sufficiently high to eradicate biofilms (at least not without causing systemic toxicity). Ventilation tube insertion dries the middle ear and thus could supress biofilms, but it may not eradicate them, possibly accounting for the high rate of OME recurrence after VT extrusion. Biofilms in the middle ear could be eradicated by administering antibiotics directly to the middle ear, to reach an antibiotic level that is locally high enough to eradicate biofilms; drug delivery methods could include slow-release formulations placed surgically, or trans-tympanic delivery. Oral treatment strategies could also be useful, but rely on appropriate selection of antibiotics that work well against biofilms, perhaps potentiated by agents to disrupt biofilm matrix and middle ear mucus.

*Conclusion*: Better understanding of biofilms in otitis media has the potential to lead to development of better treatments in the future.

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## Bacteriology and Biofilm (R663)

### ID: 663.4

### Biofilms in Otitis Media

Presenting Author: **Romain Kania**

Romain Kania

*Lariboisiere University Hospital, Paris Sorbonne Cite*

*Learning Objectives*: To describe: 1. the existence of biofilms in otitis 2. the role of biofilms in the pathogenesis of otitis media 3. the potential targets of treatment.

Biofilms are multicellular network of bacteria encased in a matrix and are noticeably resistant to both antibiotics and host defenses. Biofilms exist in otitis media, cholesteatoma, chronic otitis media, onto protheses and in adenoids. Demonstration of biofilms in otitis media has shown different mechanisms of persistence of bacteria into the middle ear. Substantial effort in understanding the biologic nature of biofilms has resulted in evidence supporting their importance in otitis media and adenoids. The predominant role played by in biofilms is important, both from the perspective how pathogens develop viable communities in the middle ear as well as how this structure impedes successful antibiotic therapy. Understanding the nature of the biofilm component in the pathogenesis of chronic otitis media will likely have a meaningful influence on the development of novel strategies of treatment.

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## Free Papers (F664)

### ID: 664.1

### A study of the otological outcomes of otitis media with effusion in children with primary ciliary dyskinesia

Presenting Author: **Reshma Ghedia**

Reshma Ghedia[1], Jonny Harcourt[2], Annakan Navaratnam[2], Jahangir Ahmed[2]

[1]*Imperial College Healthcare Trust,* [2]*Imperial College NHS Trust*

*Learning Objectives*:

*Introduction*: Primary Ciliary Dyskinesia (PCD) describes a group of inherited disorders that result in abnormal ciliary motion leading to mucous stasis. Clinical features almost always include otitis media with effusion (OME). PCD patients provided us with a cohort of patients with OME that is not treated with ventilatory tube insertion as these have been shown to result in chronic ottorhoea, early extrusion and persistent perforation without significant improvement to hearing in the long term. The most popular theory of cholesteatoma formation is invagination of the tympanic membrane due to a negative middle ear pressure, as found in OME. We used this cohort to investigate whether children with PCD and OME were predisposed to Cholesteatoma formation.

*Methods*: We performed a retrospective observational review of all the children attending a multi-disciplinary PCD clinic at a national quaternary referral centre. With thorough review of the documentation from their clinic appointments and audiology assessments we collected data regarding the management of the OME.

*Results*: We found that out of 144 patients on their database, almost all of them had a diagnosis of otitis media with effusion at some point. Of these, the only children who had insertion of a ventilatory tube were those who had the procedure before the diagnosis of PCD was made. The majority of children had none or mild hearing loss and therefore did not require any intervention. Those with moderate to severe hearing loss were referred for fitting of hearing aids. None of the children with OME were diagnosed with a Cholesteatoma in the time they had been followed up in the PCD clinic.

*Conclusions*: Cholesteatoma has not been found to occur in children with PCD despite having OME which is conservatively managed. This contradicts the traditional invagination theory of cholesteatoma formation and in these patients, the mucosal stasis may in fact provide a protective factor against cholesteatoma formation.

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## Free Papers (F664)

### ID: 664.2

### Cholesteatoma: The effects of poverty and ethnicity in New Zealand's North Central Region

Presenting Author: **Stephen Toynton**

Stephen Toynton[1], David Schreiber[2]

[1]*Hawke's Bay Hospital,* [2]*Central-Technical Advisory Service, Analysis*

*Learning Objectives*: Appreciation of social factors is important as delivering health care within ethnic groups is generally more effective.

