Relationship between objective and behavioural audiology for infants being assessed for cochlear implantation: implications for CI candidacy assessment

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Disclosures

- Dr Jaime Leigh
  - None
- Ms Rebecca Farrell
  - None
- Ms Denise Courtenay
  - None
- Prof. Richard Dowell
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- Assoc. Prof. Robert Briggs
  - Consulting fee from Cochlear Ltd
  - Non-financial involvement on advisory committee and panel for Cochlear Ltd
- Unlabelled use of commercial product
  - Nucleus CI, use for children younger than 12 months of age

Traditional pathway to cochlear implantation for infants in Victoria, Australia

2 days old
Newborn hearing screen

4-8 weeks age
Diagnostic audiology

2-4 month of age
Australian Hearing

Hearing aid fitting & verification
Aided CAEP
Functional evaluation - PEACH

By 6 month of age

2-4 month of age
Cochlear Implant Clinic

Otological investigations e.g. MRI
Behavioural audiological testing
Communication assessment

2-18 months time

Cochlear implant surgery

12-18 month of age

Study/Aims

- Challenge the requirement for behavioural audiological assessment
- Investigate the relationship between diagnostic ABR and ASSR results and subsequent behavioural audiometry for a cohort of children referred for CI
- Determine if there was a clear pattern of diagnostic audiology results which warranted a recommendation for CI, without the requirement of behavioural testing
- Goal to reduce the age at implantation for children diagnosed with congenital profound hearing loss

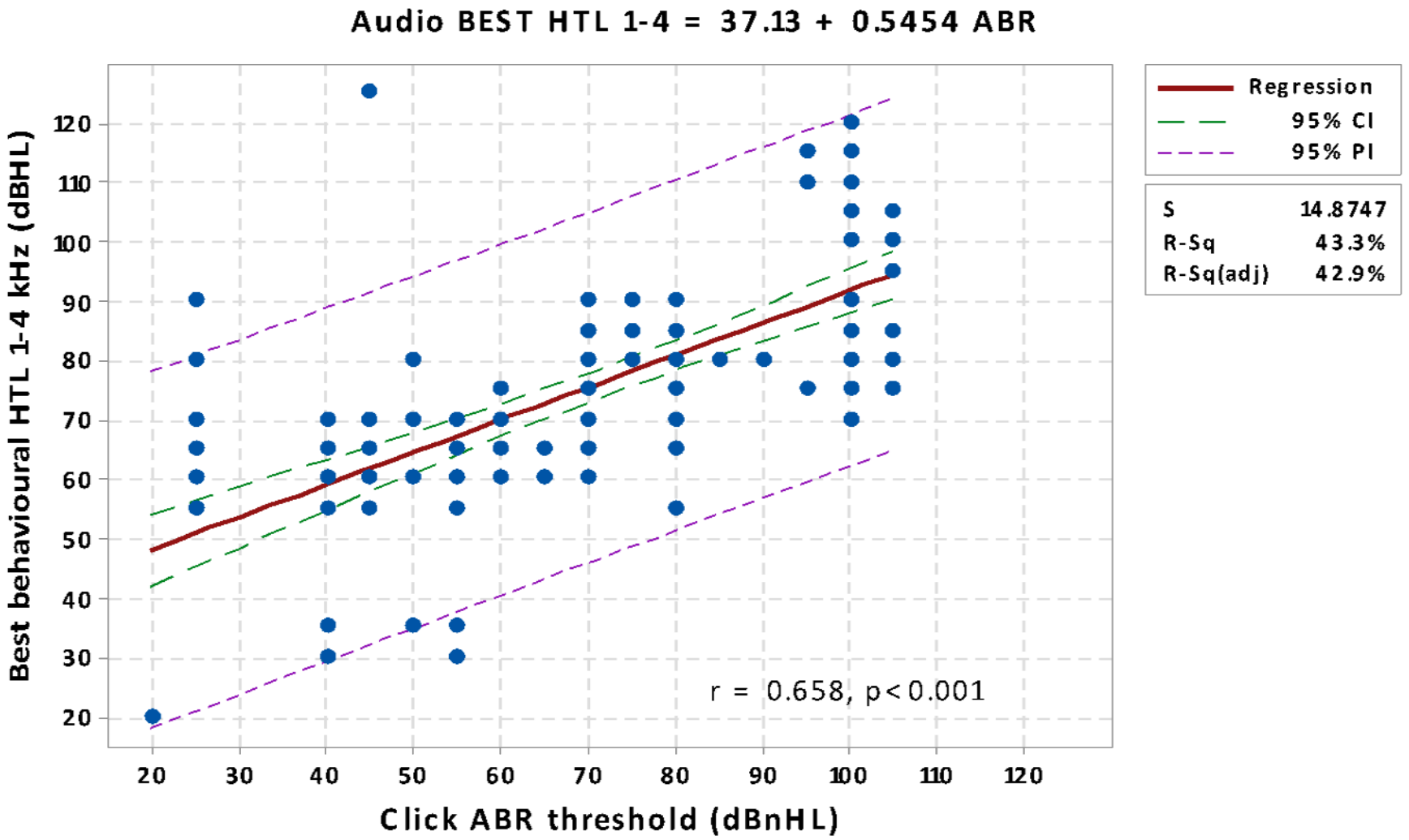
Method

- Retrospective review of electrophysiology/objective audiology for all children referred to CIC between 2012 and 2014 (n = 123)
- **n = 64** included in study
  - 59 children excluded because:
    - findings consistent with AN
    - middle ear pathology at time of testing
    - behavioural testing not reliable or did not proceed with behavioural testing
    - if not tested above >90dB for ASSR or testing completed outside Victoria
- Added 5dB to max level tested if NR ≥ 95dB for ASSR/ABR
- Electrophysiology/objective data from multiple diagnostic audiology centres

