

DR-TB medication and the effects on hearing

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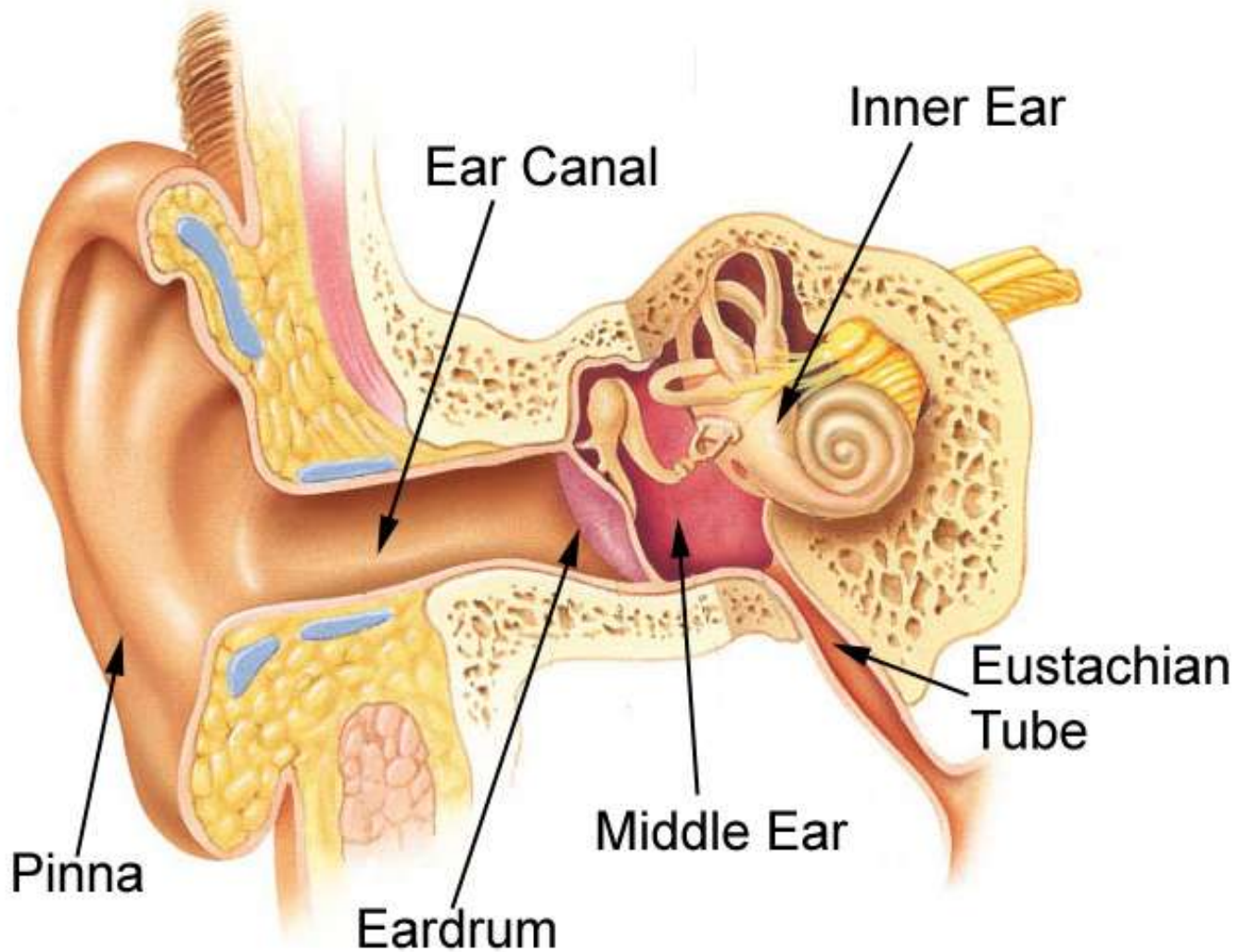
Role of an Audiologist

- Assess, diagnose & manage hearing loss, balance disorders & any other auditory related problems
- Specific role within DR TB patient population: conduct baseline audiograms & serial monitoring of the patients hearing levels
- Provide expert advice to other Multi-disciplinary team
- Provide Assistive devices
- Provide Aural rehabilitation

