

# **Cochlear Implants for Unilateral Hearing Loss in a Pediatric Population**

Clinic Data and Case Studies

**Children's Hospital  
of Michigan** 

**DMC** DETROIT MEDICAL CENTER

# Children's Hospital of Michigan: Cochlear Implant Program Stats

- Currently follow 227 cochlear implant recipients
- Perform an average of 25 to 30 implant surgeries a year
- Earliest implant surgery was in 1987

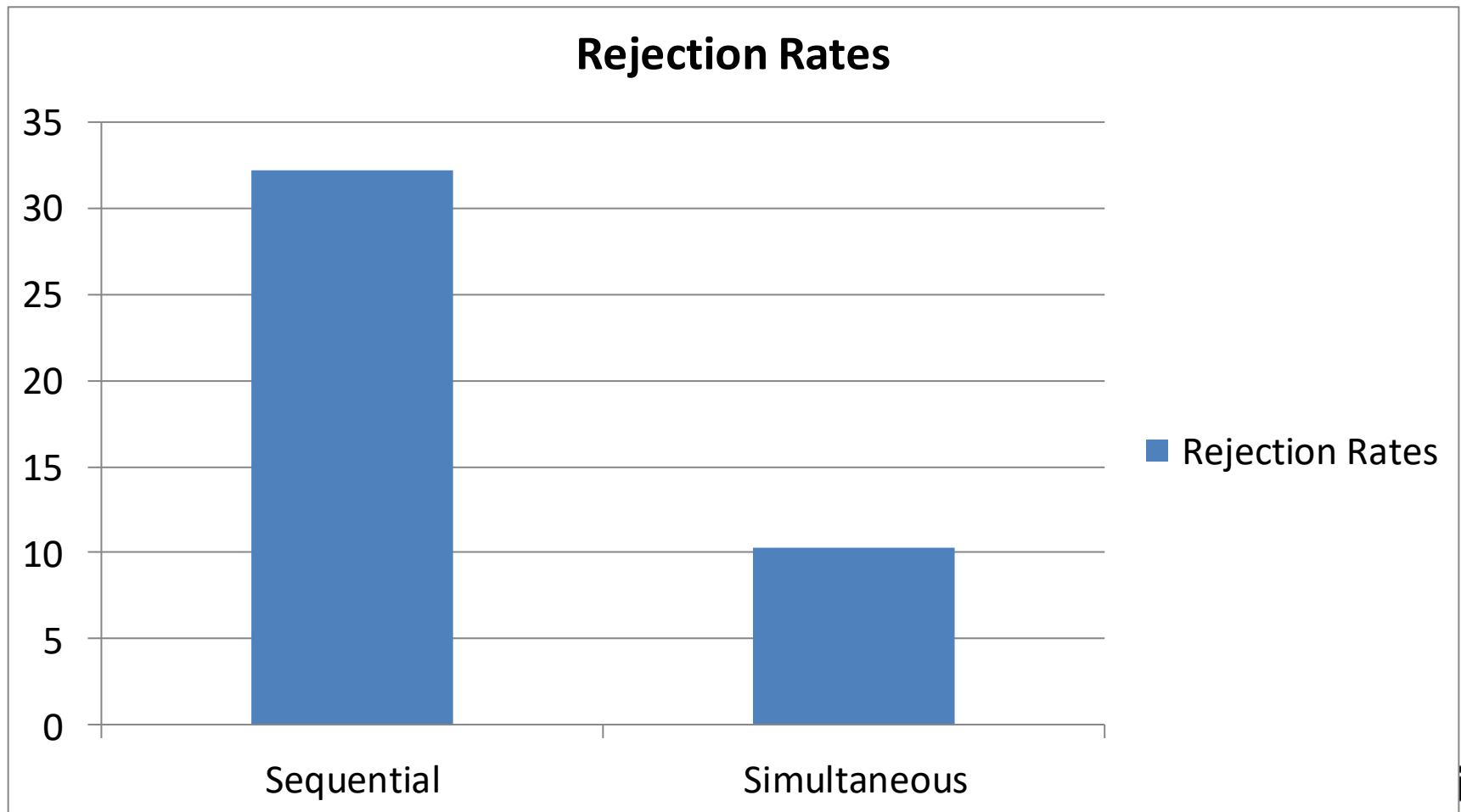
# Recipient Characteristics

- Seventy eight patients are bilateral implant users
  - 47 simultaneous
  - 31 sequential
- Fifty two patients are bimodal users (CI + HA)
- Ninety seven are unilateral CI only
  - 5 are recipients with unilateral hearing loss

