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Cochlear Implant Programming Terms and Concepts

Regularly scheduled device programming provides the foundation for success with a cochlear implant. Programming (or MAPping) must be completed regularly to make sure that each recipient's cochlear implant properly meets his or her individual needs. Since a recipient's programming needs can change over time, it is very important for device programming to be completed on the schedule recommended by the recipient's implant audiologist. If testing is not completed consistently, the recipient may not hear optimally.

MAP or Program:

The MAP or program contains the rules the cochlear implant uses to provide the recipient with access to sound in a way that matches his or her personal needs. A MAP or program is made up of several parts. These include, but are not limited to, psychophysical measurements, stimulation mode, and processing strategy. Other parameters exist (e.g. frequency allocation table, IDR, Q value, etc.), but are changed less often. No two cochlear implant programs are the same, but each MAP or program serves the same purpose – converting sound input into an individualized, usable signal for the recipient.

Psychophysical Measurements:

Psychophysical measurements are measurements obtained for each electrode, electrode pair, electrode group or channel in the recipient's implant system. These response levels are unique to each recipient and form the foundation of a recipient's program or MAP. Two measurements are typically important:

- Threshold level or T level - the lowest level of electrical stimulation that produces a sensation of hearing; perceived by the patient as "soft". The importance of T levels varies across processing strategies.

- Comfort level, C level or M - the highest level of electrical stimulation that is loud but comfortable; perceived by the patient as "loud"; similar to UCL, LDL, or ULCL in hearing aid testing.

Stimulation Mode:

Stimulation mode refers to the rules used to direct the flow of electrical current to and from the electrodes in the recipient's implant. Stimulation modes used in Cochlear Americas Nucleus systems include Common Ground, BP+X (where X = a number; e.g. BP+1, BP+ 3, etc.), MP1, MP2, and MP1+2. Stimulation modes used in Advanced Bionics systems include bipolar analogue and bipolar pulsatile, as well as odd, even, medial, lateral and "just plain" monopolar pulsatile.

Processing Strategy:

Processing strategy refers to the rules the implant system uses to translate sound energy into an encoded electrical signal pattern that is understandable to the implant recipient. (Formerly called speech-encoding strategy.) Processing strategies used in Cochlear Americas Nucleus systems include SPEAK, ACE, and CIS. Processing strategies used in the Advanced Bionics system include CIS, SAS, and MPS (formerly PPS), HiRes-S, HiRes-P, HiRes-S with Fidelity 120, and HiRes-P with Fidelity 120..

Note:

No measure exists that is able to predict which programming parameters (in particular, stimulation mode and processing strategy) will provide the best signal for an individual recipient. Therefore, a series of systematic trails is often used. Feedback from the recipient, the recipient's family, and the professionals involved in the recipient's intervention plan are critical to this often-lengthy process.

Audiometric Threshold Findings:

When listening with their implants, most cochlear implant recipients demonstrate sound detection thresholds in the 25 - 35 dB range for the frequencies from 250 – 6000 Hz. Occasionally, responses are observed at 40 or 45 dB HL. This is true regardless of the recipient's ability to use or apply the information provided by the implant. Thus, audiometric threshold data are used to confirm device function and ensure access to the speech spectrum, but do not evaluate a recipient's performance or progress. Performance and progress are evaluated using speech perception testing.