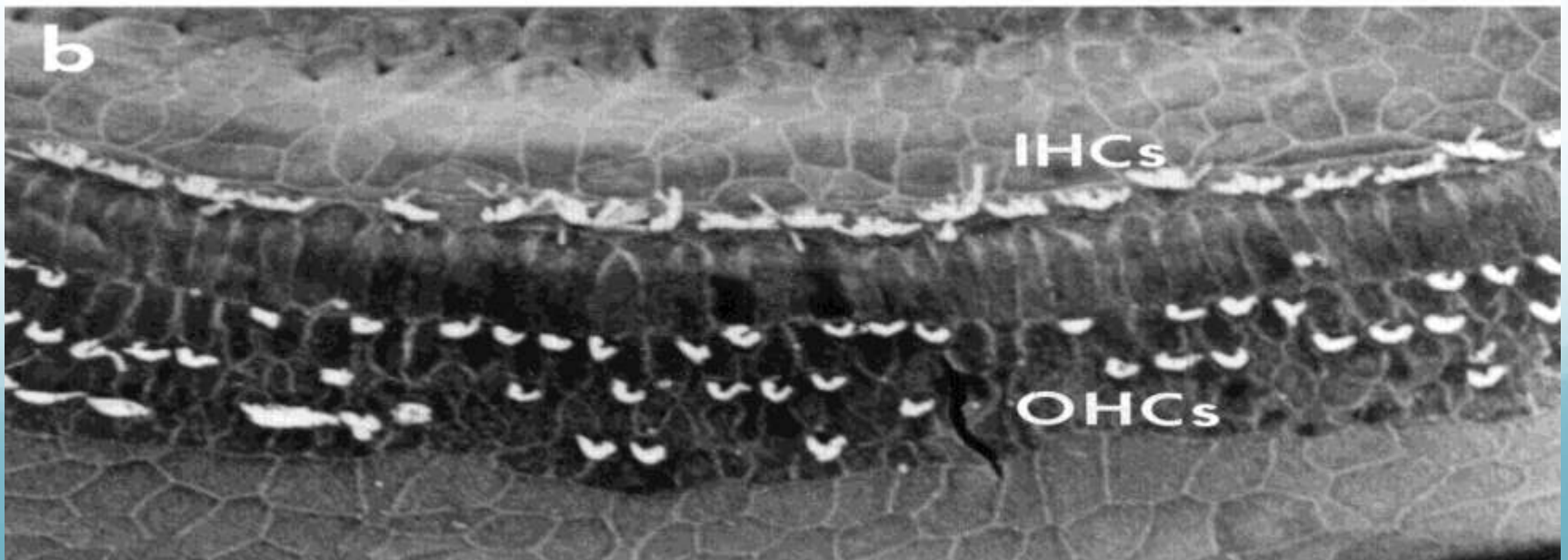
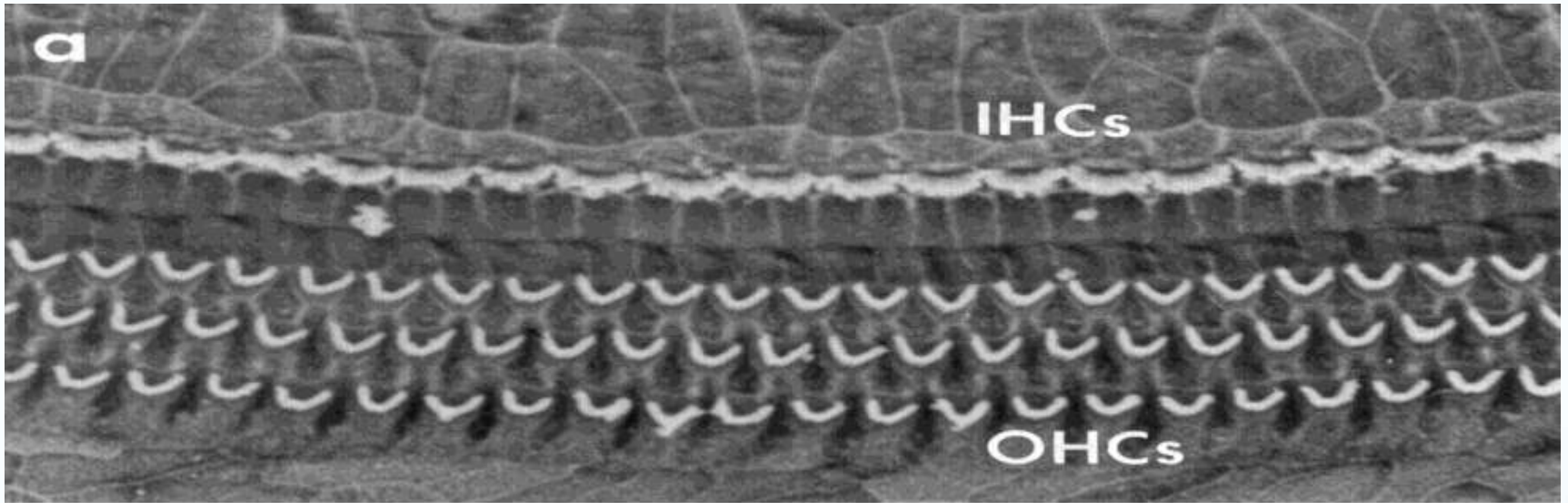
Why is an Audiologist needed

- Certain TB medications (Aminoglycosides & polypeptide) are toxic to the auditory system, mainly the cochlear, but also the vestibular system
- Permanent hearing loss
- Irreversible
- May cause complete deafness
- Kanamycin, Amikacin, Streptomycin
- Capreomycin(polypeptide)
- NB! Patient Consent is essential