*Introduction*: A preliminary study that attempts to separate the effects of ethnicity from deprivation using the surgical intervention rates for some otological conditions, particularly cholesteatoma. Indigenous populations have a greater incidence of chronic ear conditions, however it is difficult to separate deprivation and ethnicity as factors. New Zealand's official bicultural society gives an opportunity to study this. An identification of either ethnicity or deprivation as a major factor is important as it enables more effective targeting of health resources.

*Methods*: Surgical intervention data from the six Central North Island District District Health Boards (DHB) was examined for the interventions of myringotomy with or without grommets; myringoplasty; cholesteatoma related surgery, also the patient demographic profile, including ethnicity and addresses. NZDep2013 is a deprivation index of 1–10 (1-least deprived), assigned to small local areas. Cross tabulation of the data enables preliminary analysis of four ethnic groups and 10 levels of deprivation within the three surgical interventions.

*Results*: Preliminary data extract: Myringotomy/grommet interventions increase substantially with deprivation score (9.2 to 17.7 per 1000 population; decile 1–10 respectively) although Maori have more than double the intervention rate per deprivation decile. Maori and Pacific Islanders have similar cholestatoma intervention rates (12–16 per 10,000) which is again more than double that of New Zealand Europeans. This pattern is consistent across the parameters described.

*Conclusions*: Consistent results have been obtained suggesting that ethnicity and deprivation are separate factors that increase the surgical intervention rates for grommet insertion, myringoplasty and cholesteatoma surgery.

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## Free Papers (F664)

### ID: 664.3

### Bone Conduction Implants in Pediatric Cholesteatoma Management

Presenting Author: **Stephen Cass**

Stephen Cass, Gregory C Allen, Kenny H Chan

*University of Colorado*

*Learning Objectives*:

*Introduction*: The use of bone conduction hearing implants (BCI) to management hearing loss in children with cholesteatoma/CSOM has not been well studied. In particular, can the use of a BCI alter the surgical approach to cholesteatoma and result in better disease management? Are BCI-related complications in patients with cholesteatoma different than patients without cholesteatoma?

*Methods*: Following IRB approval, a 12 year retrospective chart review of our BCI population at a tertiary academic children's hospital was performed.

*Results*: 45 subjects were identified with mean age at implantation of 8.2 years (range 1.7 to 19.1 years). All subjects had a device implanted with a percutaneous abutment. In 8 subjects, a BCI was placed in conjunction with surgery for cholesteatoma or chronic suppurative OM.

In total, 58 BCI-related complications occurred in 29 subjects. The majority of the complications were related to skin infection or overgrowth: 18 events required oral antibiotic and/or office-based cauterization and 17 events required revision surgery (43% percent of patients). In the subjects with cholesteatoma, the mean age at implantation was 9 years (range 5–19 years). All 8 subjects with cholesteatoma were also syndromic (Down and Crouzon Syndrome). There was no difference in the complication rate found in subjects with or without cholesteatoma. The use of a BCI permitted alteration of the ear procedure (EAC closure or thick cartilage grafting) that resulted in dry/stable ears in all 8 subjects.

*Conclusions*: Children with recurrent cholesteatoma/CSOM and unfavorable clinical factors (syndromic) can benefit use of a BCI which then permits use of surgical procedures to better control their underlying ear disease. No postoperative complications occurred related to their ear disease and the rate of BCI-related complications was no different then in children without cholesteatoma.

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## Free Papers (F664)

### ID: 664.4

### The Vibrant Soundbridge middle ear implant in radical cavities

Presenting Author: **Marek Porowski**

Marek Porowski[1], Henryk Skarzynski[2], Kamila Osinska[2], Bartlomiej Krol[2], Piotr H. Skarzynski[2]

[1]*Institute of Physiology and Pathology of Hearing,* [2]*World Hearing Center, Institute of Physiology and Pathology of Hearing, Kajetany/ Warsaw, Poland*

*Learning Objectives*:

*Introduction*: Hearing results obtained after tympanoplasty surgeries in patients after radical operations are not always satisfactory. In these patients with chronic otitis media after radical operations and lack of the ossicles, hearing improvement may be achieved with stimulation of the round or oval windows using Vibrant Soundbridge MEI.

*Aim*: The objective of the study was to analyze hearing results obtained after surgical application of Vibrant Soundbridge in treatment of hearing impaired patients with chronic inflammation of the middle ear, especially after radical modified operations.

*Material and Methods*: The selected group of patients were adults with chronic inflammation of the middle ear, after radical modified operations with destruction of the elements of the middle ear - tympanic membrane and ossicles. Patients presented conductive or mixed type of hearing impairment. In these patients Vibrant Soundbridge was used as the method of