the antero-lateral wall. Conservative management is usually successful, but surgical correction is sometimes indicated.

This presentation will show some practical aspects of ET physiology that are relevant to surgeons, methods for evaluating ET function and a systematic approach for diagnosing pathology. Accurate diagnosis of ET disorders will lead to successful management and when appropriate, surgical indications will be clear.

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## Pathogenesis of Cholesteatoma (R636)

### ID: 636.1

### Pathogenesis of the cholesteatoma: changing old concepts

Presenting Author: **Leticia Rosito**

Leticia Rosito

*Hospital de Clínicas de Porto Alegre*

*Learning Objectives*: 1. To define and classify the cholesteatomas and the spreading routes followed by the disease.; 2. to understand a novel model of pathogenesis with special emphasis on the key role of tympanic membrane retractions; 3. to employ an algorithm to aid the decision making process to maximize surgical results.

Cholesteatoma is a very intriguing condition and still poses a challenge to the otologist. Since it was first described by Duverney in 1683 it has been extensively studied but there are still many pending questions about its development, natural history and prognosis. In 2015 our group proposed a new and embracing classification system for acquired cholesteatomas based on pathogenesis. Our recent studies have shown differences in cholesteatoma growth patterns between children and adults and demonstrated the effect of the disease in the inner ear in both groups. Our contralateral ear studies have also confirmed the essential role of tympanic membrane retractions in the pathogenesis of cholesteatoma.

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## Pathogenesis of Cholesteatoma (R636)

### ID: 636.2

### Congenital Cholesteatoma: Clinical and ethiopatogenetic aspects

Presenting Author: **Dragoslava Djeric**

Dragoslava Djeric

*Medical Faculty University of Belgrade*

*Learning Objectives*: To present the features of congenital cholesteatoma.

*Design*: Case series

*Patients and Methods*: Ten patients were included in the study. The diagnosis of congenital cholesteatoma was based on previous history that excluded tympanic membrane perforation, otorreha, or otologic procedure, an intact tympanic membrane on otomicroscopic examination and a identified cholesteatoma at the time of surgical procedures (tympanotomy, atticotomy, tympanomastoidectomy).

*Results*: Six of the 10 patients had lesions isolated to the anterosuperior quadrant of the tympanum, the other had more extensive cholesteatoma that involve posterior part of the tympanic cavity and mastoid. Three of the patients underwent surgery for recidivism(none were from isolated anterior lesions). One of these patients was referred at the time of recurrence, one had known residual cholesteatoma, and one had recurrence.

*Conclusion*: Clinical and surgical findings suggest that congenital cholesteatoma showed various characteristics depending on the location and stage of development.

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## Pathogenesis of Cholesteatoma (R636)

### ID: 636.3

### The Pathogenesis of Cholesteatoma - Experimental Evidence (R636) 6–6

Presenting Author: **Richard Chole**

Richard Chole

*Washington University in St. Louis School of Medicine*

*Learning Objectives*: The objective of this presentation is to understand the scientific basis for the etiology of aural cholesteatoma.

Over the last century, a number of theories have been proposed to explain the pathogenesis of acquired cholesteatomas. Several of these theories have experimental evidence in animal studies.

Support for the ***retraction pocket invagination*** theory is seen in Eustachian tube obstruction models in Mongolian gerbils. When Eustachian tubes of gerbils are ligated in middle ear (bulla) fills with fluid, then over time the pars flaccida retracts, accumulates keratin and forms cholesteatomas.

Support for the ***epithelial ingrowth*** theory had been documented in a number of animal models. When toxic materials are applied to the tympanic membrane, destruction of the tympanic membrane and ingrowth of keratinizing epithelium occurs. In infected gerbils cholesteatomas often rupture leading to epithelial ingrowth. Human temporal bone studies have also supported this theory.

The ***squamous metaplasia*** theory is not support by experimental evidence. The only demonstration of squamous metaplasia has been seen in vitamin A deficiency. When rats are deprived of dietary vitamin A, the middle ear mucosa changes to a multilayered squamous epithelium, but cholesteatomas have never been seen in this model.

***Basal cell hyperplasia and ingrowth*** through the basal lamina has been observed in human temporal bones for many years. Ruedi first described this phenomenon. It has been observed in human temporal bone section and occurs in spontaneous in induced cholesteatomas and Mongolian gerbils.

The pathogenesis of cholesteatoma is complex and cholesteatomas may arise from various simultaneous mechanisms.