The Ear



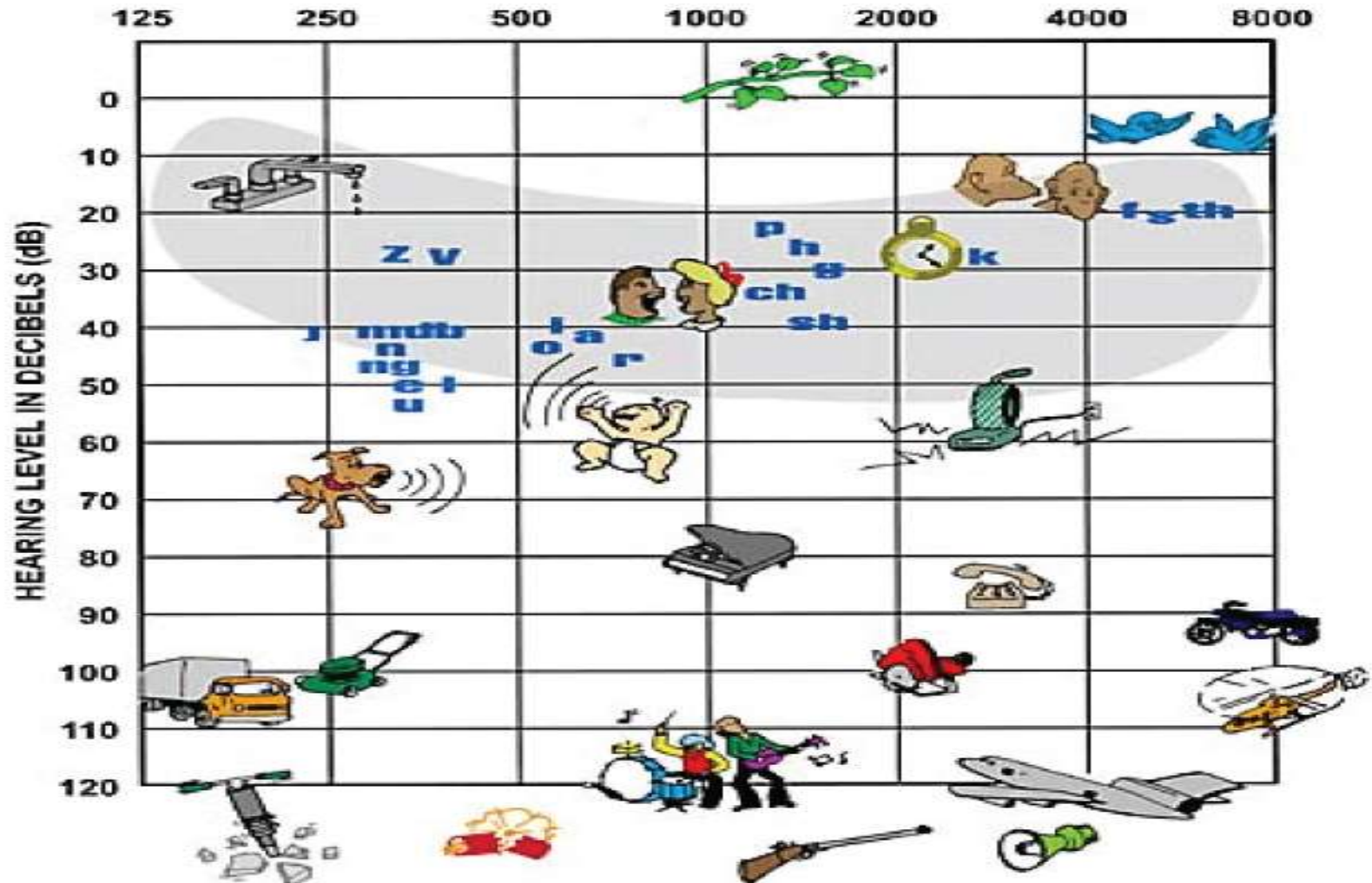
Normal Cochlear vs Damaged Cochlear



Speech Banana

AUDIOGRAM OF FAMILIAR SOUNDS

FREQUENCY IN CYCLES PER SECOND (HZ)



Possible symptoms experienced by patient

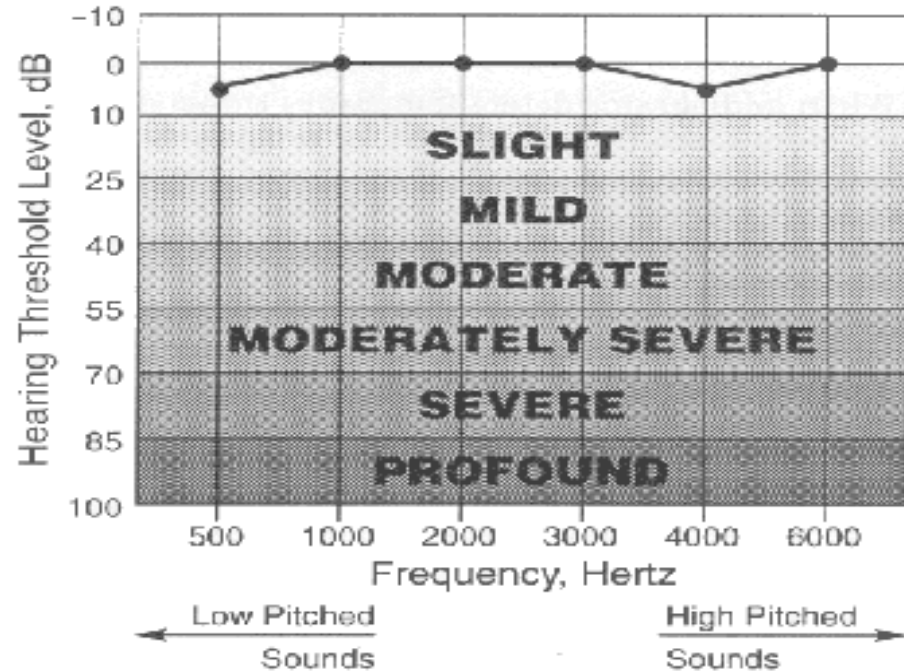
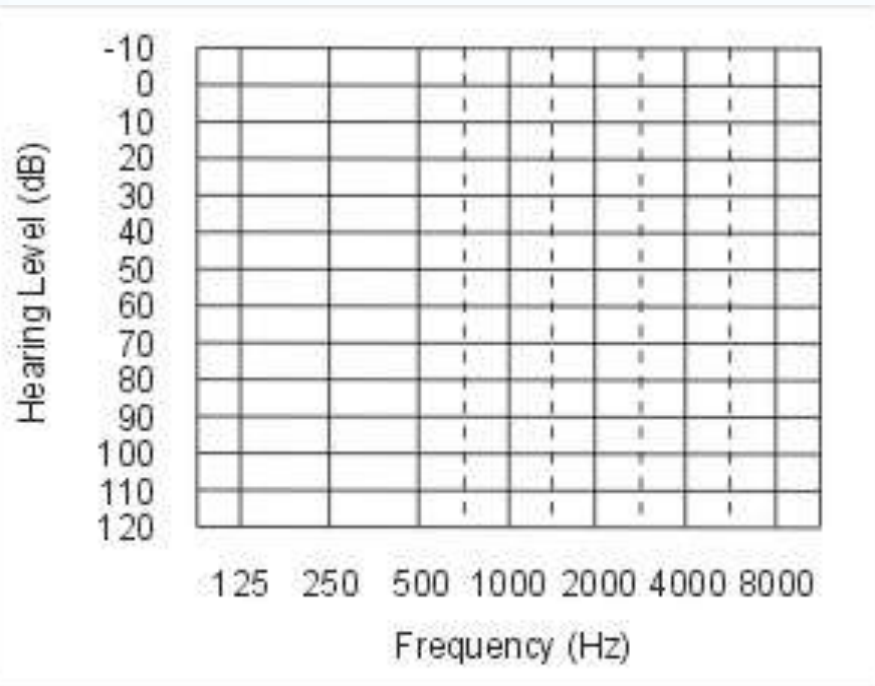
- Aural fullness
- Tinnitus
- Dizziness
- Hearing loss
- Complete obliteration of cochlear hair cells= complete deafness

