



CI Patient journey and E-health

Romain Cardot



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sound matters

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Programme

- ◊ Tour de tables: Présentations / attentes / objectifs
- ◊ Présentation : Parcours patients sourds orientés implant cochléaire
- ◊ Pause
- ◊ Vidéo chirurgie
- ◊ Démo :
 - Outils de chirurgie
 - Logiciel de réglages I.C
 - Ponto
 - Buzz
- ◊ Travail de groupes : e-santé et implant cochléaire
- ◊ Conclusion



CI Patient journey

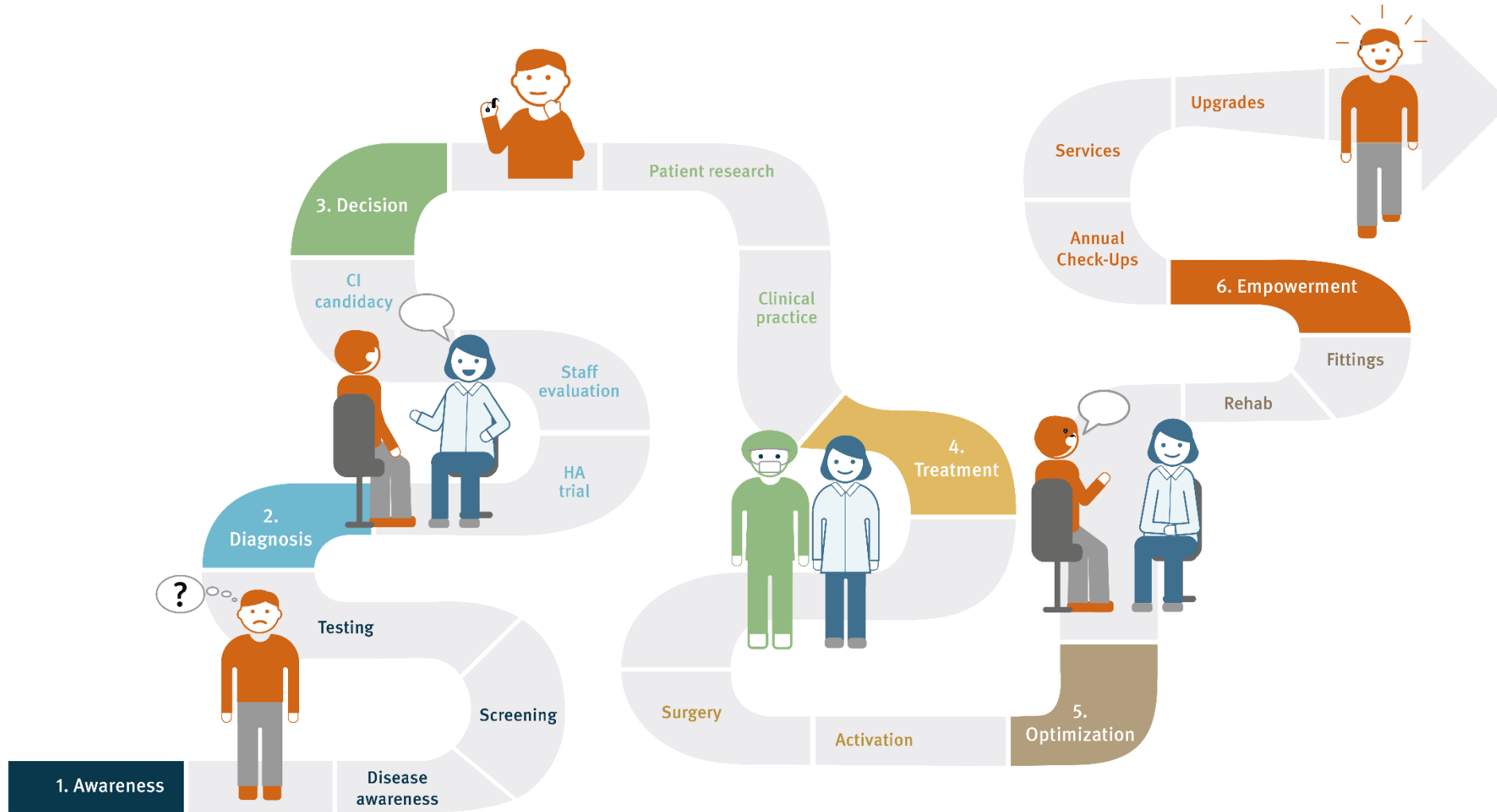
Romain Cardot – Product manager



