CT scan (n = 41) and MRI (n = 17) showed no residual cholesteatoma inside or near the obliteration. GBI and specific questionnaire (n = 41) showed an improvement in the QOL (mean total score = 28).

**Conclusion:** The bioactive glass S53P4 is a well-tolerated biomaterial for primary or revision chronic otitis surgery, as shown by the absence of revision surgery for removal of the granules even in case of surgery in infected ears. Hearing results depend mainly on the number of previous surgeries, and the patient's quality of life is improved after operation.

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## ID: IP017

### A systematic review of the epidemiological relationship of mucosal otitis media, tympanic retraction, and cholesteatoma

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Mahmood Bhutta

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**Learning Objectives:** To better understand the relationship of squamous forms of otitis media to mucosal disease, based upon a systematic review of longitudinal epidemiological studies. To use these data to create a map of disease relationships.

**Introduction:** Clinical experience suggests that cholesteatoma often arises in individuals with a history of prior mucosal otitis media, or a history of tympanic retraction. I set out to exploit existing longitudinal studies to ascertain the relation of these disease entities, specifically to assess the relation of mucosal disease to tympanic retraction and cholesteatoma.

**Methods:** I searched the pubmed database using terms “tympanic retraction” OR “cholesteatoma” AND “epidemiology”. 708 articles were returned. Titles and abstracts were screened for relevance. Only longitudinal prospective or retrospective studies were included. Articles on syndromic or special populations were excluded. 24 articles were included for review, and the full text of these articles was evaluated to identify further references.

**Results:** Differing populations and definitions make meta-analysis inappropriate. There is no evidence of association of acute otitis media with risk of squamous disease. Presence and duration of chronic otitis media with effusion is associated with risk of subsequent squamous disease. Tympanic membrane retraction shows variable chronology, with many retractions resolving, and development of new retractions rare. Cholesteatoma remains a rare complication, and is predisposed to by TM retraction, but almost certainly also arises de novo, perhaps in those with subclinical disease. There is no evidence that grommet insertion reduces risk. These relationships can be constructed into a map of the inter-relation of disease, akin to the landscape map for mucosal otitis media I have previously constructed (Audiol Neurotol 2014;19:210–223).

**Conclusions:** Existing epidemiological studies can be used to construct a map of the relation of mucosal to squamous forms of otitis media, and so help to better understand epidemiological correlates, and to hypothesise pathophysiological relations.

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#### ID: IP018

### Distinguishing Between Conductive and Sensorineural Extended High-Frequency Hearing Loss Following Middle Ear Surgery

Presenting Author: **Philip Bird**

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**Learning Objectives:** 1. Appreciate the issues regarding bone conduction in high frequencies. 2. Recognise the risk of extended high frequency hearing loss with middle ear surgery and its possible significance.

**Introduction:** Permanent hearing loss in the extended high-frequency range (8–16 kHz) occurs in up to 50% of patients following otherwise successful middle ear surgery. The mechanisms of this high-frequency loss are poorly understood, but hypotheses include suprphysiological ossicular movement and noise exposure from drilling and suctioning. High-frequency loss could also be conductive and result from physical changes to the conductive mechanism. Previous research has been limited by difficulties measuring high-frequency bone-conduction thresholds, and thus distinguishing between conductive and sensorineural loss. We present a small pilot study demonstrating that high-frequency

hearing loss can be composed of both conductive and sensorineural components.

**Methods:** A giant magnetostrictive transducer was modified for audiometric use and testing was conducted to establish the reliability and validity of thresholds measured using the device. Air- and bone-conduction audiometric thresholds at 0.5–16 kHz were then measured preoperatively and at 1 week, 1 month, and 3 months postoperatively in four patients; three undergoing stapedectomy and one ossiculoplasty.

**Results:** Testing in normal hearing listeners showed that the modified transducer could be used to measure high-frequency bone-conduction thresholds with a level of reliability comparable to standard bone-conduction testing. The pilot study identified two clear cases in which an initial transient conductive high-frequency loss was documented concurrently with a persistent high-frequency sensorineural loss.

**Conclusions:** These results suggest that extended high-frequency hearing thresholds as measured using the modified bone-conduction transducer are a more sensitive measure of operative trauma to the cochlea that may be used to determine the efficacy of interventions to protect the ear from surgical trauma.

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#### ID: IP019

### The use of titanium to repair the external ear canal: sheeting vs. mesh

Presenting Author: **Bruce Black**

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**Learning Objectives:**

**Introduction:** Titanium sheeting and mesh have been used in this centre from 2008 to repair EAC defects, succeeding previous porous hydroxylapatite techniques. The purpose of this presentation was to evaluate and compare the outcomes from each material.

**Materials and Method:** Titanium sheeting (0.12 mm, 99% pure, annealed) was used in 111 cases, and fine mesh (Biomet) in 74. Surgical techniques were intact canal wall mastoidectomy in 130 cases, mastoidectomy reconstruction in 55. The titanium was used as a support layer, applied to the medial aspect of the bony ICW wall and overlaid with cartilage. In reconstruction cases the titanium was covered with a middle temporal flap, but with only occasional cartilage supplements.

Ossiculoplasties employed Grace Alto devices, alternatively Gyrus Spanner struts if the malleus-stapes angulation was favourable.

**Results:** Sheetting results were excellent for both the ICW and reconstruction roles. Mesh was disappointing. Dehiscences of the overlying tissue occurred in 16% of