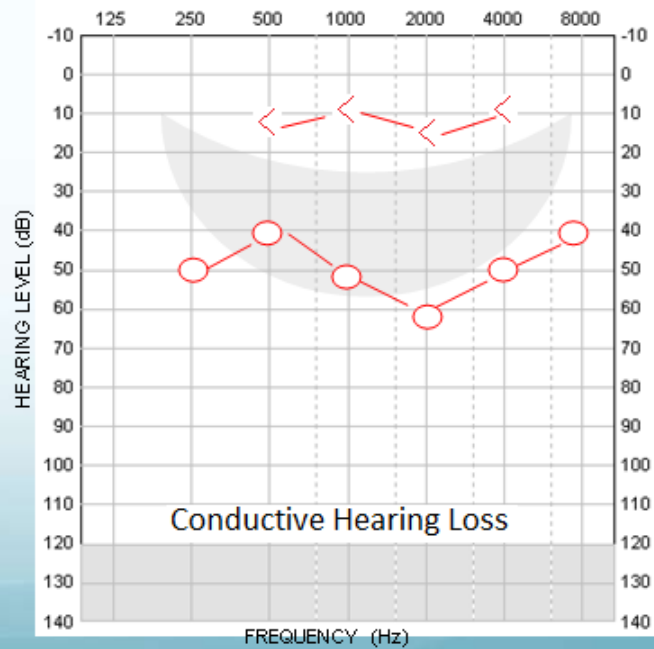
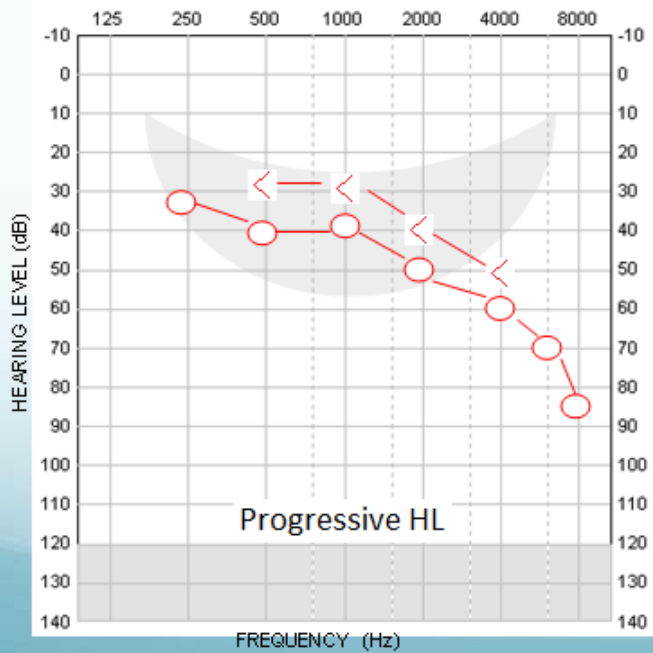
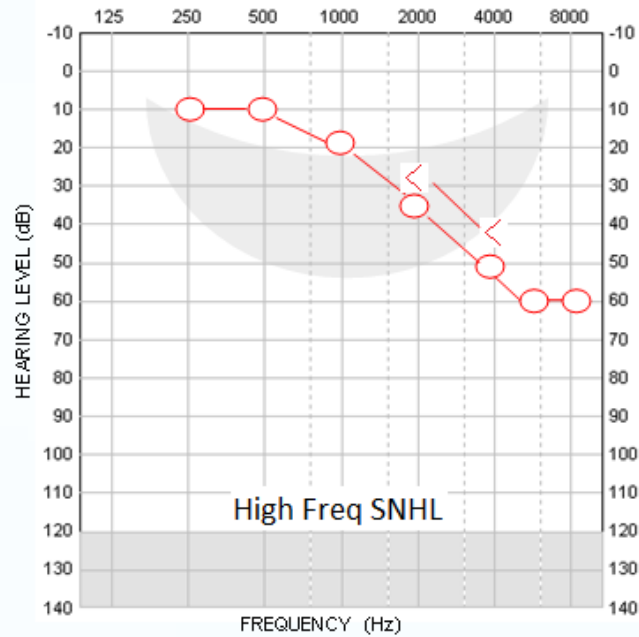
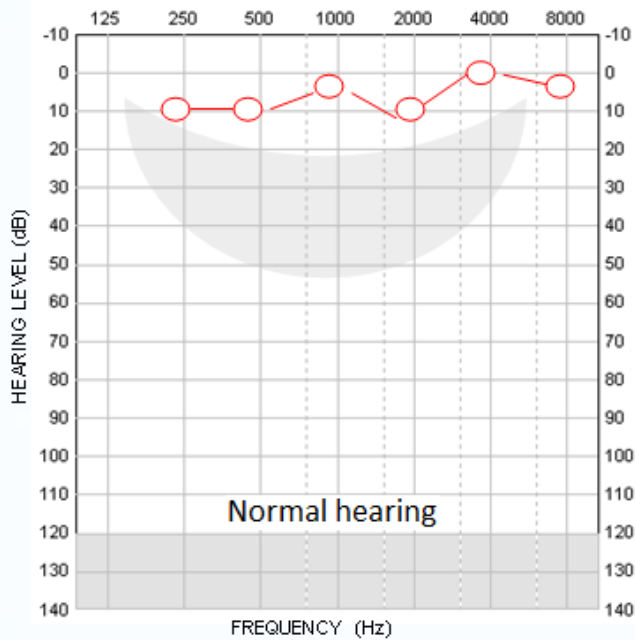
Assessments

