

Review and comparison of Version 1 (V1) and Version 2 (V2) Advanced Bionics HiRes Cochlear Implants at Cambridge University Hospital

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Objective:

To review the performance of 2 versions of Advanced Bionics HiRes cochlear implants (V1 and V2). Two audiological variables were measured: sound-field thresholds (SFTs) and impedance. SFTs refer to the quietest sound, presented via a loudspeaker, that can be detected in a sound-treated environment. Electrode impedance is a measure of intracochlear resistance, and higher values are associated with faster battery drainage.

Methods:

Retrospective review of electronic medical records was used to record SFTs and impedance in all adult and pediatric patients undergoing V1 and V2 HiRes Advanced Bionics cochlear implants between 2020 and 2022 at our center. The above variables were recorded 6 months after implant insertion.

Figure 1: Sound field Thresholds (SFTs) at 6 months after implantation

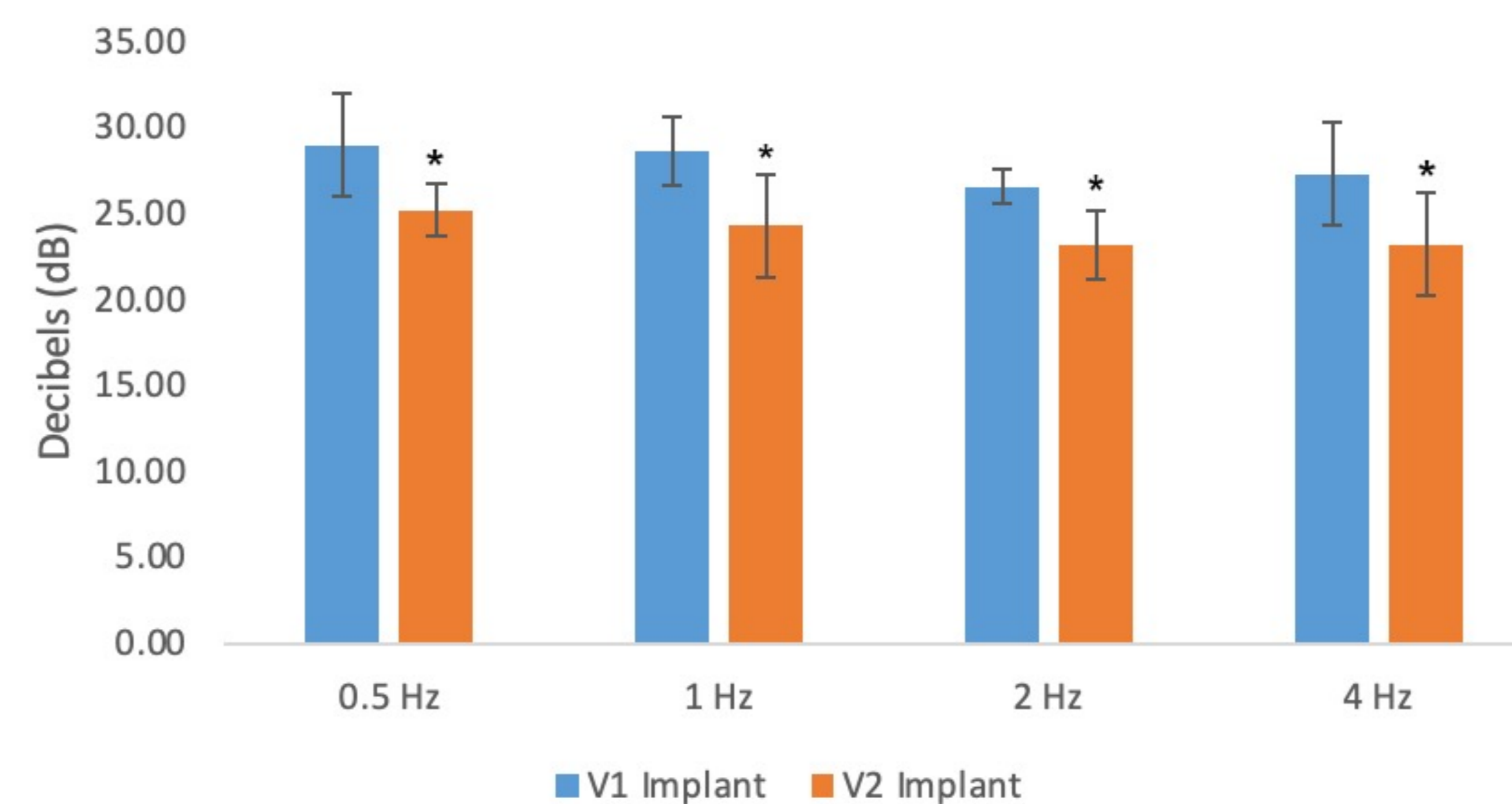
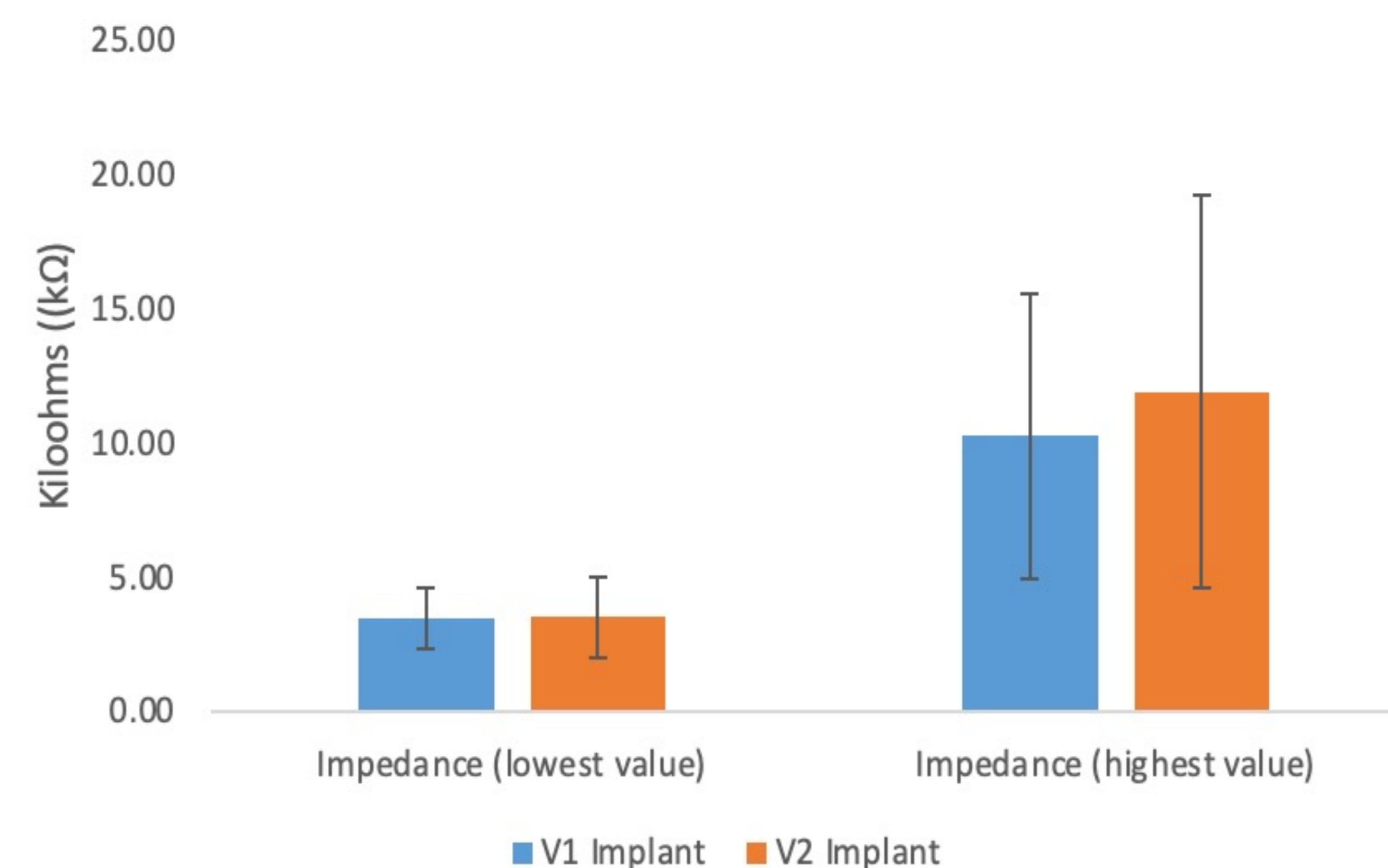


