Long vs. Short electrode arrays (part 1)

Do longer electrodes give a better speech perception than shorter ones? This question was the reason behind the Buchman et al. 2013 study. To investigate and answer this question a prospective randomized trial was done where patients either were implanted with a 31.5mm or a 24mm electrode array using the same implant. The postoperative testing audiologist was blinded to the map details and array. The speech perception was assessed with HINT sentences in quiet and steady noise (SNR. +10dB) and CNC words in quiet.

The original plan was to implant N=20 patients in both groups, thus all together N=40. After testing the first 13 patients (N=7 for 31.5mm and N=6 for 24mm) the Institutional Review Board (IRB) terminated the study.

Why was the study terminated?
The study was stopped because there was a clear trend that the 31.5mm patients performed superior to those subjects implanted with a shorter array (24mm). Thus it was ethical questionable to implant further patients with the shorter one.

The remaining patients were all implanted with a 31.5mm which supported the findings.

The conclusion:
Longer electrode insertions (and greater insertion angles) appear to offer better speech perception performance in the early post-activation period when using the same implant system

*Influence of Cochlear Implant Insertion Depth on Performance: A Prospective Randomized Trial (Buchman et al. 2013)*
Long vs. Short electrode arrays (part 2)

The question that remained from (Buchman et al. 2013) was how the plasticity of the brain would influence the hearing performance over time and whether or not the patients with the 24mm electrode array would perform just as good.

Thus the patients were tested again after 24 months with this result:

The findings suggest:
- Greater depth of CI electrode insertions affords better speech performance outcomes that persist out to 2 years following implantation when using the same implant system.
- That accommodation and cortical plasticity cannot always overcome frequency mismatch in the cochlea

*Enduring Long-Term Speech Comprehension Benefits of Apical Stimulation in Cochlear Implantation (Brown et al. 2015)*