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Patient journey



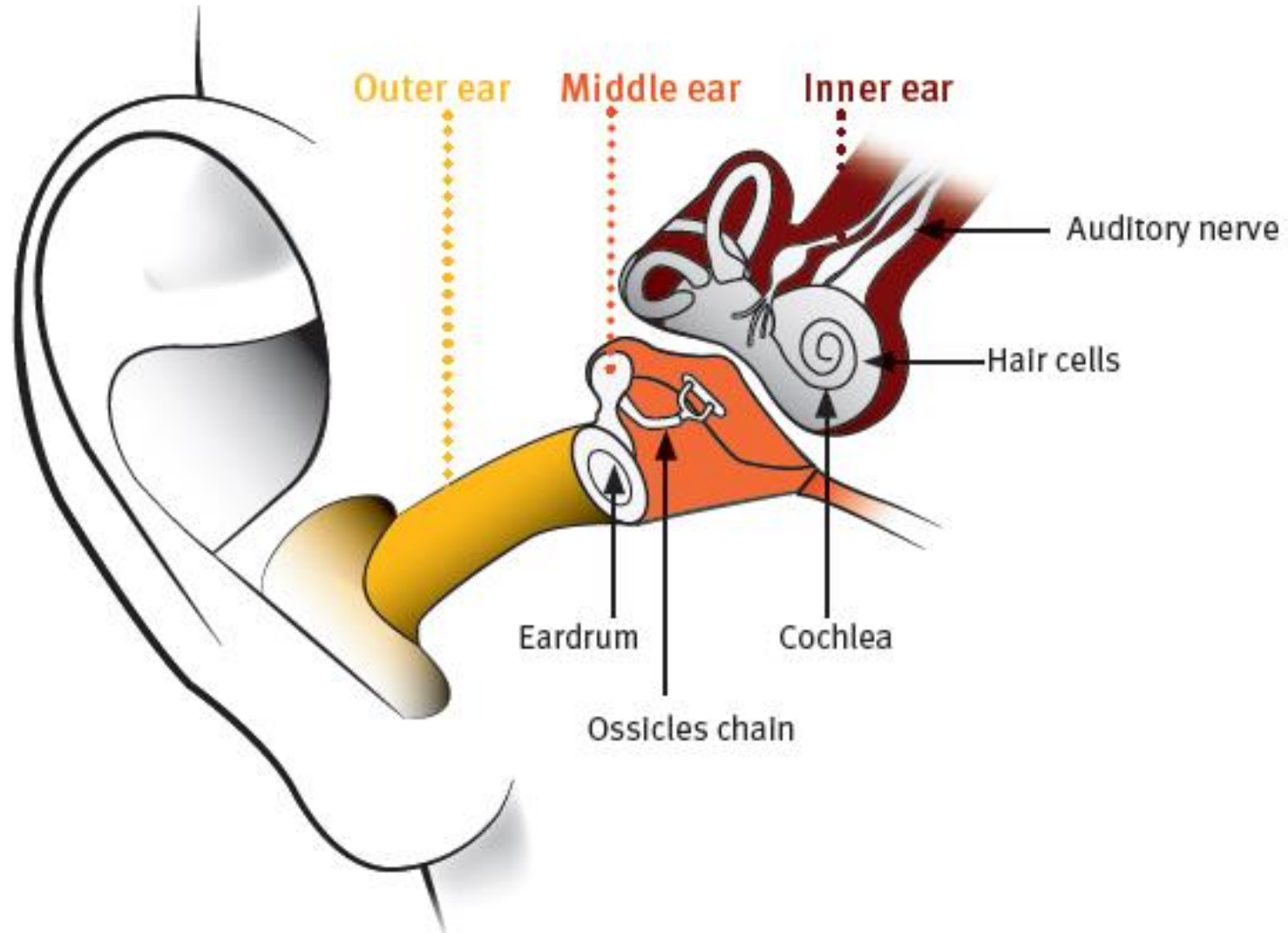
Introduction



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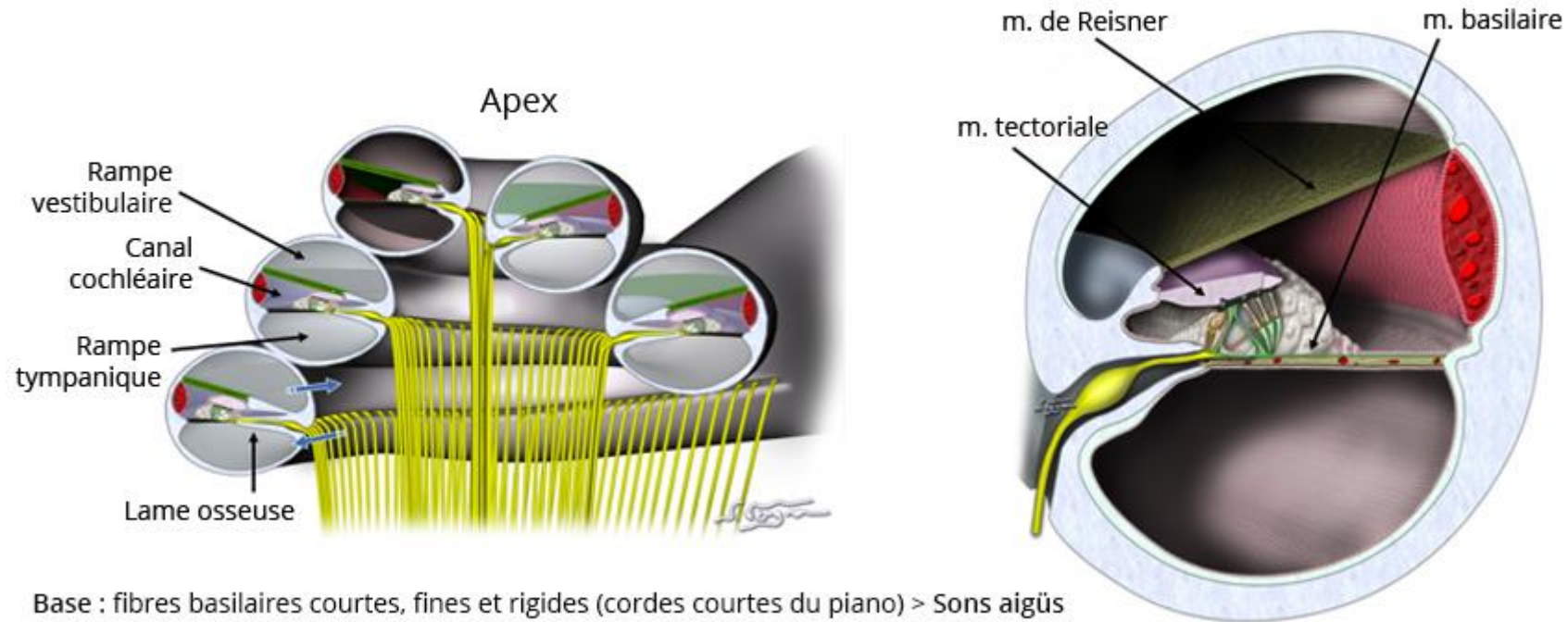
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Anatomy