Figure 2: Impedance range at 6 months after implantation



Results:

Eighty-five patients had V1 implants; 104 patients had V2 implants. All had full insertion at surgery. At 6-month review, t-tests showed a significant difference of SFTs (Figure 1), between V1 and V2 at 0.5 Hz (V1: 29 dB; V2: 25 dB; $p < 0.0001$), 1 Hz (V1: 29 dB; V2: 24 dB; $p < 0.0001$), 2 Hz (V1: 27 dB; V2: 23 dB; $p < 0.0005$), 4 Hz (V1: 27 dB; V2: 23 dB; $p < 0.0001$). The lowest impedance value for V1 implants was 3.5 kilohms, while the lowest impedance value for V2 implants was 3.5 kilohms. The highest impedance value for V1 implants was 10.3 kilohms, while the highest impedance value for V2 implants was 11.9 kilohms (Figure 2). There was no significant difference in the lowest or highest impedance values between V1 and V2 implants ($p > 0.05$).

Conclusion:

At 0.5 Hz, 1 Hz, 2 Hz and 4 Hz, sound-field thresholds for V2 implants were significantly lower ($p < 0.05$) compared to V1 implants. There was no significant difference ($p > 0.05$) in the lowest or highest impedance values between the two implant types. Further research on V1 and V2 implant performance using metrics such as the Bamford-Kowal-Bench sentence test will be useful for further comparison.