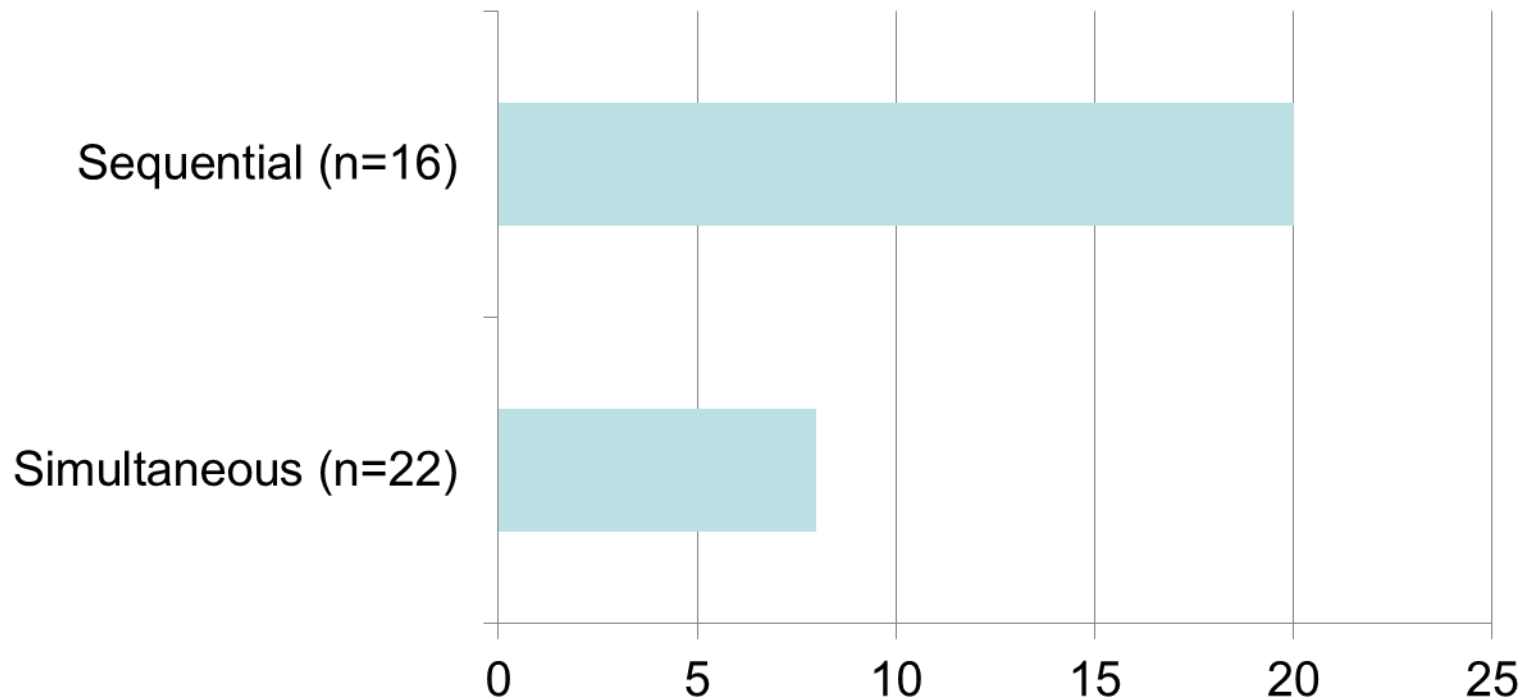
# A Closer Look at Sequential Bilaterals

- Of the 31 sequential bilateral recipients, 11 are non users of second CI
  - Rejection rate of 35.4%
- Of the 49 simultaneous bilateral recipients, 5 are non users of second CI
  - Rejection rate of 10.3%

# Simultaneous vs Sequential



# Average Word Recognition Differences Between ears: Sequential vs Simultaneous



# Unilateral CI Case Studies

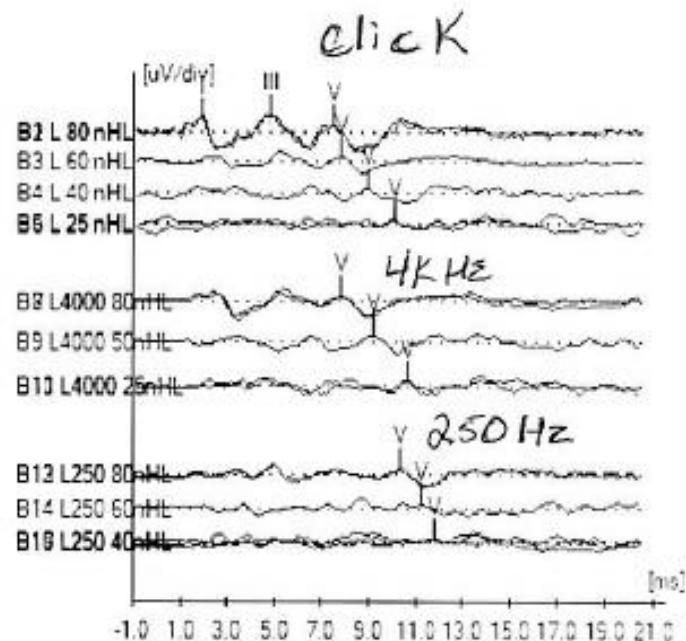
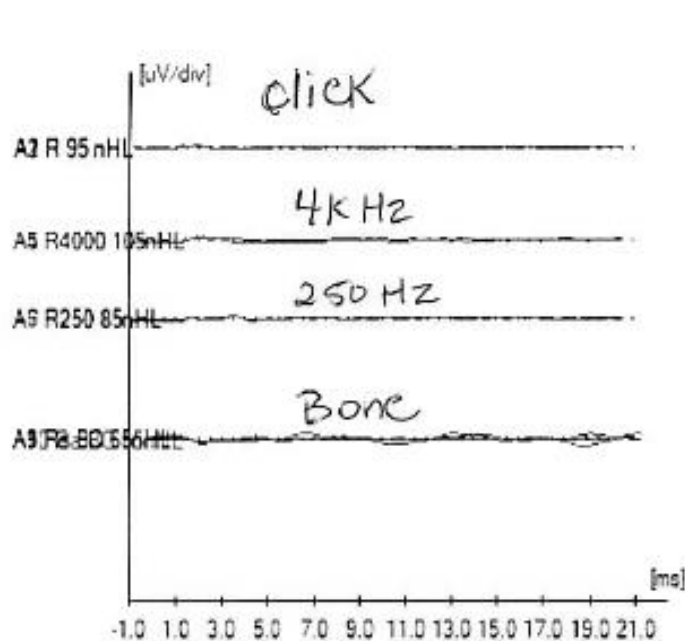
- Currently 5 patients with CIs for SSD
  - Age at implantation and etiology:
    - 1 year, 6 months (CMV)
    - 6 years, 4 months (Unknown etiology)
    - 12 years, 1 month (CMV and EVA)
    - 15 years, 4 months (CMV)
    - 25 years, 8 months (familial. Younger sibling has bilateral CI)
  - Currently 3 of the 5 recipients are consistent users