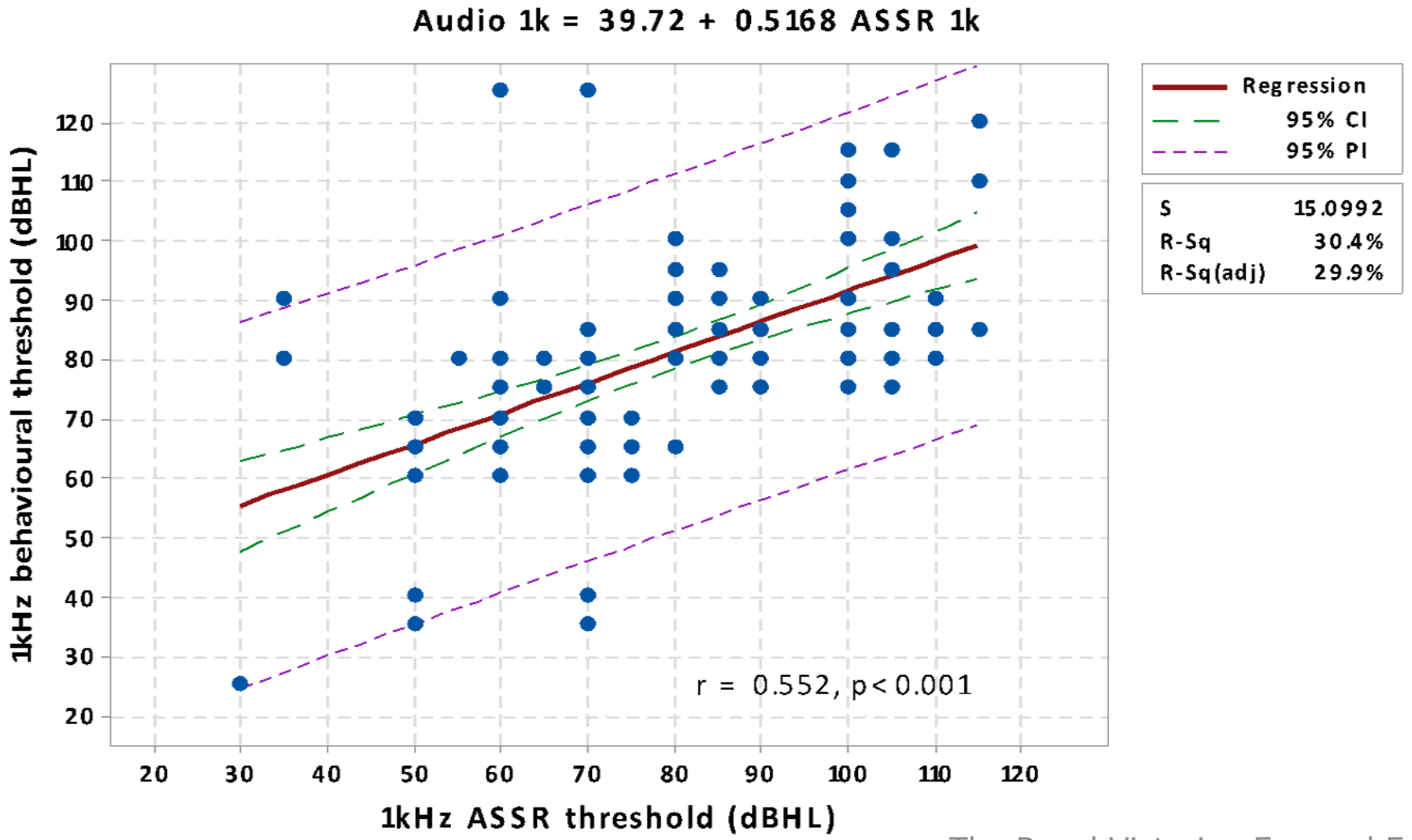
Limitations/observations

- 129 occasions of service for electrophysiology/objective testing
- 31 (24%) sets of data where ASSR and/or ABR testing stopped at ≤90dB
- 98 sets of objective data analysed
- Number of electrophysiological audiology appointments ranged from one to five
- Number of behavioural audiology appointments ranged from two to seven
- Minimal variation across tests for individual children (for both objective and behavioural testing)

