

autografts such as temporal fascia. In that procedure, a perforated tympanic membrane is filled with a synthetic graft material (atelocollagen sponge/silicon membrane; TERUDERMIS®), to which human fibroblast growth factor is applied to promote wound healing (bFGF preparation; Fibrast Spray®). This study describes the details of this treatment procedure and discusses the outcome of patients who presented to our outpatient clinic and underwent the procedure for tympanic membrane regeneration over a 2-year period between July 2009 and December 2011 and who were followed for at least 1 year with respect to the preoperative factors that affect closure outcome. Complete closure was achieved in 105 (66.5%) patients after 1 year of postoperative follow up. The incidence of residual perforation was significantly higher in patients with the following four factors than in those without: 1) unidentified perforation margin, 2) severe calcification of the tympanic membrane, 3) marginal perforation, and 4) large perforation. Logistic regression analysis adjusted for the effects of each factor identified marginal perforation as significant factors affecting the outcome of tympanic membrane closure.

Tympanic membrane regeneration therapy can be applied to all patients. However, in patients whose perforation margin cannot be identified, in those with severe calcification of the tympanic membrane, and in those with marginal or large perforation, the therapy should be performed prudently after obtaining consent following sufficient explanation that tympanic membrane regeneration may not be achieved.

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What is new in Otology (R814)

ID: 814.3

Turner syndrome: Translational research concerning ear and hearing

Presenting Author: **Malou Hulcrantz**

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Learning Objectives: Translational research concerning a syndrome with new information added stepwise.

Background: In Turner syndrome (loss of one X-chromosome) a female phenotype is presented with ear and hearing problems. These women lack ovaries and do not produce any estrogen. Both the outer, the middle and the inner ear are commonly affected in this syndrome. These women have massive otitis media problems, middle ear problems and a rapid hearing decline already at the age of 35. Males in general have a slow decline over time (from age 20), while females in general have a good hearing until time for menopause, when estrogen levels are low. What impact does estrogen have on hearing?

A Turner mouse, lacking one x-chromosome, has been developed and underlying immunological causes to explain the frequent otitis media problems have been ruled out. Estrogen receptors, a prerequisite for estrogen acting in the inner ear, have been demonstrated in mice, rats, pigs and humans in the hearing nuclei where the hearing pathways are switched. There are two estrogen receptors present, an alpha and a beta receptor in the inner ear and if the beta receptor is knocked-out, mice gets deaf early at the age of 1 year.

A rapid decline in hearing is seen just at the time for menopause in the general population of women and hearing decline can improve if estrogen substitution is given. Estrogen substitution given to rats after ovaries having been surgically removed, hear better.

Methods: Experimental animal studies using immunohistochemistry, ABR measurements, genetic manipulations and hormone substitution have been performed as well as human longitudinal studies following hearing over time.

Results and Conclusion: It has been proven in animal and human studies that estrogen has an impact on hearing and can be regulated. Prednisolone does not show any receptors in the inner ear. Would it be possible to stimulate selective receptors with estrogen substitution to diminish the infections and hearing problems in the future?

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What is new in Otology (R814)

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What is new in Otology (R814), The new technology: canal wall up tympanoplasty with transplantation of tissue-engineered cell sheets

Presenting Author: **Hiromi Kojima**

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Learning Objectives:

Objectives: The likelihood of recurrent retraction and adhesion of newly formed tympanic membrane is high when normal middle ear mucosa is extensively lost during intractable middle surgery. If rapid postoperative regeneration of the mucosa on the exposed bone surface can be achieved, prevention of recurrent tympanic membrane adhesion and cholesteatoma formation can be expected. The aim of this study was to develop a new method to transplant autologous cell-sheets to promote postoperative regeneration of the middle ear mucosa.

Methods: We harvested 10-by-10-mm specimens of inferior turbinate mucosal tissue from the patient with acquired middle ear cholesteatoma. Tissue-engineered epithelial-cell sheets were fabricated ex vivo by culturing harvested cells for three weeks on temperature-responsive culture dishes in a cell-processing center (CPC) according to good manufacturing practice guidelines. After canal wall up tympanoplasty with mastoidectomy had been performed, sheets of cultured autologous cells that had been harvested with a simple reduced-temperature treatment were transplanted directly into the exposed bone surface of middle ear cavity from which normal mucosa had been defect.