# Case #1

- Implanted at 1 year, 5 months
- CMV positive at birth and failed right NBHS
- Diagnostic ABR at 1 month indicated at least severe to profound loss (no response) in right ear (WNL left ear)
- Appealed to insurance for coverage (CMV and risk of BILATERAL progressive loss)



# ABR



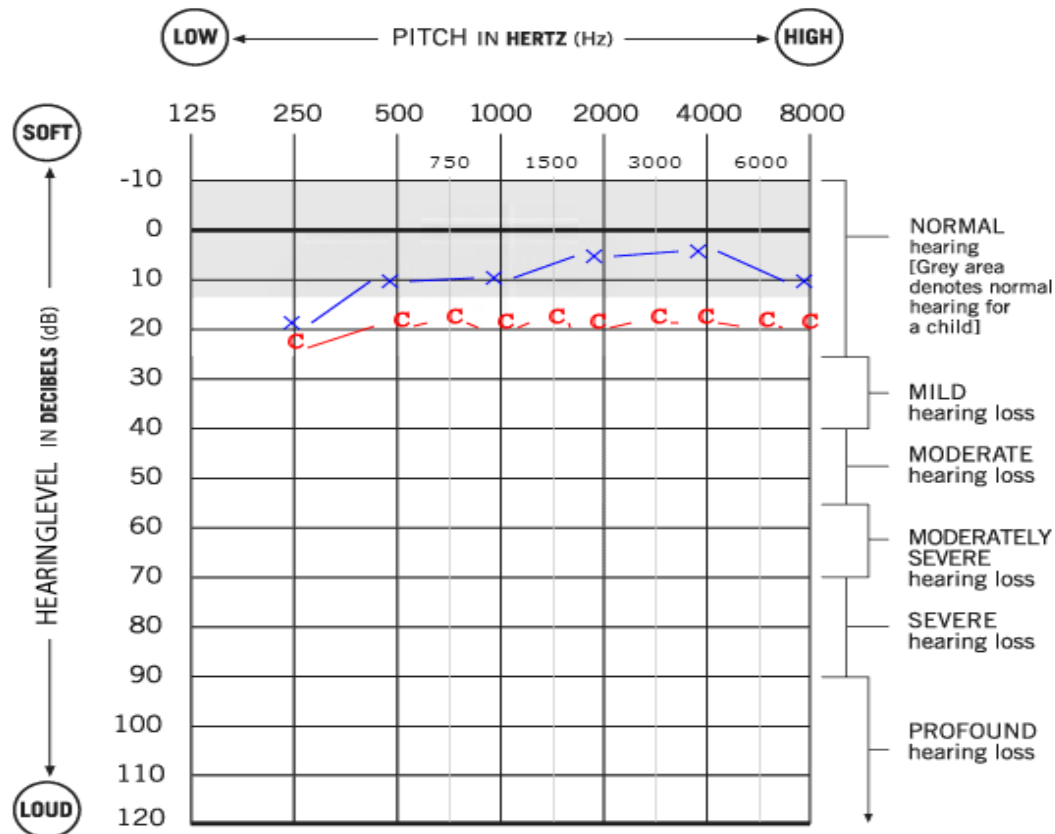
# Implanted at 17 months

- Trial with Phonak UP hearing aid (not tolerated well)
- Implanted at 17 months (activated at 18 months)
- Consistent user from the start
- Early On and speech therapy
- Currently mainstreamed

# Most Recent Testing

- Last mapping session: Datalogging (12.5 hrs/day)
- Current testing at 6 years, 2 months:
  - Left ear: SRT 0 dB, WRS 100% (PBK-50)
  - Right CI: SRT 10 dB, WRS 96% (PBK-50)
  - HINT at +5 dB SNR (left ear + right CI): 96%

# Most Recent Thresholds

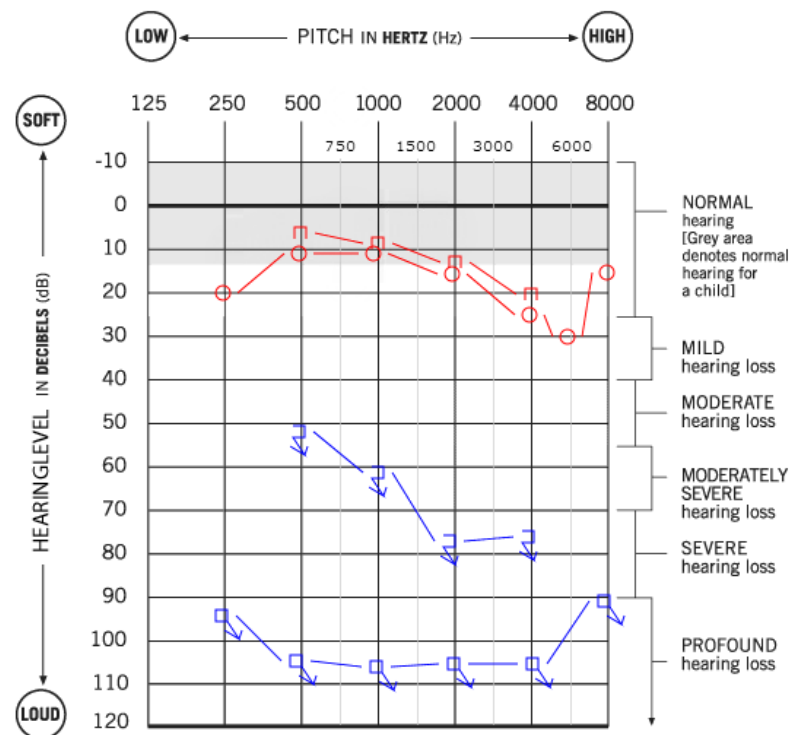


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# Case #2

- Fifteen year old presented to ENT/Audiology from outside facility.
- History of CMV and profound hearing loss in the left ear from birth (parent brought all reports from birth to present day)

