

A long-term comparison of impedance and pulse widths changes between the Contour Advanced and the Slim Straight cochlear implant in children

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Introduction

The objective of this retrospective study was to analyze impedance data between the Contour Advance and Slim Straight cochlear implants (CI) manufactured by Cochlear Ltd. An increase in impedance levels can result in out of-voltage compliance, which indicates that the implant is unable to deliver sufficient current to the upper part of the dynamic range. If this issue is not addressed by widening the pulse width, it can have a negative impact on the sound perception for the user. This is an important issue for young children with CI, as they may not be able to report changes in their auditory perception, potentially leading to a longer period of reduced audibility compared to users with the ability to clearly communicate changes. This study aimed to analyze long-term changes in impedances and pulse widths in two common implant types.

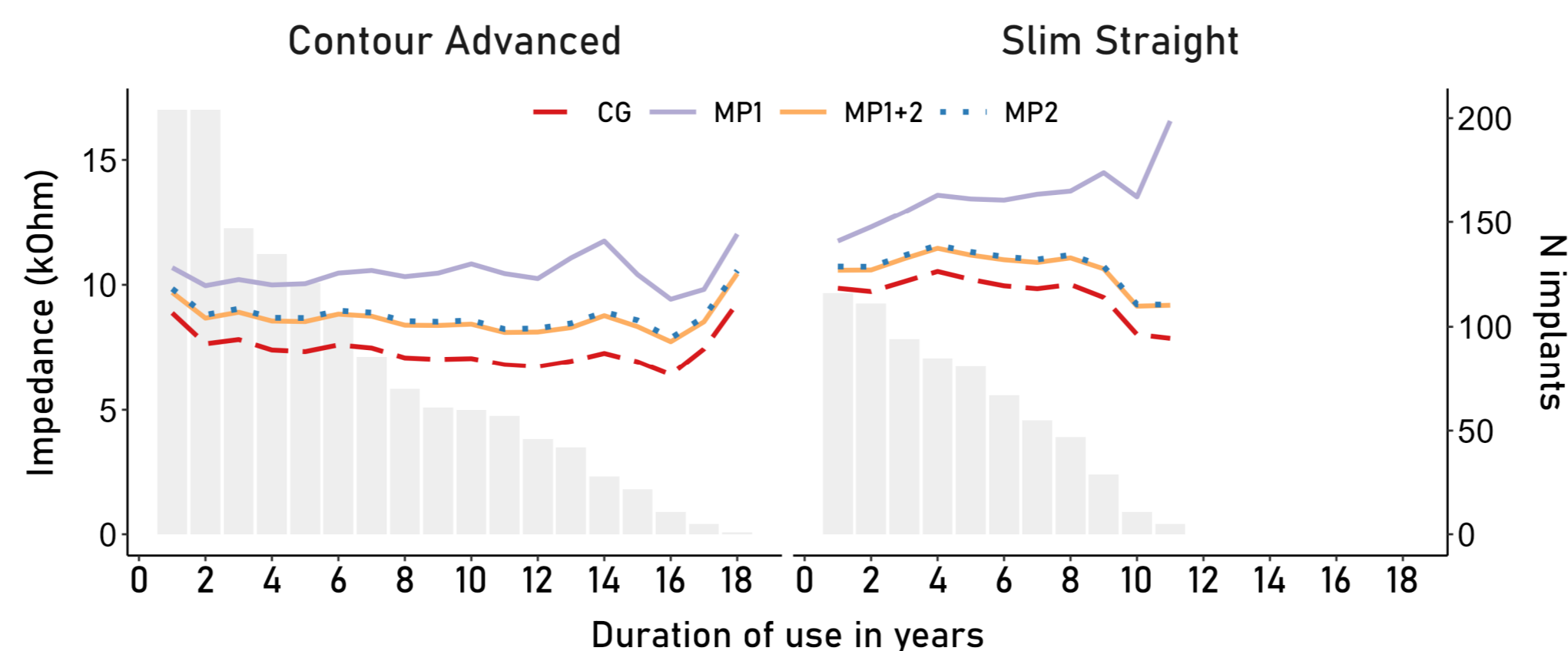
Population

This single-center retrospective study comprises 208 children who were implanted at an age of 18 or younger. The study included impedance data from all children at the current clinic with either a Contour Advance or Slim Straight electrode array, and with impedance data recorded for at least one year after activation. The data were analyzed per implant, with 207 Contour Advanced implants and 116 Slim Straight implants.

Impedance variation over time

The change in impedance levels over time was analyzed by calculating the mean for each year of usage. The Slim Straight electrode had significantly higher impedance levels than the Contour Advanced electrode during the first 10 years of use, $p < 0.001$.

Mean impedance and number of measured implants



Conclusion

The smaller electrode stimulation area of the Slim Straight electrode is likely the highest contributor to the difference in impedance levels and pulse width changes. When the Slim Straight electrode is implanted, it may be advisable to schedule more frequent check-up visits in order to avoid any prolonged periods of degraded hearing due to out of compliance.

Pulse width increment

The pulse width increment was analyzed based on the change from the factory preset pulse width. In line with the higher impedance levels, the Slim Straight electrode also had a higher risk of increasing pulse width from the preset levels compared to the Contour Advanced electrode.

Probability of keeping the pre-set pulse width
Kaplan-Meier plot

