

Morphological and functional correlation using X Ray and Soe

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Aim of this presentation is to share practical information about a procedure that can combine morphological and functional data obtained during intra- and post-operative sessions.

Data collected and analysed refer to the position of the electrode array and its frequency allocation and nerve responses. The synthesis of morphological and functional data can be used as a diagnostic tool to evaluate nerve functionality and as a fitting tool to better define the choice of the frequency table.

The morphological analysis is achieved after surgery and gives morphological information. It is based upon the Stenvers X-Ray projection that allows the definition of the cochlear array position in the scala tympani using the "Cochlear View" orientation of the patient's head as described by Marsh and Xu (1993). The position of the round window is estimated by drawing a reference line along the SSC and the middle of the vestibule at the intersection with the electrode array. Then a template of the cochlea, generated by a vectorial graphic software, is matched to the cochlea and to the electrode spiral of each patient. At the end a further reference line is drawn from the centre of the spiral template perpendicularly to the first line. In the resulting image, the angle of each electrode and the array insertion depth can be measured. The frequency allocation for each electrode is inferred from radiological data according to previously reported papers (Bredberg, 1968; Greenwood, 1990).

The functional analysis relies on ECAP thresholds, AGF and SOE. The threshold response and the amplitude growth function slope provide data on responsiveness and synchronization degree of neural elements, while the study of spread of excitation is related to the stimulation selectivity of each electrode. Combining morphological and functional data we can achieve a clinical definition of the physiology of each segment of the "new cochlea" in order to assess nerve functionality and choose a customized stimulation.