00331

AUDITORY OBJECTIVE MEASURES

The relationship between the electrically evoked stapedius reflex threhold and stimuli burts duration in pediatric cochlear implant users.

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Abstract

Aim:

The electrically evoked stapedius reflex threshold (ESRT) can assist in fitting cochlear implants (CI).

Primary aim of this study was to investigate the relationship between different burst duration to elicit ESRT in young pediatric users. As secondary aim, we compared mean eSRT values and MCL values. The eSRT values were measured at 9 months post-CI activation.

Population:

Eleven children participated in the study. Their age varied beteween 1.1 to 5.5 years (mean 3.5 years).

For the secondary aim, retrospective data of pediatric CI users implanted from 2015–2020 at the World Hearing Center was collected.

Methods:

Different stimuli burst durations (100, 200, 300 and 500 ms) were applied to observe the effect in the reflex determination. Reflexes were measured in electrodes contacts 2, 6, 9 and 11. Testing was conducted 9 months post activation.

Results:

Burst duration and electrode contact site had a significant effect on the ESRT ($p<<0.001$). The lowest ESRT was obtained with the longest burst duration. For all burst durations, there was a tendency of increased stimulation level required to elicit a reflex towards basal electrode contacts. This tendency became more pronounced with decreasing burst duration.

Interpretation:

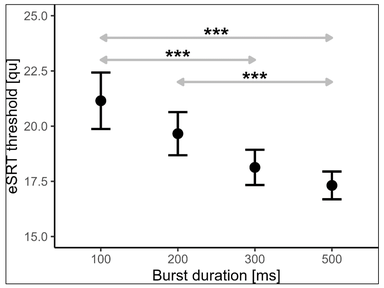
Thresholds obtained with the longest burst durations reflected maximum comfortable levels (MCL) typically found at early post activation stages. 100 ms burst duration yielded larger ESRTs, similar to MCLs that have stabilized.

Conclusion:

Best burst duration to use, depends on the follow up interval: longer bursts are useful for estimating MCLs for earlier intervals, while shorter burst durations are useful for later intervals. These findings may help clinicians optimize fitting in cases where using behavioural responses is problematic.

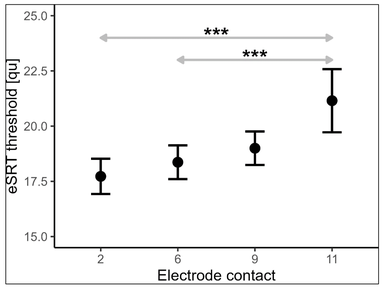
Results

ESRT and burst duration



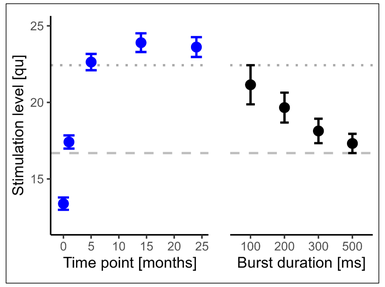
The reflex decay exponentially as burst duration increases

ESRT and electrode site



The reflex threshold trend to increase towards the basal end of the electrode array.

Progression of ESRT and MCLs across time



Average MCLs at 1 month post activation are within the 95% confidence intervals of the reflex thresholds obtained with the 500-ms-long burst. Similarly, the confidence interval of the 5-month post-activation MCL value overlap with the confidence interval of the reflex threshold measured with 100ms bursts.

Objectives

The primary aim of this study was to investigate the relationship between different burst durations to elicit eSRT in young pediatric CI users. We hypothesized there is a correlation between 1) eSRT profiles and stimuli duration and 2) loudness perception monitored during eSRT and stimuli duration. The secondary objective was to observe retrospectively 1) the relationship between eSRT mean values (obtained with different burst lengths), and 2) the upper limit of the electrical dynamic range, known as the maximum comfortable level (MCL), across time in pediatric CI users.

Conclusion

The present study investigated the relationship between different burst durations to elicit eSRT in pediatric CI users with at least 9 months of CI experience. We found that the best burst duration to use depends on the follow-up interval. Longer burst durations (500ms) are useful for estimating MCLs for earlier intervals, while shorter burst durations (100ms) are useful for estimating MCLs for later intervals, i.e., 1–2 years post-CI activation. These findings are clinically relevant because they may help clinicians optimize fitting in pediatric CI users, especially in cases where using behavioral responses is problematic.

Methods and Materials

- Primary objective: 11 unilateral CI users
  - Age 1.1 to 5.5 years (mean 3.5 years).
  - CI experience: 9 months.
- Secondary objective: 488 pediatric CI users
  - Age 0.4 to 7.0 years (mean 2.4 years).
- Stimulation through MAESTRO clinical software
  - Biphasic pulses with 100,200,300,500 ms burst duration
  - Initial stimulation level 75% individual MCL
  - 4 electrodes (apical, medial, basal).
- Recording through Titan tympanometer
  - Contralateral ear
  - 226 Hz probe tone

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