

# Translating the Science



## Translating the Science

**Our Translating the Science research updates will be available bi-monthly for you to access on-demand.**

1. Please read the research articles
2. Watch this video from the lead researcher
3. Submit your questions via the website and
4. Complete the reflection form, which will be emailed to you for submitting for non-endorsed CPD points.

<https://www.earsience.org.au/implant-clinic/translating-the-science/>



Scan this QR code to access the website

## Session 2

### A multi-centre analysis of factors associated with hearing outcome for 2735 adults with cochlear implants

Trends in Hearing Volume  
25: 1-17 2021 DOI:  
10.1177/23312165211037525

**Dr Cathy Sucher BSc, DipAud, MAud, AuD**

Benjamin Goudey<sup>a,b</sup>, Kerrie Plant<sup>b</sup>, Isabell Kiral<sup>a</sup>, Antonio Jimeno-Yepes<sup>a</sup>, Annalisa Swan<sup>a</sup>, Manoj Gambhir<sup>a</sup>, Andreas Buechner<sup>c</sup>, Eugen Kludt<sup>c</sup>, Robert H. Eikelboom<sup>d,f,g</sup>, Cathy Sucher<sup>d,f</sup>, Rene Gifford<sup>a</sup>, Riaan Rottier<sup>b</sup> and Hamideh Anjomshoa<sup>a</sup>

<sup>a</sup> IBM Research Australia, <sup>b</sup> Cochlear Limited, <sup>c</sup> Medizinische Hochschule Hannover <sup>d</sup> Ear Science Institute Australia <sup>e</sup> Vanderbilt University Medical Center <sup>f</sup> Ear Sciences Centres, The University of Western Australia <sup>g</sup> Department of Speech Language Pathology and Audiology, University of Pretoria, South Africa <sup>h</sup> School of Computing and Information Systems, University of Melbourne, Australia



## Disclosures

**This research was been conducted primarily while all authors employed by their institutional affiliations.**

**The Authors report no conflict of interest**

Corresponding author email: [hamideh.anjomshoa@unimelb.edu.au](mailto:hamideh.anjomshoa@unimelb.edu.au)



# Cochlear implants.....



Cochlear implants have been an effective intervention for hearing rehabilitation for individuals with severe-profound hearing loss, for many people BUT .....



# Outcomes can vary.....



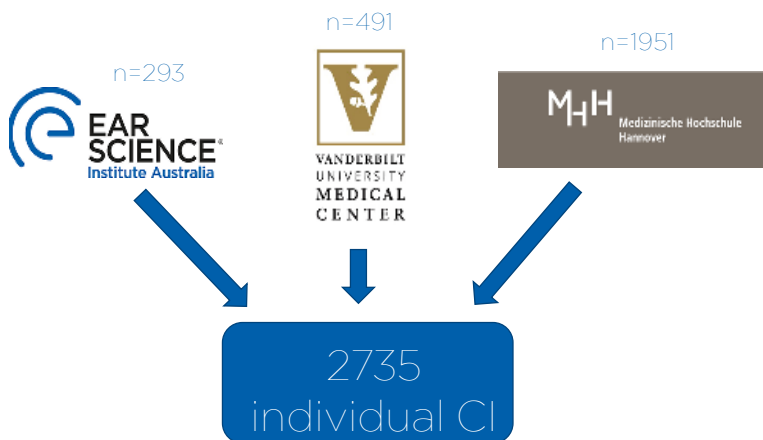
# Factors shown to be associated with CI outcomes in past research

- Aetiology of hearing loss
- Duration of hearing loss
- Duration of hearing aid use prior to implant
- Patient age at implant
- Pre-operative hearing scores
- Percentage of stimulating electrodes

Ability of predictive factors to explain variance in performance outcomes varies from 10% (all CI users) to 31% (for CI users with pre-lingual hearing loss)



# Multicentre retrospective review of clinical outcomes



KEY Outcome:  
Monosyllabic Word  
Recognition Scores  
(WRS)  
ESIA and VUMC = CNC Words  
MHH = Freiburg monosyllabic test