Cochlea

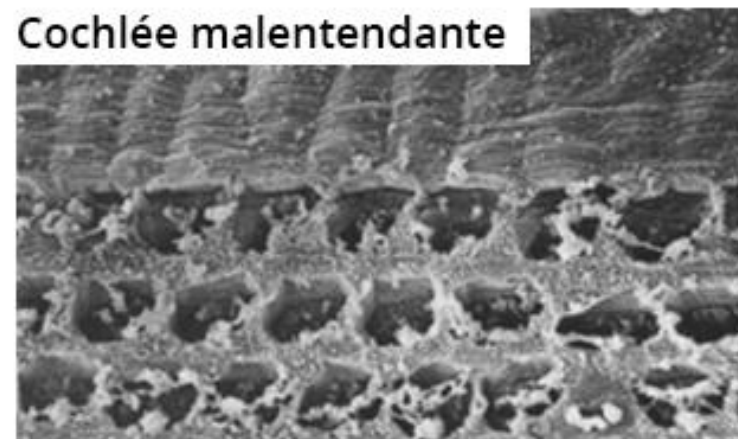
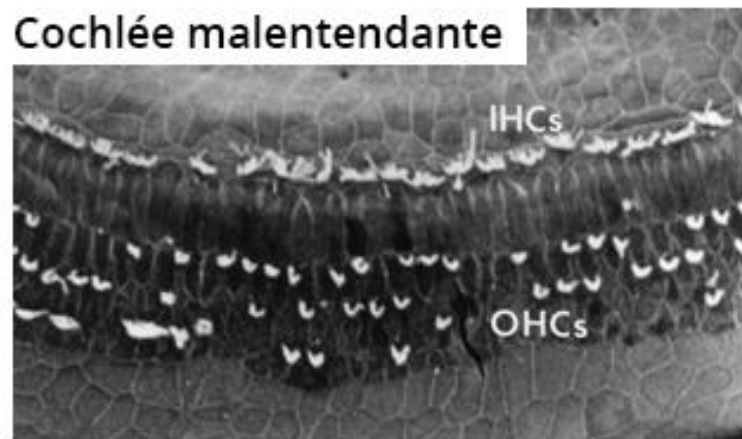
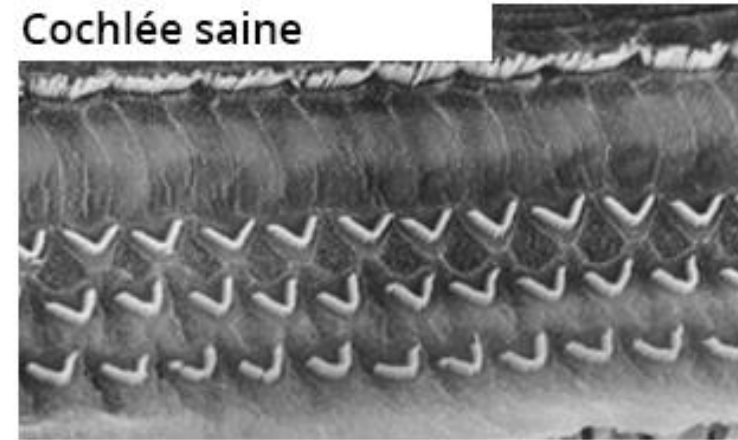
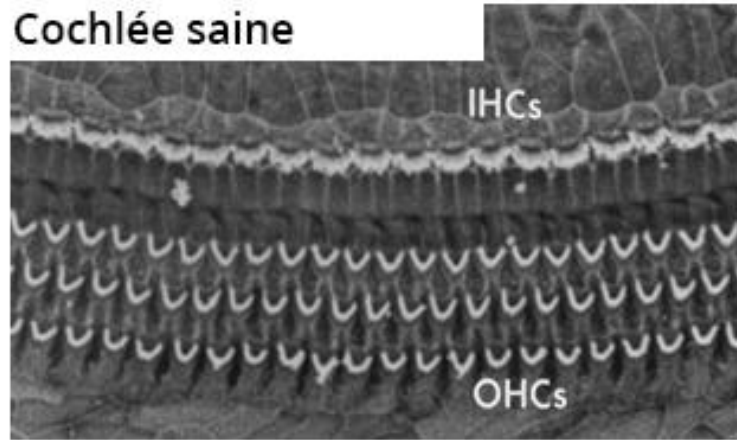
Coupe de la cochlée (S. Vergnon)