Results: Autologous cell sheets were successfully transplanted to human middle ear. Postoperative tympanic membrane findings showed that there was no retraction of tympanic membrane. Furthermore postoperative CT findings showed that aeration were seen in attic and mastoid cavity

where the cell sheet were transplanted. No recurrence of choleateatomas were seen.

Conclusion: This is the first clinical study approved from the Ministry of Health, Labour and Welfare in Japan. Furthermore this is a first-in-man study in the world that the cultured cells were transplanted to the human ear. This novel technology of transplantation might be an effective alternative to the surgical operation on intractable otitis media in the near future.

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What is new in Otology (R814)

ID: 814.5

Management of patients with symptoms related to raised intracranial pressure

Presenting Author: **Patrick Axon**

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Learning Objectives: Understanding the relationship between raised intracranial pressure and oto-neurological symptoms.

Raised intracranial pressure (ICP) is often managed by neurologists and neurosurgeons based on the severity of symptoms. Patients who have very high ICP (idiopathic intracranial hypertension - IIH) are dominated by headache, lethargy and visual disturbance. Closer questioning, however, reveals a multitude of ENT symptoms including pulsatile tinnitus, imbalance, facial pain and hearing disturbance.

This presentation discusses management of the otological manifestations of raised ICP and presents early evidence that raised ICP not only is a cause of meningoencephalocele and CSF otorrhoea but could also play a role in the development of superior semicircular canal dehiscence.

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Implantable hearing devices (N815)

ID: 815.1

Treatment of Single-Sided Deafness and Asymmetric Hearing Loss in Adults

Presenting Author: **Susan Arndt**

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Medical Center - University of Freiburg

Learning Objectives: Cochlear implantation treatment is significantly superior to alternative therapy options (Bi-/CROS and BCI) in terms of speech comprehension in background noise and sound localization.

In the past, unilateral hearing loss had not been perceived as a severe handicap. However, our research results show that, despite a normal hearing capacity in one ear and the ability to understand language in quiet surroundings, patients suffering from single-sided deafness (SSD) and asymmetric hearing loss (AHL) experience significant challenges in various everyday situations. This is particularly evident when the language reaches the deaf ear in additional background noise.

The limitation of the auditory function may result in a fatigue due to increased listening effort and can have a major impact on psychosocial factors. Furthermore, the localization capacity is significantly limited, as bilateral hearing is mandatory for spatial hearing. Thus, treatment of single-sided deafness has to become a relevant issue.

Patients with SSD and AHL can be rehabilitated with conventional CROS or Bi-CROS systems (contra-lateral routing of signal), bone anchored hearing systems or with a cochlear implant (CI). The indications and results of the different treatments are presented.

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Implantable hearing devices (N815)

ID: 815.2

Indications and surgical coupling techniques of active middle ear implants

Presenting Author: **Stefan Volkenstein**

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Learning Objectives: Active middle ear implants; Hearing loss.

During the last years, indication range for active middle ear implants (AMEI) has been widely extended. Originally, AMEI were indicated in patients with sensory neural hearing loss. Due to new coupling strategies, these days also patients with conductive and mixed hearing loss can be provided with AMEI. Therefore, these systems are also indicated in cases such as chronic otitis media and/or ear malformations etc.

Using recently introduced coupling techniques, AMEIs may be adapted to ears with an intact ossicular chain and in cases with partially or complete missing ossicles. According to the remaining middle ear structures, the mechanical transducers of AMEIs may be adapted to different ossicles (incus, stapes) or to structures such as the oval or the round window. We will discuss advantages and disadvantages of different implants such as systems with one or two point fixation. Also, the various surgical techniques to place and adapt the transducers to middle ear structures will be addressed.

The post-operative outcome will be presented and we will finish up with a discussion of our experiences with the audience who might have had patients with similar conditions or different pitfalls.