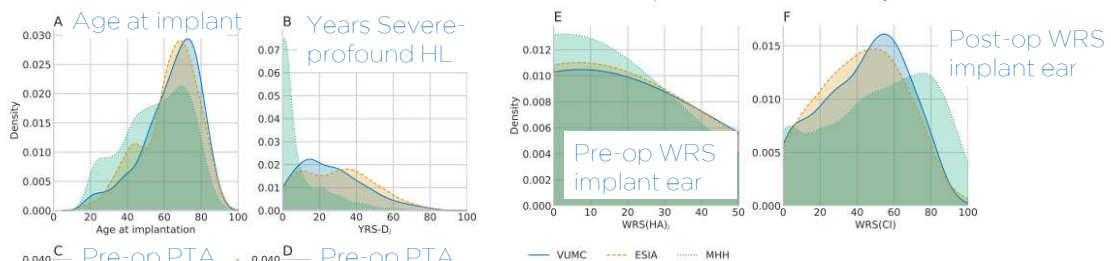


# Factors studied

- Demographics
  - Age at implant
  - Native speaker of test material
  - Gender
- Hearing related measurements
  - Pre-op WRS
    - Implanted and contralateral ear
  - Pre-op PTA (4FAHL)
    - Implanted and contralateral ear
  - PB max WRS under headphones
    - Ear to be implanted
- Clinical History
  - Pre-lingual hearing loss
  - Course of hearing loss
    - sudden vs progressive
  - Years of hearing loss
    - Implanted and contralateral ear
  - Side of implant
  - Years of severe-profound deafness
  - Years of HA use
- Aetiology



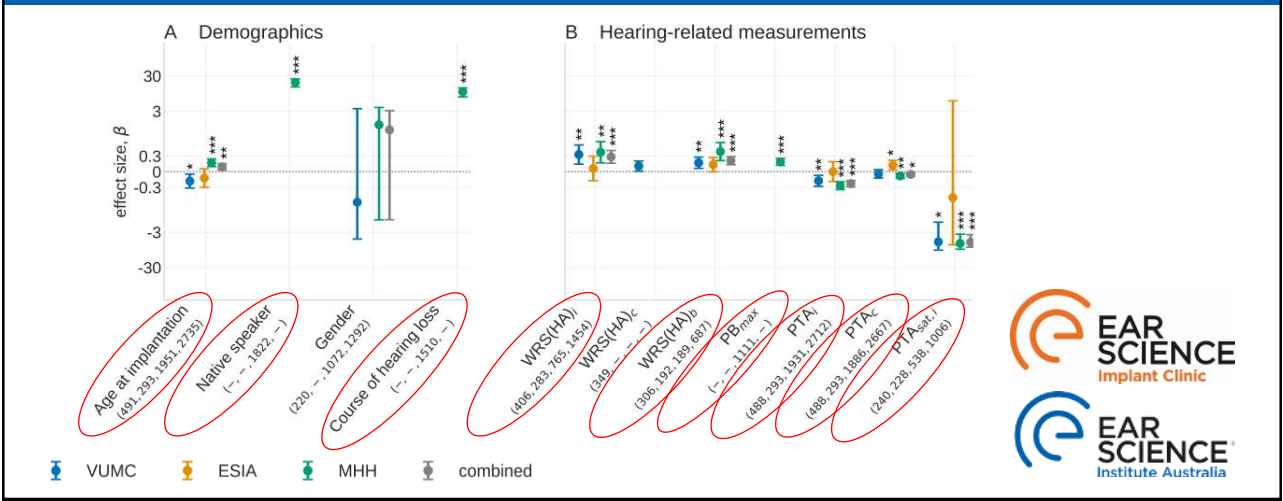
# Distributions of key predictive factors between clinics



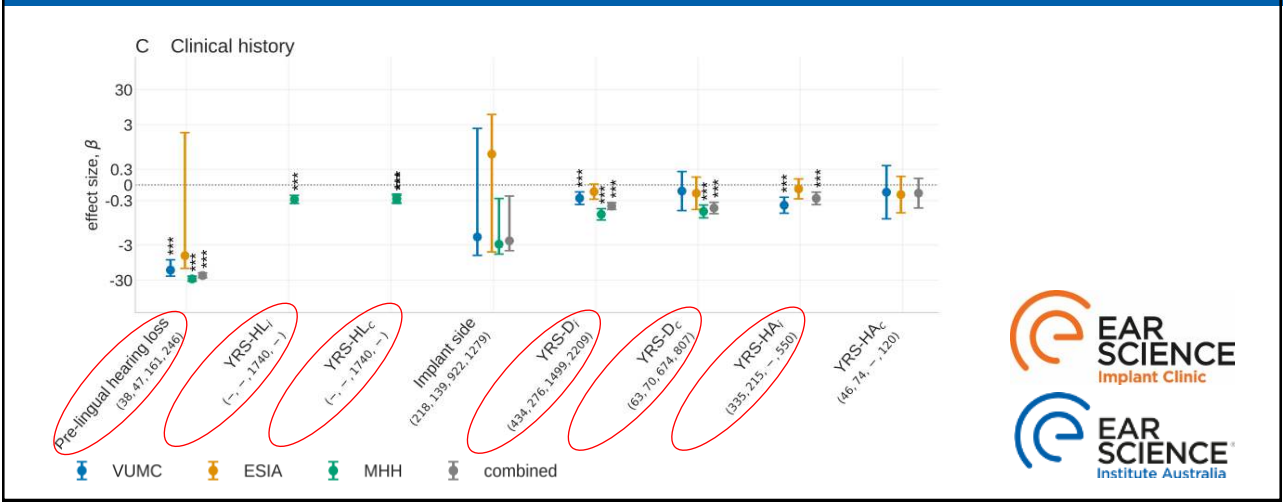
- MHH dataset significantly different to other clinics for all 6 factors
- Years of sev-prof HL and PTA (implant ear) significantly different between ESIA and VUMC