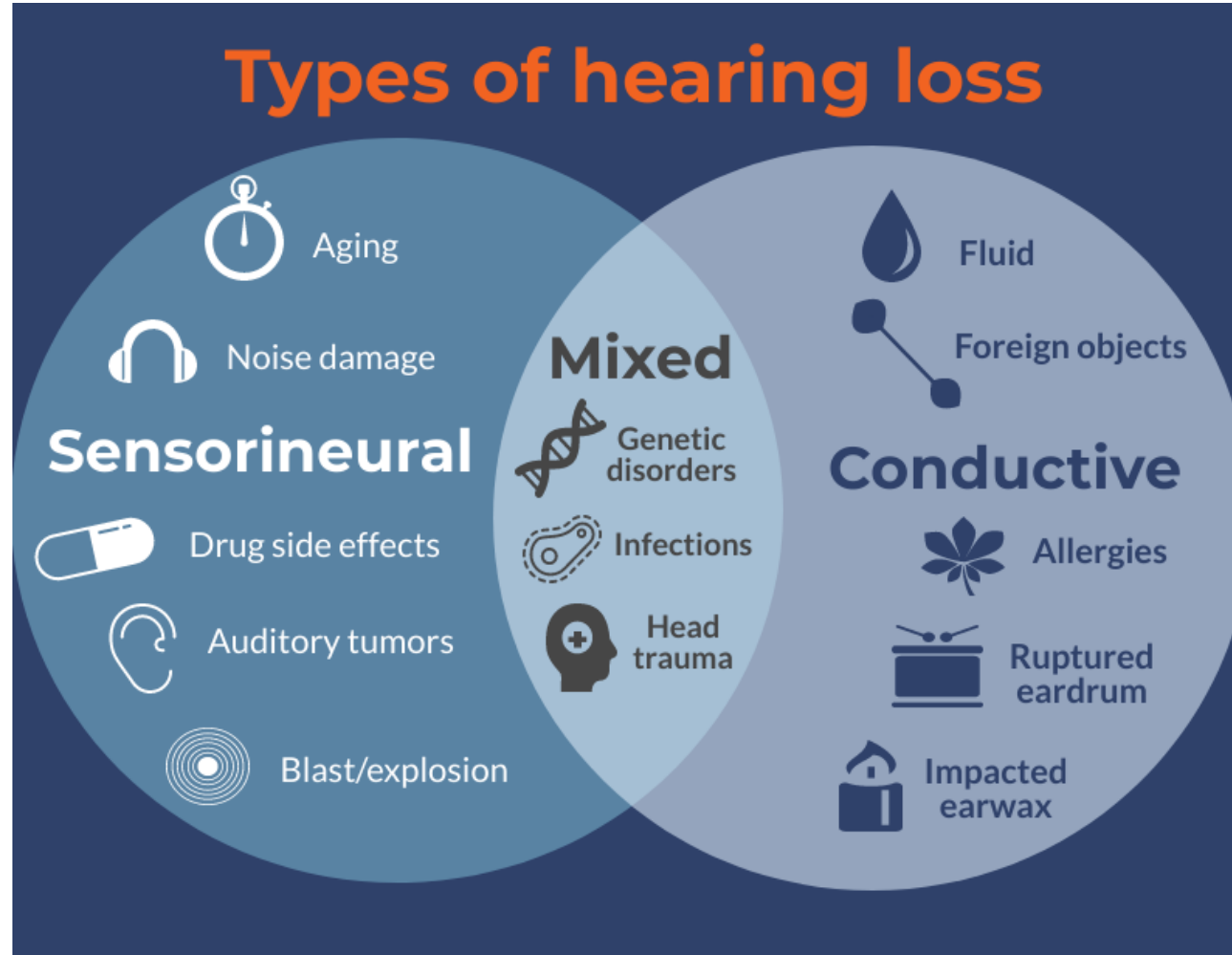
Base : fibres basilaires courtes, fines et rigides (cordes courtes du piano) > Sons aigus
Apex : fibres basilaires longues, épaisses et souples (cordes logues) > Sons graves