- **Case history:** Previous HL, fam HX of HL, previous use of TB meds
- **Otoscopy:** occluding wax, otitis media, perforation, foreign objects & cone of light
- **Tympanometry:** functioning of the middle ear
- **Pure Tone Audiometry**, including air & bone conduction: patient's hearing levels (soundproof room)
- **Speech Perception** testing: ability to understand speech (soundproof room)
- **Oto-Acoustic Emissions:** objective means of testing cochlear outer hair cell function

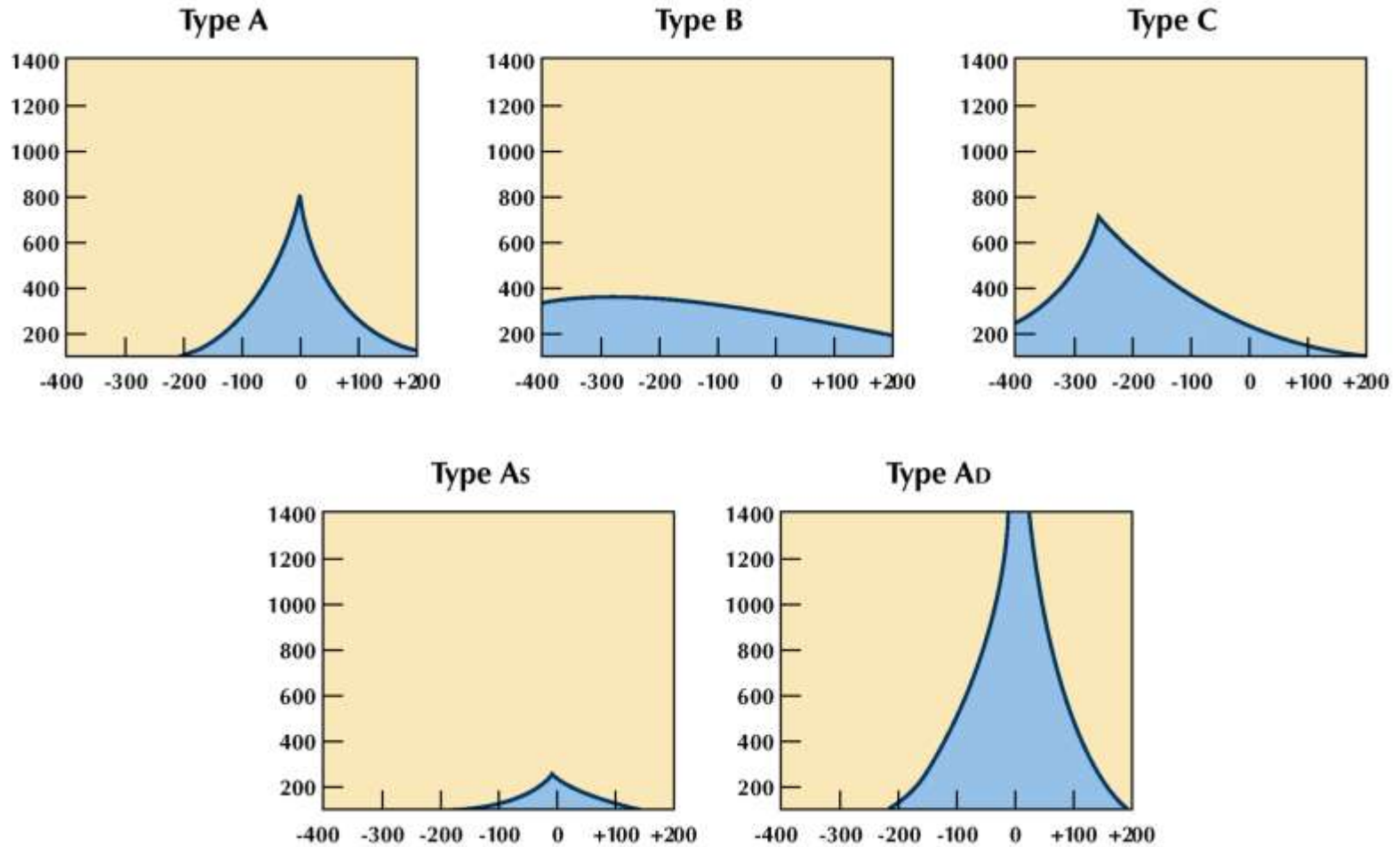
How to read an audiogram?