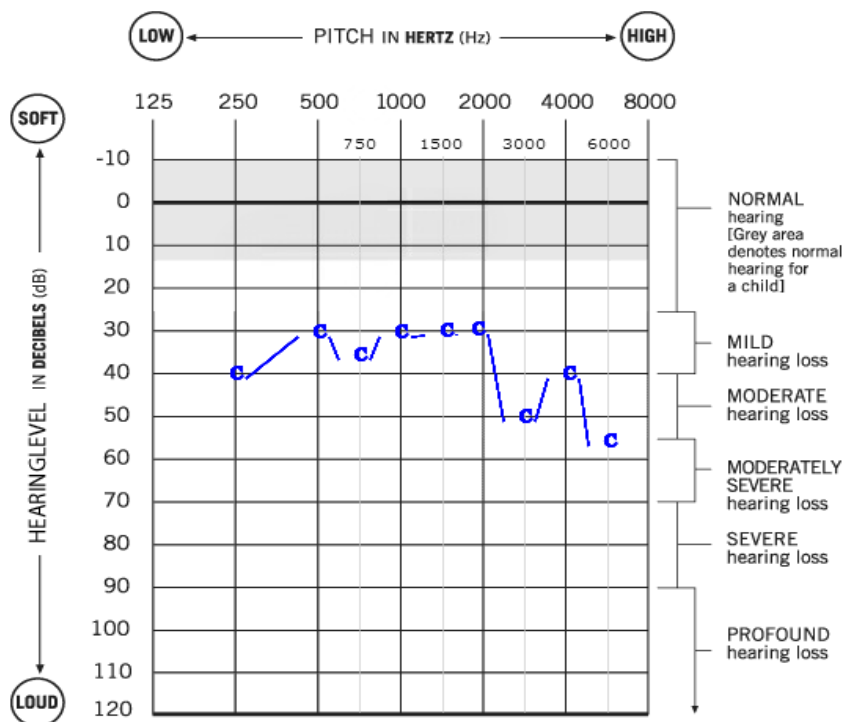


# Left Ear Implanted

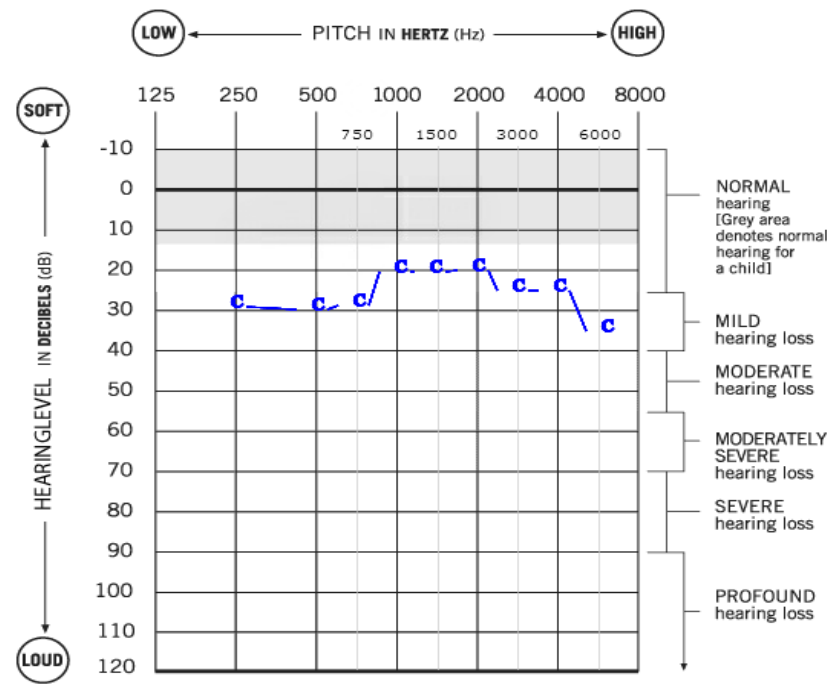
- Interoperative NRT: All impedances 'okay'. NRT thresholds obtained within voltage compliance (except electrodes 8 through 1)
- Activation successful (NRT obtained on all electrodes)
- Two week follow up (datalogging: 8 hrs/day)
- Four week follow up (datalogging drops to 4.6 hrs/day)
- Unable to perform SRT or WRS