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## Mastoidectomy: How I do it (1) (V637)

### ID: 637.1

### How to do scutumplasty after cortical mastoidectomy or atticotomy

Presenting Author: **Masafumi Sakagami**

Masafumi Sakagami

*Hyogo College of Medicine*

*Learning Objectives*: To learn how to do scutumplasty for intact canal wall tympanoplasty and atticotomy/antrotomy in the video session

*Introduction*: Postoperative retraction of the ear drum sometimes occurs after cortical mastoidectomy or atticotomy for attic cholesteatoma. One of the most important points to protect retraction is to firmly reconstruct the scutum with a sliced cartilage.

*Surgical procedures*: After the tympanomeatal flap is elevated anteriorly beyond the scutum, choleateatoma matrix was removed with canal wall up method or attictomy. Concha cartilage was thinned by 0.5 mm or less with a cartilage slicer. The most important point for the scutumplasty is to firmly pile up a thinly sliced cartilage on the anterior bony edge of the scutum bone defect. When a cartilage size is not enough to cover the posterior bony edge, a piece of cartilage is added to cover the posterior site. The inferior edge of the cartilage is placed on the malleus neck.

*Subjects and Methods*: Between 2006 and 2011, 138 ears with primary acquired cholesteatoma were operated on with atticotomy/scutumplasty (28 ears), canal wall up method (87 ears), and canal wall down and reconstruction (23 ears). One-stage operation was 49 ears and two-stage operation was 89 ears. The mean follow-up time was 44.1 months (9–100 months).

*Results*: Postoperative recurrence due to the ear drum retraction was 17.0% using Kaplan-Meier analysis. Successful hearing outcomes (A-B gap 20 dB or less) was 83/124 (66.9%) according to the AAO-HNS criteria in 1995.

*Conclusion*: To reconstruct the scutum bone defect firmly is a key point to succeed canal wall up method and atticotomy for attic cholesteatoma. At the presentation, surgical videos and slides will be presented.

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## Mastoidectomy: How I do it (1) (V637)

### ID: 637.2

### Cochlear Implantation after Subtotal Petrosectomy in Chronic Otitis Media

Presenting Author: **Gianluca Piras**

Gianluca Piras, Sampath Chandra Prasad, Mario Sanna

*Gruppo Otologico*

*Learning Objectives*: Subtotal petrosectomy combined with cochlear implantation is a procedure required in specific situations and lowers the risk of repetitive ear infections, CSF leakage, and meningitis by closing off all connection with the external environment. Additionally, it gives excellent visibility and access in difficult anatomy or in drill-out procedures. Here we demonstrate the usefulness of Subtotal Petrosectomy in a case of recurrent chronic otitis media with sensorineural hearing loss in the only hearing ear, where it was possible to perform a simultaneous cochlear implantation.

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## Emerging Technologies (1) (R641)

### ID: 641.1

### Codacs as new treatment option for patients with severe and profound mixed hearing loss including cases with chronic otitis and cholesteatoma

Presenting Author: **Thomas Lenarz**

Thomas Lenarz

*Medical University Hannover*

*Learning Objectives*: Use of Codacs

*Objective*: Implantable hearing aids have become a valid option for the therapy of various forms of hearing loss. Codacs Direct Acoustic Cochlear Implant System is the first vibratory implant available for patients with MHL. By directly coupling sound energy into the perilymph, a very high maximum power output (MPO) is achieved over a broad frequency range. Via a conventional stapedotomy, the vibratory energy of the electromagnetic actuator is transferred directly to the perilymph through the oval window.

*Patients and Methods*: Patients with different etiologies of MHL were implanted:

Otosclerosis: n = 29

Tympanosclerosis: n = 4 (1 with subtotal petrosectomy)

Chronic otitis media: n = 15 (12 with subtotal petrosectomy)

In cases with intact posterior canal wall the implantation was done through the posterior tympanotomy. Stapes footplate was perforated and the stapes prosthesis was fixed at the long process of the incus. In cases with canal wall down and chronic otitis media there was a two-step procedure with subtotal petrosectomy and optimal fat obliteration followed by Codacs implantation six month afterwards. Pre- and postoperative bone and air conduction thresholds and word recognition scores were recorded preoperatively with fitted hearing aid (only 32 of the reported patients were able to use a hearing aid before implantation or subtotal petrosectomy) and postoperatively over time.