Hair cells




Pertes auditives : CCI endommagées et CCE détruites ou disparues



Hearing Loss



Different diagnosis – Different solution

Input	Hearing device	Output
Sound [dB SPL]		Sound [dB SPL]
Sound [dB SPL]		Force [dB μ N]
Sound [dB SPL]		Electric charge [C / coulomb]



Part I

Awareness

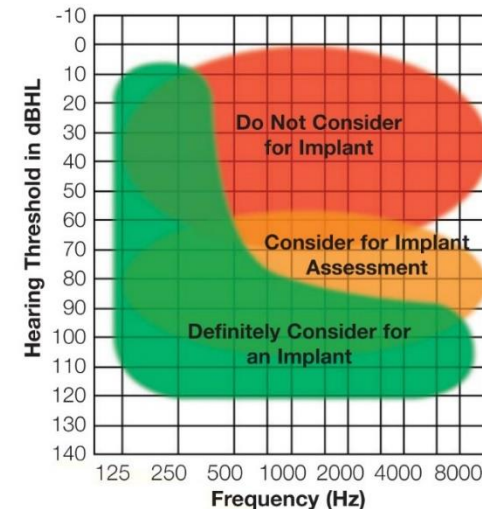


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CI candidacy: audiological criteria

- Adults and children suffering from severe to profound sensorineural hearing loss
- No benefit using a conventional hearing aid
 - Pure Tone Audiometry exceed 70 dB (severe) to 90 dB (profound)
 - Intelligibility usually between 30% and 60% at 65dB with H.A
 - Indications depend on the country
- Functioning auditory nerve
- No medical contra-indications
 - malformation of the ear
 - psychologic criteria
 - Motivation
 - Expected results
 - Family support ...
- Bilateral implantation proposed now in most of CI developed countries (children)



CI candidacy – etiology – Children cases

- Congenital deafness (inherited/non-inherited)
- Meningitis
- Syndroms, malformation of Cochlea



Newborn screening



ABR



OAE

CI candidacy – etiology – Adult cases

- Progressive hearing loss
- Sudden deafness
- Meningitis
- Trauma



Progressive hearing loss



Audiologist in retail



Implant Center



Private ENT



Part II

Diagnostic



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Before the implantation

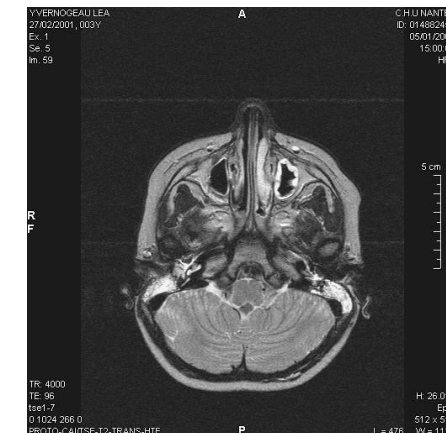
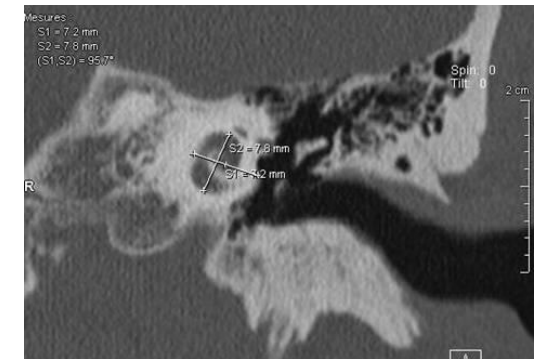
- Amplification and aural rehabilitation over a 3-month time period
- Psychological care for the family : results expectations, speech/language-therapy
- Implantation from 9 to 12 months with the approval of the anesthesiologist



Pre-implant assessment : the exams

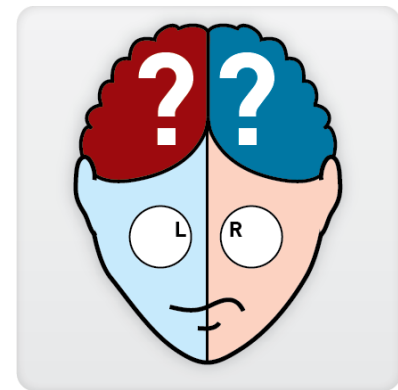
During staff meeting, several points are studied:

