

Proposal for the optimisation of a Nucleus® CI Recipient's contralateral Hearing Aid (HA)

1) The Earmould

Subject to the high frequency gain needed and the efficiency of the feedback manager, it may be possible to have a more comfortable earmold as compared to a HA only solution. This should be a priority where patient acceptance of the earmold is a critical issue.

2) The Hearing Aid:

The optimisation procedure proposed here requires a WDRC aid with adjustable compression ratio and output compression¹.

3) The Required Resources:

- a. Experienced HA audiologist
- b. HA Programming equipment, including a Real Ear Measurement system
- c. Loudness scale
- d. Calibrated stimulus;
 - i. Free-field, modulated speech-shaped noise
 - ii. Speech signal.



4) The Procedure:

- a. Fit the HA to prescriptive targets² as close as possible, using a real ear measurement system. Move this into ➔ P1
- b. Change the frequency response to the prescriptive fitting **PLUS** 6dB/Oct ➔ P2
- c. Change the frequency response to the prescriptive fitting **MINUS** 6dB/Oct. ➔ P3
- d. Compensate for any differences in loudness between these three programmes by adjusting the overall gain for each, using a 65dB SPL speech or speech-shaped signal
 - i. The objective of this step is to make sure that the three programmes are perceived as equally loud, so that the patient can accurately identify the most clear sound, unbiased by volume.
- e. Identify the best frequency response by asking for the patient's preference, using live voice at ~65dB SPL i.e. normal voice level. ➔ P1.
- f. Adjust the overall gain and/or compression characteristics of the HA (P1) so that the loudness of speech or speech simulating in the ear with the HA is matched to that in the implanted ear at soft (55dB SPL), average (65dB SPL) and loud speech levels (75dB SPL).

- 5) **Follow-up** 4 weeks later to adjust the HA according to the patient's subjective evaluation, and to ensure HA usage and benefit.

Bibliography:

Blamey, P. J. , Dooley, G. J. , Parisi, E. S. , Clark, G. M.: Pitch comparisons of acoustically and electrically evoked auditory sensations. *Hear Res* 1996;99;1-2:139-150. **Blamey**, P. J. , Dooley, G. J. , James, C. J. , Parisi, E. S.: Monaural and binaural loudness measures in cochlear implant users with contralateral residual hearing [see comments]. *Ear Hear* 2000;21;1:6-17. **James**, C. , Blamey, P. , Shallop, J. K. , Incerti, P. V. , Nicholas, A. M.: Contralateral masking in cochlear implant users with residual hearing in the non-implanted ear. *Audiol Neurootol* 2001;6;2:87-97. **Ching**, T. Y. C. , Incerti, P. , Hill, M.: Binaural benefits for adults who use hearing aids and cochlear implants in opposite ears. *Ear and hearing* 2004;25;1:9-21. **Tyler**, R. S. , Parkinson, A. J. , Wilson, B. S. , Witt, S. , Preece, J. P. , Noble, W.: Patients utilizing a hearing aid and a cochlear implant: speech perception and localization. *Ear Hear* 2002;23;2:98-105. **Ching**, T. Y. , Incerti, P. , Hill, M.: Binaural benefits for adults who use hearing aids and cochlear implants in opposite ears. *Ear Hear* 2004;25;1:9-21; see also: http://www.nal.gov.au/nal_products%20front%20page.htm

¹ Hearing impaired patients having used a linear aid previously might need an acclimatisation period.

² Published experience with contralateral HA optimisation is based on the NAL NL-1 procedure. Other formulas such as DSL are conceivable as well.