# First 2 Follow Up Post Activation

## 2 week follow up

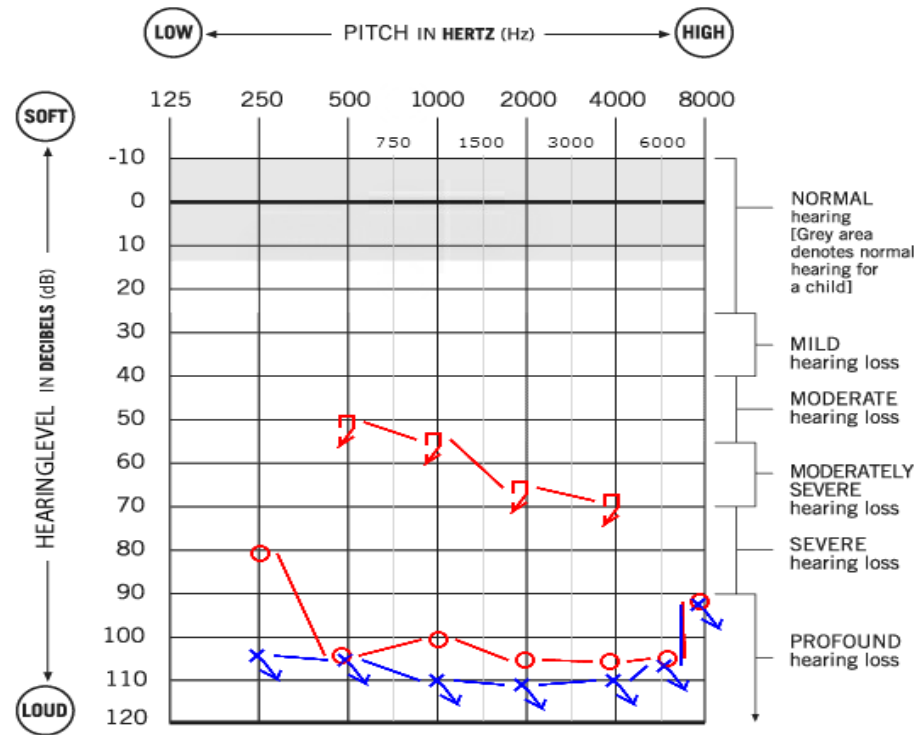


## 4 week follow up



# Four Months Post Op Left CI

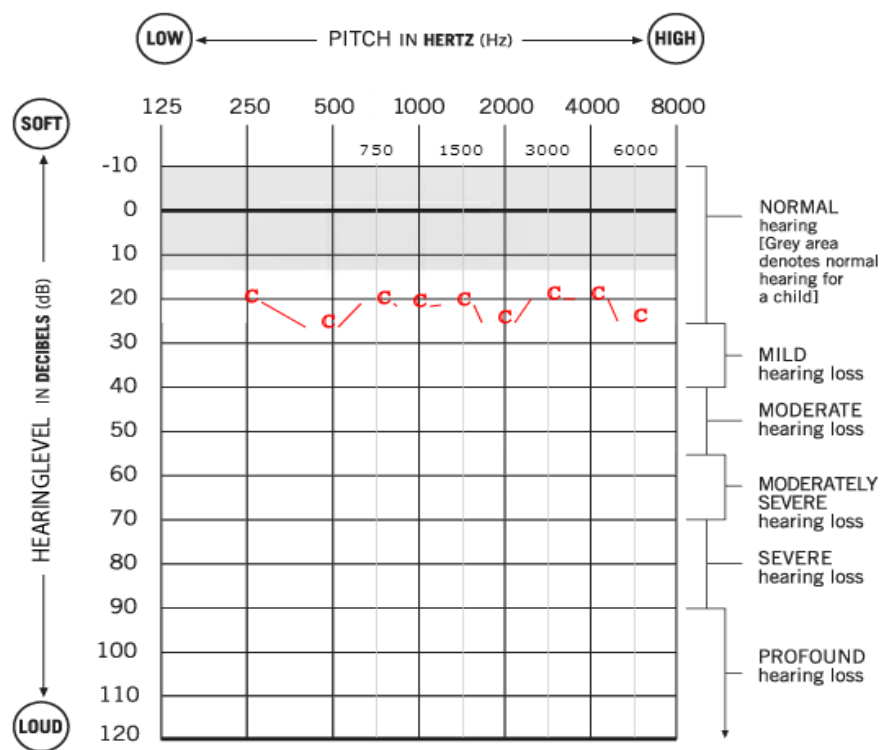
- Sudden loss of right ear (treated with course of steroids)
- Continued to use left CI but primarily relied on lip reading and texting
- Decision made to implant right ear expeditiously





