**Tittle:** Cochlear implant for single sided deafness: The importance of a limited frequency-to-place mismatch

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**Introduction and aim :**

During CI activation, a standard procedure of assigning auditory frequencies is applied to each patient based on the specific implant model. However, due to the natural variability of cochlear anatomy, this frequency assignment may not align with the cochlea's natural tonotopy. As a result, there is a discrepancy between the default frequency assigned to an electrode and the actual frequency of the stimulated neurons. This phenomenon is commonly referred as the frequency-to-place mismatch.

The aim of this retrospective study is to investigate the influence of the frequency-to-place mismatch on the hearing performance of patients presenting a SSD by comparing the anatomical frequency mapping defined by OTOPLAN® and the default mapping at the time of CI activation.

**Materials and methods**:

This retrospective study included patients with post-lingual deafness implanted unilaterally with MEDEL CI. The inclusion criteria were age >18 years and unilateral post-lingual hearing loss eligible for CI implantation in the deaf ear with a normal hearing in the contralateral ear.

The patients were interviewed to fill a satisfaction questionnaire.

We analysed post-operative CBCT images with OTOPLAN and MAESTRO 9.0 determined a frequency allocation that followed the natural tonotopic map of the cochlea.

We compared the default frequency allocation with the frequency defined by OTOPLAN®.

**Results:**

The closer the match was between the adjusted and predicted frequencies, the higher total score of the 5 questions on the subjective perception is after CI activation. In addition, the speech intelligibility was higher when the mismatch was smaller.

**Conclusion:**

we have demonstrated a systematic mismatch between the default frequencies assigned with those established based on the anatomical values defined in OTOPLAN®. The mismatch between frequency and place could explain the variability of results in tests in noise or in localisation tests.