- You read it from top to bottom. The top being normal up until 25dB and mild hearing loss starting from 26dB and becoming worse





Tympanometry results

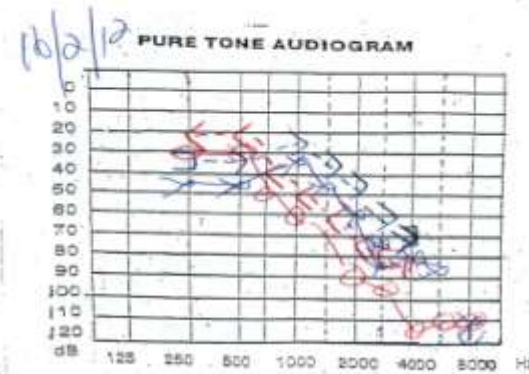
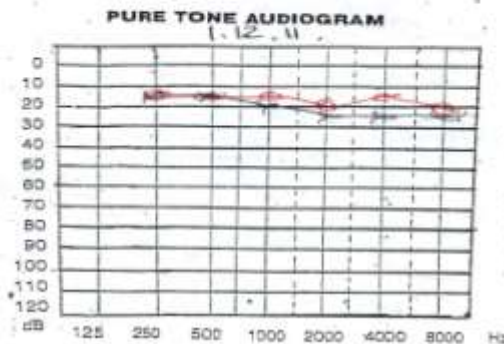
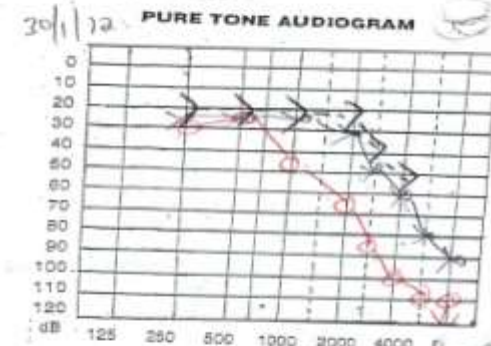
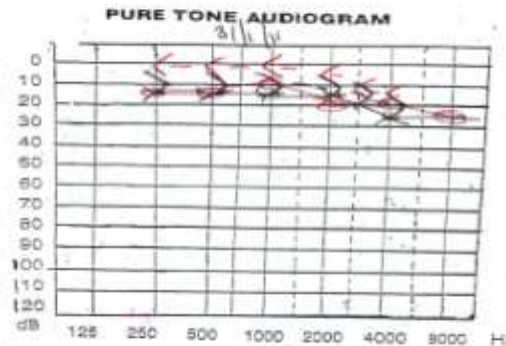
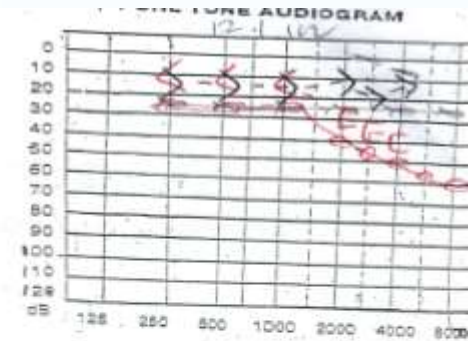
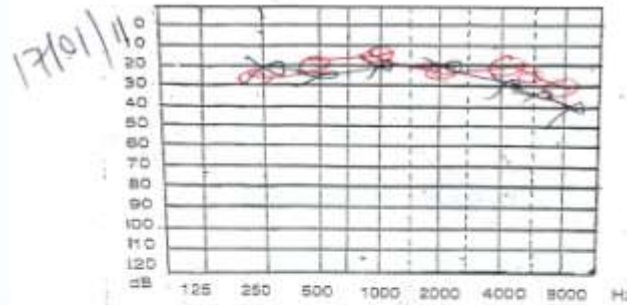


Criteria used for significant change

- D.o.H: no guidelines except SA MDR- TB for Doctors
- There are no South African based Audiology guidelines for TB assessment & monitoring
- Baseline: hearing loss- 2weeks
- Baseline: normal hearing- 1monthly
 - >10dB decrease at 2 or more Freq
 - >15dB-20dB decrease at 1 Freq
 - Loss of response at 3 consecutive freq
- Compare current to baseline & previous
- Decrease on threshold, retest 2weeks
- Stable then 1monthly

Progressive Hearing Loss

- 44yrs old
- HIV+
- No noise exposure
- Otoscopy: NAD bil
- Type A Tymps
- Started Rx: 01-2011
- Injectable started
in 2011
- DNA 02-2011
until 12-2011
- Stopped Km: 01-2012



Management

Depends on hearing loss or other auditory conditions and other issues.

- Occluding Wax
- Ear infection
- Perforation
- Tinnitus: counselling and therapy
- Hearing aids
- Aural rehabilitation: hearing aid use, listening strategies

Management continued...