# Right CI

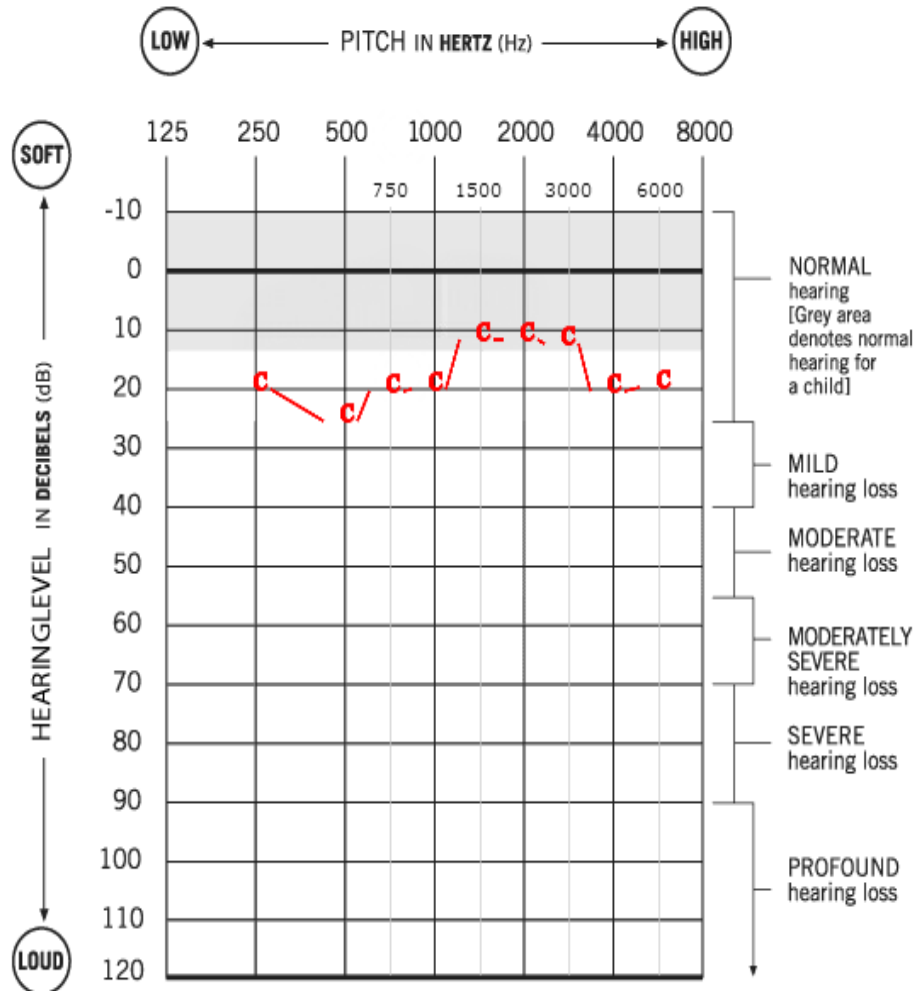
## Activation Day



## Word recognition

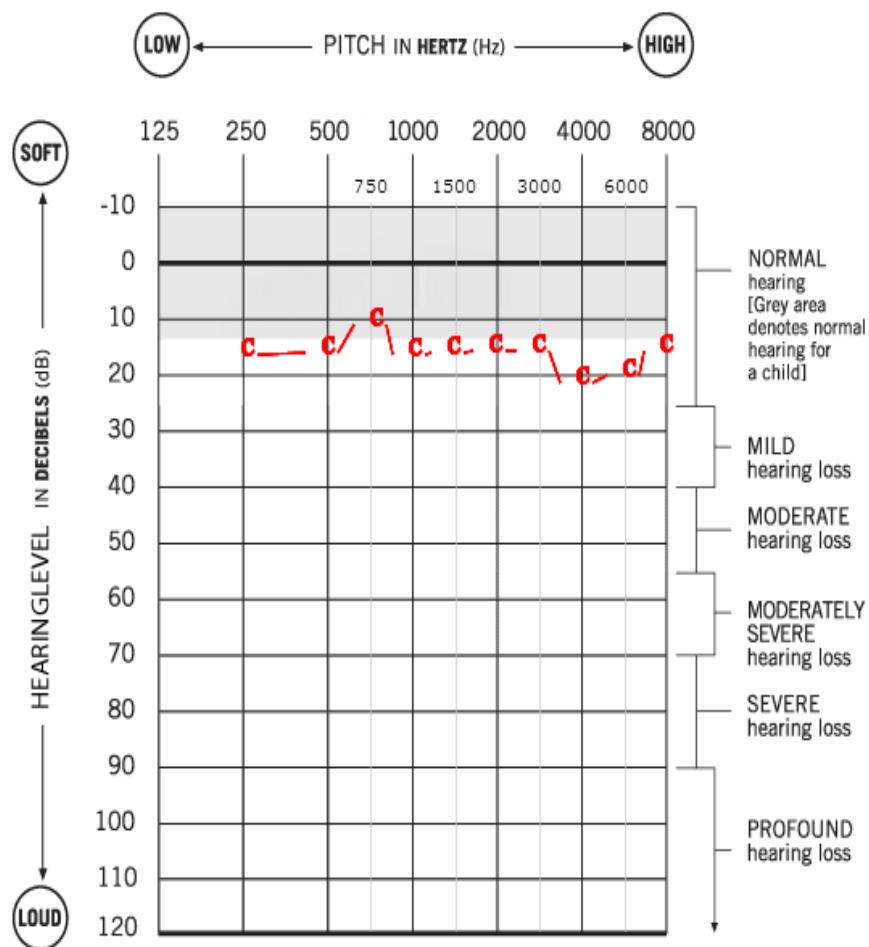
- SRT and WRS were recordable immediately after activation
- SRT= 10 dB
- WRS= 76%

# Two Week Follow Up



- WRS= 96%
- HINT (+10 dB SNR)= 96% with both CI
- Patient reports “sound from left CI is still 'unclear', but is easier to use since right CI activation”

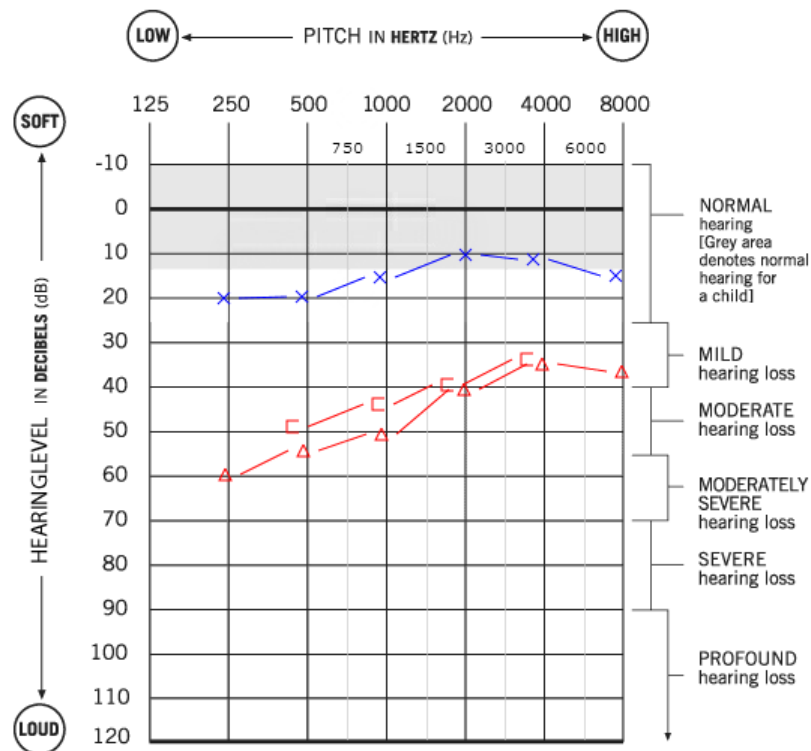
# Most Recent Testing



- Discontinued use of left CI
- Reports left CI just sounds like “noise” and can be too distracting
- Using Left processor as back up for right CI
- WRS= 100%
- HINT at +5 dB SNR= 88%

