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AUDITORY IMPLANTS

# Auditory neural responses: Do we need special considerations for the paediatric population?

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## Abstract

**Aim**:
To compare neural responses in cochlear implant recipients, children and adults, to observe differences that might affect the fitting procedure.

**Population**:
Twelve children (4 bilateral) and eight adults participated in the study. Their age varied between 5 to 70 years (mean 22.4 SD= 20.3 years). Participants experience with their cochlear implants was between 1 month to 13 years at the time of testing.

**Methods**:
Neural responses were obtained in all active electrodes (AutoART task of MAESTRO clinical software). Measurements were performed using default parameters (stimulation 0-30 charge units, phase duration automatically adjusted to ensure compliance and stop criteria on neural responses thresholds finding). Data from the highest ranked recording electrode from such measurements were considered for data analysis.
Evaluated aspects where: ECAP thresholds, slopes and suprathreshold N1 latency (30% above threshold).

**Results**:
No statistically significant differences were found between the two groups for any of the investigated aspects: ECAP thresholds presented larger values at basal electrodes for both groups. Slopes were steeper at the apical region with a trend of steeper slopes observed in children. Larger latencies values were observed at apical electrodes in the adult group, but the difference failed to reach statistical significance.

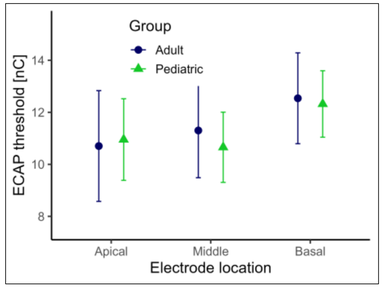
**Interpretation**:
No significant differences were found in the ECAP characteristics between adults and children. Therefore, no drastic changes might be needed to tune the ECAP based initial fitting approaches for pediatric CI users.

**Conclusion**:
Intial fitting method based on neural responses, can be applied in all CI population without any special consideration at this early stage of mapping.

## Results

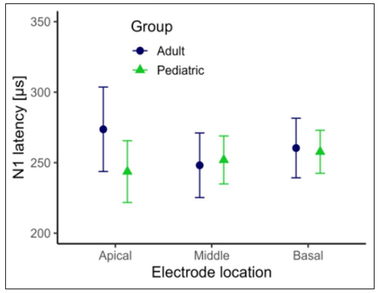
No statistically significant diferences were found between the 2 groups for any of the investigated aspects.

Effect on ECAP threshold



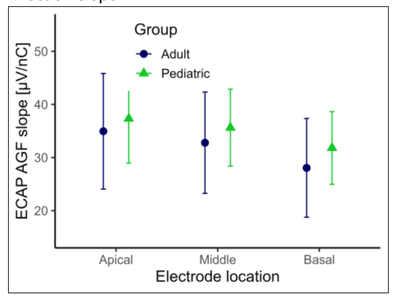

Larger values were observed at basal electrodes for both groups

Effect on N1 latency




Larger values were observed at apical electrodes for the adults but difference failed to reach statistically significance

Effect on slope




Sharper slopes were found at apical area as well a trend of steeper slopes in children

## Objectives

Auditory nerve response (ECAP) data can be used to create initial fitting profile (Vaerenberg et al, 2014) for cochlear implant (CI) users. ECAP base approach have been generally validated using adult CI population (Gärtner et al, 2021). Here, we compare data from adults and children, to see whether there are any differences that might afffect the fitting procedure.

## Conclusion

In this experiment, no significant differences were found in the ECAP registered in the adult population concluding that no drastic changes might be needed at the initial fittings guided by auditory neural responses.

## Methods and Materials

- 20 CI users (12 children, 8 adults-4 bilateral)
  - Age 5 to 70 years (mean 22.4 SD ± 20.3 years).
  - CI experience: 1 month-13 years.
- ECAPs obtained through AutoART (MAESTRO clinical software), at all active electrodes
  - Stim. Range 0-30 charge units
  - Phase duration determine according to individual compliance limit
  - Stop at ECAP finding

Data from the highest ranked recording electrode were considered for data analysis as ECAP thresholds, slopes and suprathreshold N1 latency (30% above threshold).

## References

- Vaerenberg et al. 2014, The Scientific World Journal, vol. 2014.
- Gärtner et al., 2021, Life 11,203.
- Schvartz-Leyzac & Pfingst. 2018. Ear Hear. 2018 Mar/Apr;39(2):344-358.
- Skidmore et al. 2021. Ear Hear. Jan/Feb;42(1):180-192