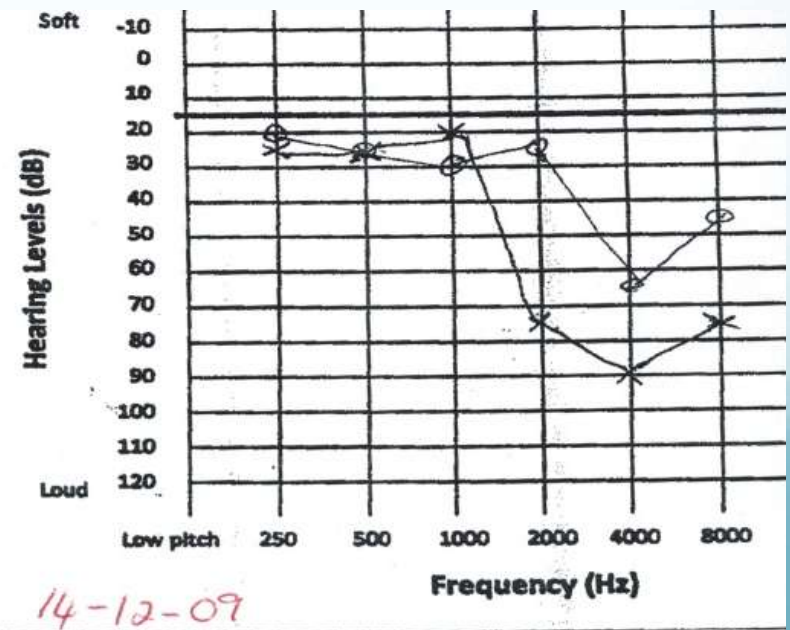
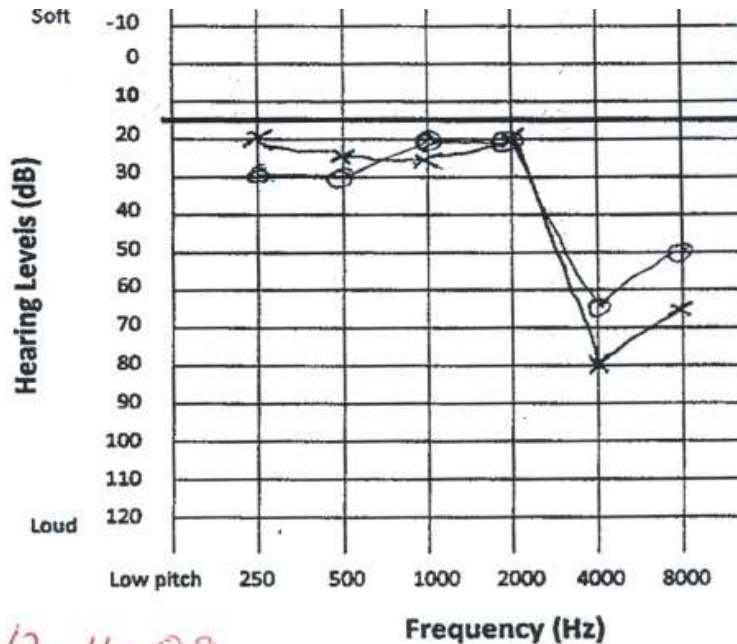
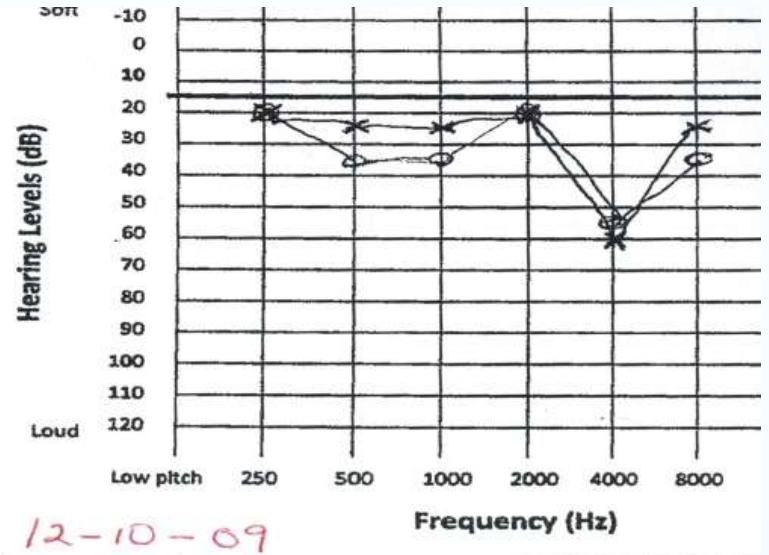
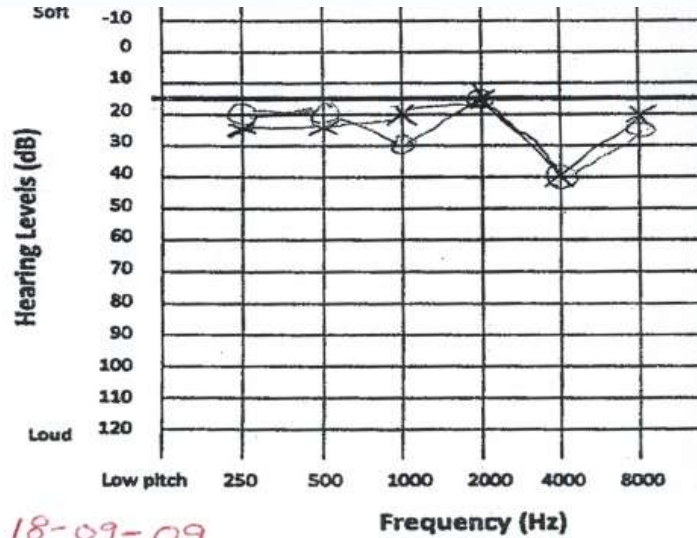
- Dependent on adverse effects:
 - Change injectable **frequency**: 3 x weekly
 - Change injectable **dosage**
 - **Stop** injectable completely
 - **Continue** injectable without any changes
- According to Peloquin *et al.* A larger cumulative dose & older age was associated with ototoxicity
- Susceptibility, degree and rate of progression of HL differs: Individual case approach NB.