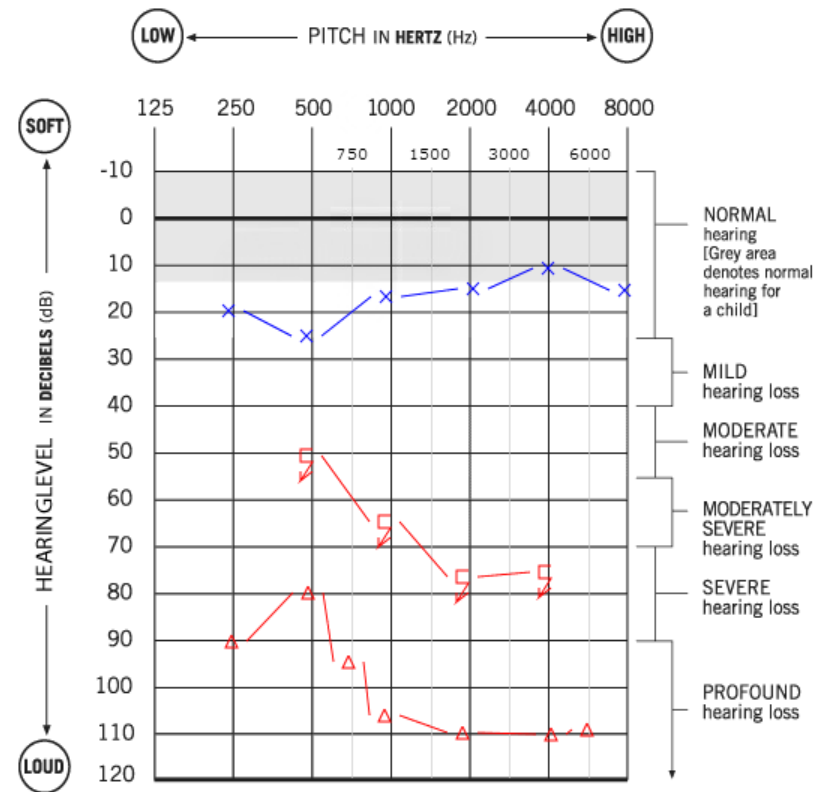
# Case # 3

- History of CMV
- Pass NBHS bilaterally (AABR)
- Hearing in right ear started to progress at age six years
- Successful with hearing aid



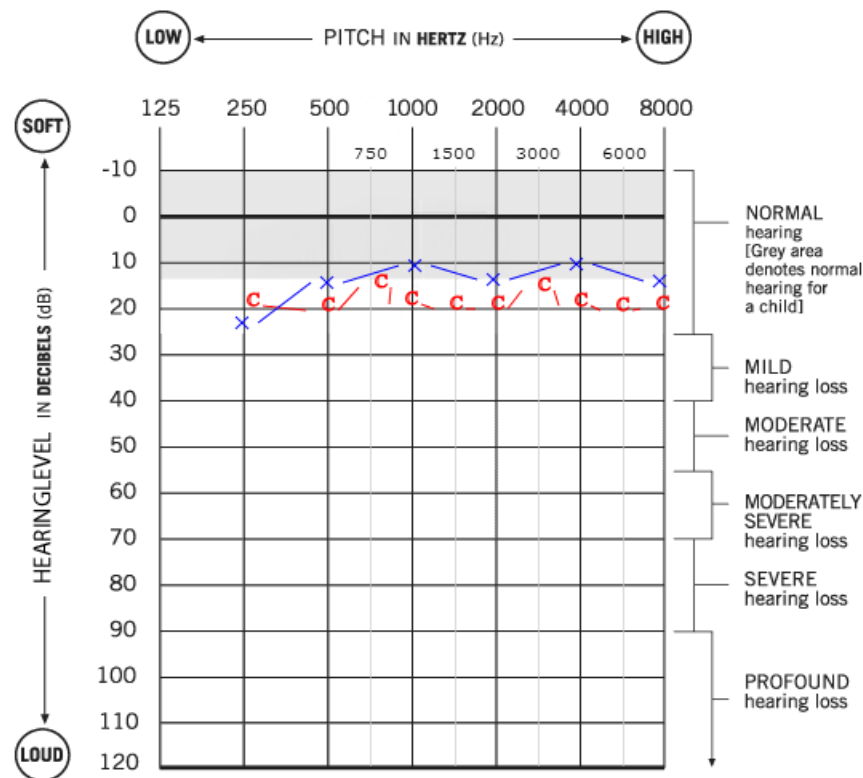
# Case # 3 Progressive Loss

- Normal speech and language
- Progressed to profound at the age 10 years, 1 month
- Implanted 2 months post progression



# Most Recent Testing

- Datalogging indicates 13 hrs/day CI use
- WRS w/ masking=80%
- Patient reports enjoying connectivity to phone