- Medical (genetic, vestibular, age, heart issue...)
- Audiological (no benefit from HA, auditory nerve function)
- Imaging
 - Scanner (malformation of the ear, ossification of the cochlea)
 - MRI (nerve aplasia, central system...)
- Speech therapy (adults – language aptitude and lip-reading)
- Psychology (patient and family)



Pre-implant assessment : the choice of brand and the side

- Choice of the surgeon (anatomy, habit...)
 - Request from the patient (marketing, other member of the family...)
 - Choice of the audiologist
 - Hearing Aids , accessories connectivity ...
 - 1 brand tender
 - ...
- Choice of the “best hear” : residual hearing, used of an H.A during several years
 - Choice of the “worst hear” : the other side can be a complement of the C.I




Part IV
treatment



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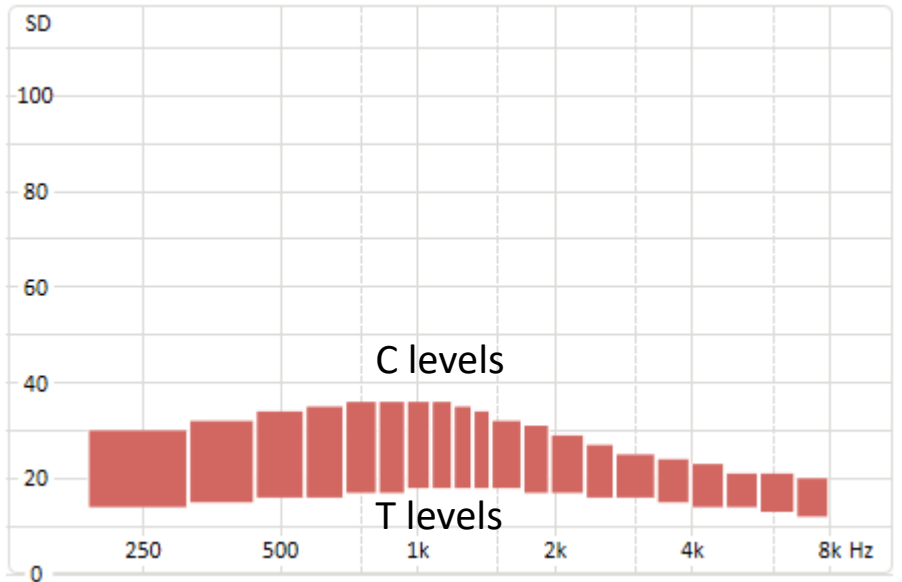
Surgery

- Global time in hospital : 3 days
- Surgery duration : 2 hours
- Under general anesthesia, few cases are done in local: **where saving time matters!***
- Preoperative measurements (Impedance, ECAP ...) 
- Main complications during the surgery:
 - Lesion of the facial nerve (use of facial nerve monitoring)
 - Skin infection
 - Difficult access to the RW
 - Ossification of the cochlea (difficult insertion, partial insertion...)
 - Malformation of the cochlea (leakage of CSF) cerebrospinal fluid



Activation

- After the recovery period (~1 month), the patient receives the sound processor.
- The fitting audiologist adapt the sound processor to the physiology of the hear of the user, by defining the stimulation levels produced by a group of electrodes



- Define the level of electrical current that generate a loudness sensation that is weak (T levels) and comfortable (C levels)
- The MAP obtained defines the electrical dynamic range (EDR) of the patient

- Each experience of activation is unique, but it generally takes some time for the brain to adapt to this new type of stimulation.