Screening vs Diagnostics

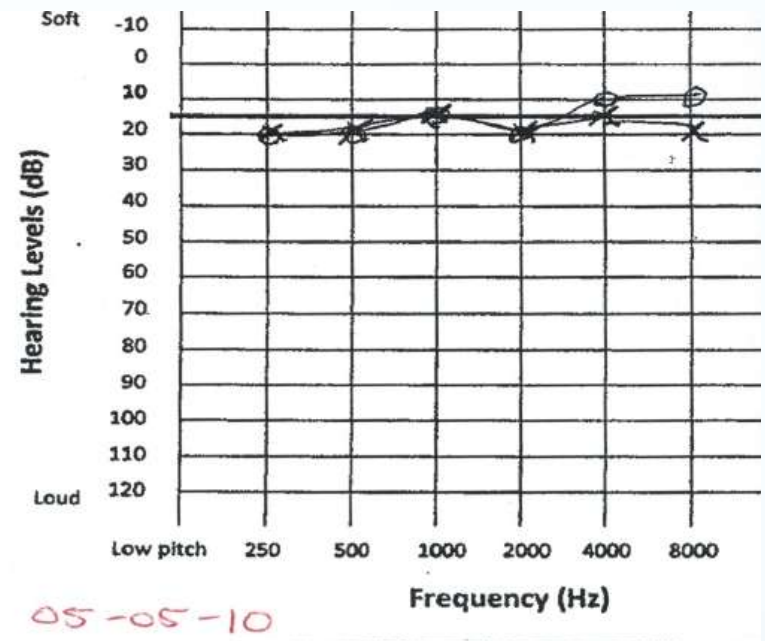
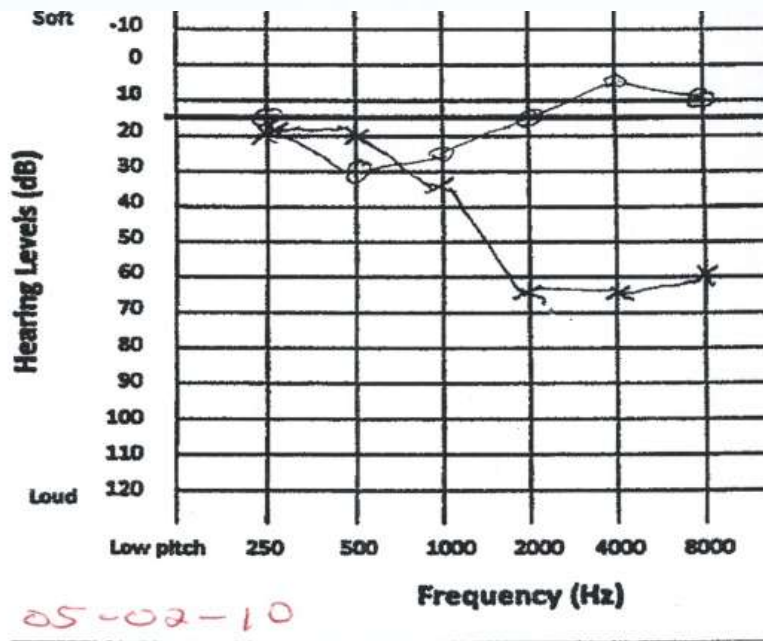
- To see whether patient has normal or impaired hearing
- Baseline + monitoring audiograms
- Quick easy test
- Otoscopy & AC
- No differentiation
- OAE's may be used
- To investigate the patients' hearing levels
- Differential diagnostics
- Longer time to do
- Otoscopy, Tymps, AC, BC, Speech
- Tests external, middle & inner
- SNHL, CHL, and MHL
- Better representation of the patients' auditory system
- OAE's may be used

NB! Case history: Age, chronic ear infection, noise exposure, family history etc.

Screening vs Diagnostic audiograms



Screening vs Diagnostic audiograms



Limitations: Screener (inaccurate results; not representative of the whole auditory system; may affect TB regimen or treatment success). Best to always obtain a diagnostic as well, especially where HL indicated on screener

Issues hindering possible Audiology services for TB patients

- Under staff (x2 BCH; x1 KDH)
- Transportation
- Weather dependent
- Patients are too weak
- Patient inter-communication
- Misinformed healthcare workers: hearing loss
- Misinformed patients at Clinic level: importance of hearing tests
- Uninformed doctors

What's known...?

- Aminoglycosides: ototoxic to hearing
- Baseline required before injectable phase
- HL severely affects patients' communication ability
- HL may have a delayed onset, even after stopping the injectable
- F-up: 4-6months after injectable stopped
- Accumulative dosage over time contributes to HL
- Patients with HIV/ older age at higher risk
- Genetic mutation predisposition
- Otoprotective agents are being developed

What's unknown...?

- Can hearing truly be preserved if we intervene sooner than later? How soon?
- At what degree of HL should treatment be modified?
- Does it help to reduce frequency and dose simultaneously or at different times?
- Auditory monitoring and rehabilitation integral part of package of care for DR-TB patients
- Further research desperately needed if DR-TB treatment will continue to include and injectable in future
- Standardised procedures and protocols

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