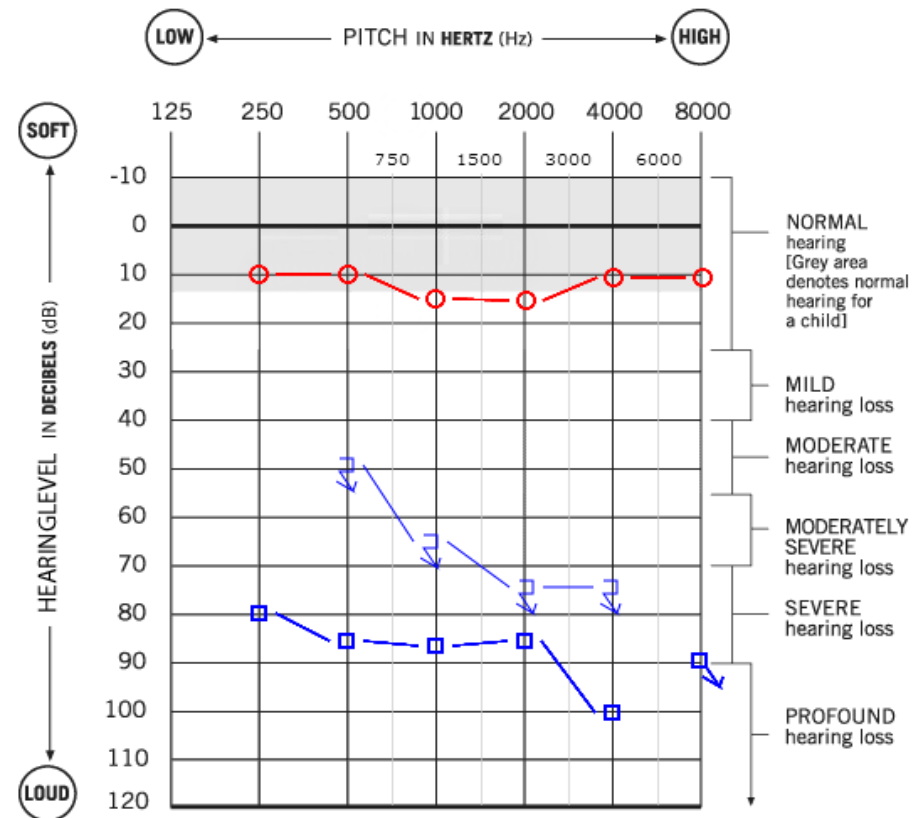


# Case # 4

- Nine year old. Progressive severe/profound SNHL left ear (pass NBHS both ears)
- Initially present at age 4 years with a suspect hearing loss over the course of a year (3 years old)
- MRI/CT scan unremarkable. Unknown etiology
- WRS w/ masking=unable to perform

# Case # 4

- Nine year old. Progressive severe/profound SNHL left ear (pass NBHS both ears)
- Initially present at age 4 years with a suspect hearing loss over the course of a year (3 years old)
- MRI/CT scan unremarkable. Unknown etiology
- WRS w/ masking=unable to perform



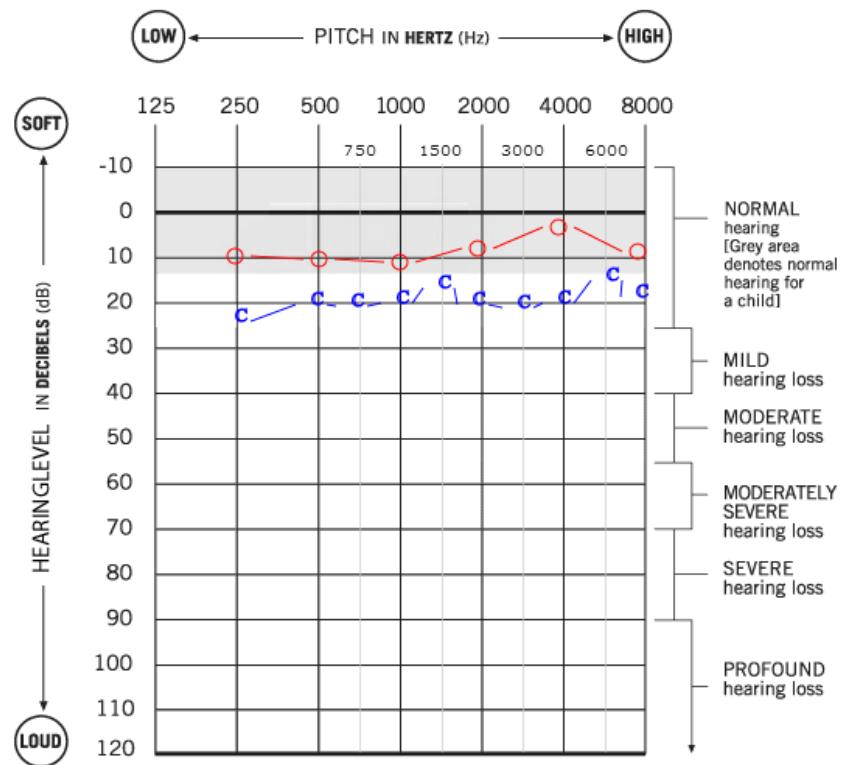


# Amplification Options Extensively Discussed

- Trial with bone conducted device w/ softband unsuccessful
- Parents very motivated to move forward with unilateral cochlear implantation
- Discussed realistic expectations
- Implanted at 7 years, 2 months

# Current CI status

- Two years post surgery, essentially a non user (0.2 hrs/day use)
- No word recognition (with masking)
- Detection levels in appropriate range (SDT=10 dB, Lings detected at 15 dB)



# Final Thoughts

- The younger a patient is implanted, the better the prognosis and consistency of use
- Good intervention option for progressive hearing losses (depending on duration of SSD)
- Excellent potential for sudden onset SSD (ease of acclimation and auditory memory)
- For long duration SSD, consider all options (bone conducted device or CROS). If CI pursued, importance placed on realistic expectations

# Children's Hospital of Michigan Cochlear Implant Team



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