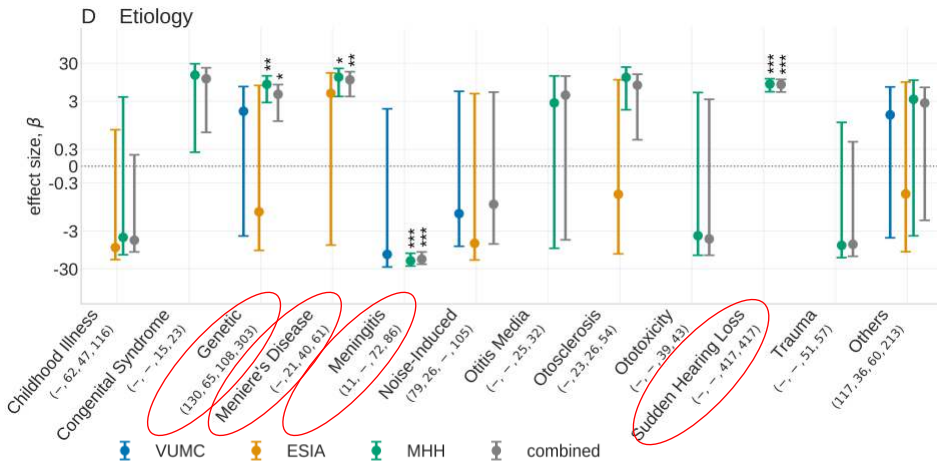
# Distributions of key predictive factors between clinics



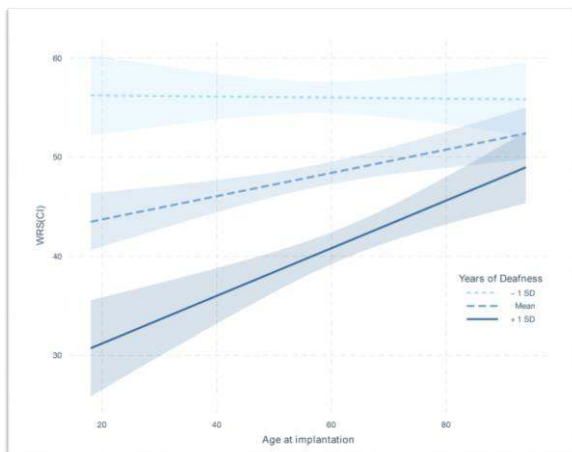
# Distributions of key predictive factors between clinics



# Distributions of key predictive factors between clinics



# Interactions between factors



Duration of deafness in the implanted ear has a stronger impact on hearing outcome when considered in relation to the CI users' age at implant (remained when prelingual data removed)



# Conclusions

- **Multivariate analysis explains only 13-21% of variance in post-op Word Recognition Score (WRS) (combined analysis 12%)**
  - Consistent with previous research
- **Factors found to be associated with WRS here are consistent with those published previously**
- **Results must be interpreted with caution when considering cohort differences, testing protocol and setup differences, patient selection criteria, differing regulatory rules across countries**
- **Results highlight the need for standardization in collection of data between CI clinics**
- **Prediction of CI outcomes will greatly improve with larger, more cohesive datasets**



# Future directions

- **Development of standardized reporting and testing protocols**
- **Inclusion of other factors potentially associated with CI outcomes**
  - Device specific
  - User specific
  - Multiple time points rather than only 1 post-op time point
  - Use of adaptive tests to limit issues with ceiling and floor effects
- **Outcomes not just about word perception in quiet**
  - Need to consider other factors that directly capture aspects of implantation itself



Dr Cathy Sucher  
 cathy.sucher@earsience.org.au  
 www.earsience.org.au



## Translating the Science

### Next Steps:

- ✓ Please read the research articles
- ✓ Watch this video from the lead researcher
- 3. Submit your questions which will be directly responded to and updated weekly on the website and
- 4. Complete the reflection form, which will be emailed to you for submitting for non-endorsed CPD points.

<https://www.earsience.org.au/implant-clinic/translating-the-science/>



Scan this QR  
 code to access  
 the website