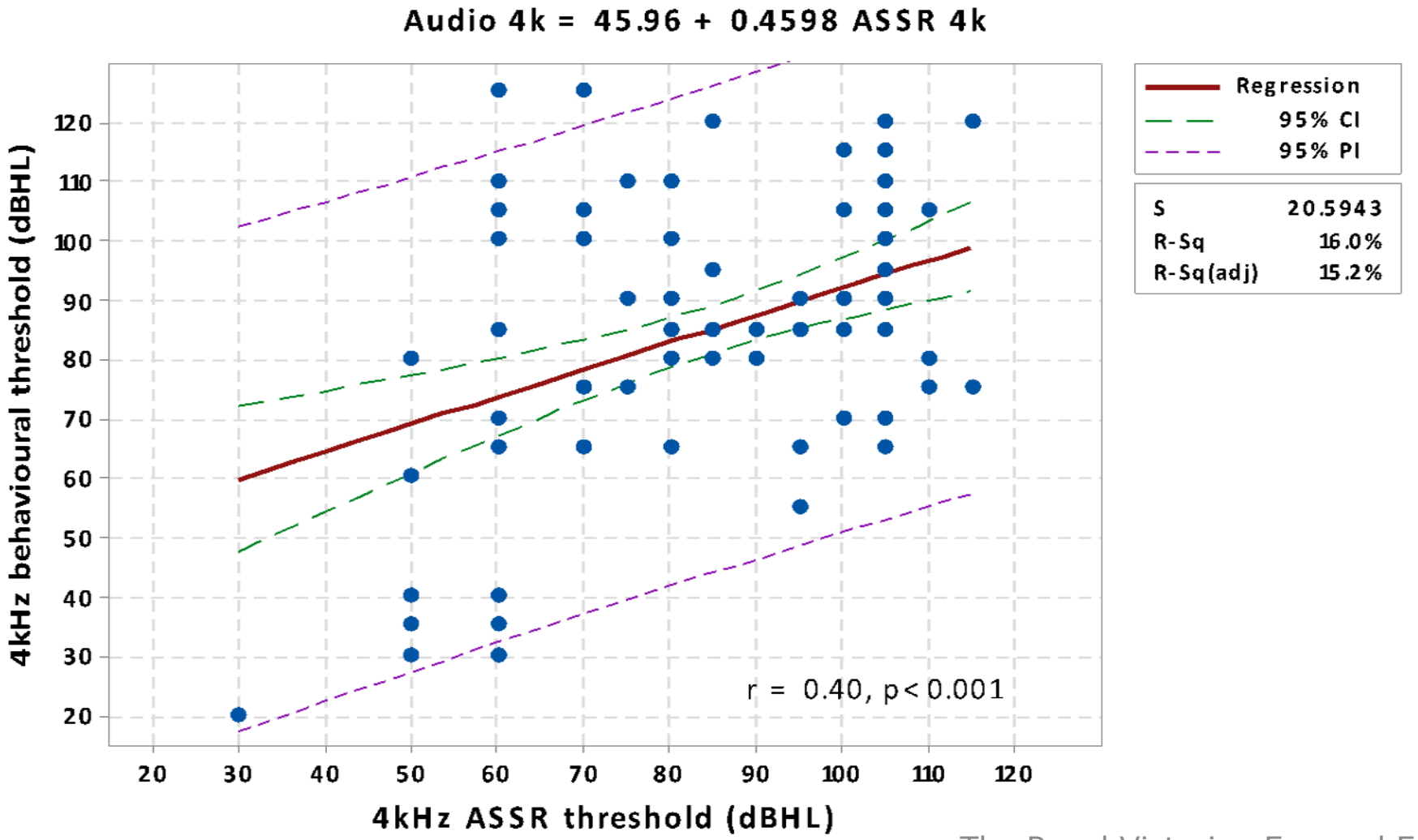
Results: ABR vs best behavioural hearing threshold 1-4kHz



Results: ASSR vs behavioural hearing threshold for 1KHz



Results: ASSR vs behavioural hearing threshold for 4KHz



Results

- Objective audiological results received at referral to the Cochlear Implant Clinic correlated with subsequent behavioural hearing level but had limited predictive value
- Objective testing suggested profound hearing loss and behavioural threshold(s) in severe hearing loss range for eight children (13% of group)

Conclusion

- Cannot rely on objective/electrophysiological testing alone to make CI recommendation
- Early implantation remains a goal
- What other information is available within the first 6 months of life to inform CI recommendation?
  - Patient history
  - Aided CAEP results with optimized HAs to assess audibility
  - Therapy observations of functional performance
  - Parent reports of functional performance in real life (e.g. PEACH)

Proposal for “fast track” to CI

- Full term (>38weeks)
- Full set of objective results consistent with bilateral profound SNHL
  - e.g. ABR absent at 95dBnHL and ASSR absent at 110dBHL across all frequencies
- Documented consistent hearing aid use
- Aided CAEP suggesting mid and high frequency speech sounds are not audible with optimized aids
- Functional assessment suggests child is not responding to sound while aided, parental and external providers observations consistent with this

→ CI at earliest opportunity (e.g. 6 months)

no requirement for behavioural audiology