Part V

optimization

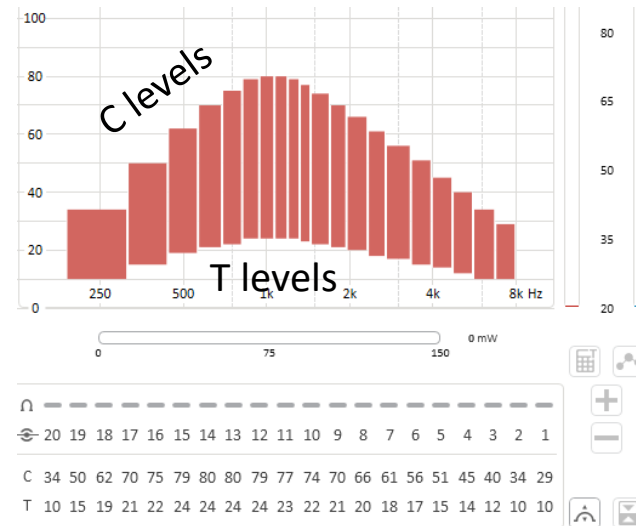


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Fittings

- Progressive adaptation of the MAP with the objective of maximizing the amount of information to the patient at a certain moment of time
- The fitting is now realized electrode per electrode
- The EDR is getting wider
- Session after session the patient improves the audiological performance
- Start to use connectivity accessories



Rehabilitation

- Rehabilitation therapy is necessary to maximize benefit from the cochlear implant.
- The patient is taught how to listen with the implant, and how to understand speech (and talk)
- Performed by speech therapist in CI centers and in private practice
- Directly by the patient/parents



Children

For children with pre-lingual deafness who have received a CI at a young age, language acquisition and comprehension may take many years to achieve.

For children with post-lingual deafness positive results are often quickly achieved if the implantation is carried out promptly after the loss of hearing

Adults

For adults with post-lingual deafness rehabilitation lasts on average between 6-12 months, whilst some users may need a longer period.

Rehabilitation can be more challenging if users have suffered from auditory deprivation for a long period



Part VI

Empowerment



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At school / work

- Classic or specific school
- An assistant can be propose to help the child
- Accessories can improve the understanding (FM systems, T-coil...)



Global results

- Low complication rates (3%): failures, infection, migration, no nerve...
- Excellent results for:
 - Adults with the shortest duration of deafness tend to experience better outcomes (75% use the phone)
 - Child who was is implanted before 2 years old (speech and language development =, integration of classical school)
- Benefit of the bilateral implantation : better understanding in noise and improvement of the localisation.



Sound processor upgrades

Depending on the countries, upgrades can be proposed under conditions :

- ◊ 5 to 7 years after the activation of the former sound processor
- ◊ Performance improvement



Interaction patient – Manufacturer

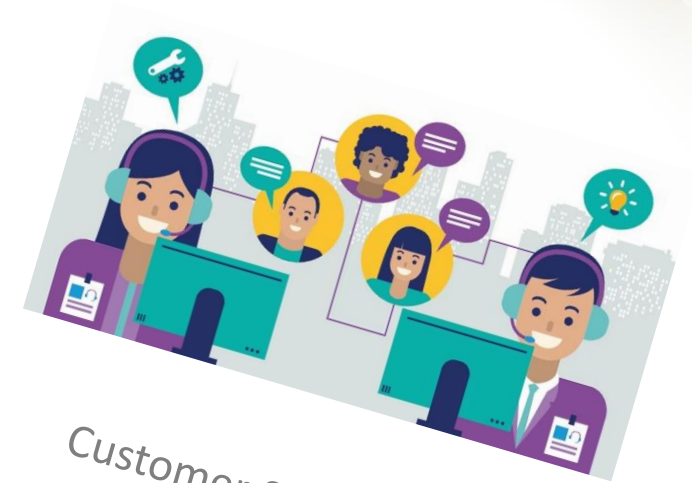


- Clinical Support
- Technical Support
 - Expertise



Marketing

- Videos
- Information (website ...)
- Patient association meetings



- Customer Service
- Problem solving
 - Orders of accessories
 - Guidance



Testimonial

- ◊ Vi <https://www.youtube.com/watch?v=uBChAfH9c>
- ◊ Twins <https://www.youtube.com/watch?v=saVpZAM9I9o>
- ◊ Europe https://www.youtube.com/watch?v=8_QAtWoj66U



Pause



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Vidéo chirurgie



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Demo



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E-santé & I.C



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