Title: Comparison Between Flat-Panel Computed Tomography and Temporal Bone Histology in Determining Cochlear Implant Electrode Positioning

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Objective: To evaluate flat-panel computed tomography (CT) imaging for accuracy in determining cochlear implant (CI) electrode intrascalar positioning, and to compare electrode depth of insertion, scalar positioning, and insertional trauma as measured by flat-panel CT radiographic data with that determined by gross histological examination.

Study Design: Cadaveric temporal bone study

Methods: All studies were conducted on fixed cadaveric temporal bones. Each temporal bone is imaged prior to implantation on a flat-panel CT scanner. Using a standard transmastoid facial recess approach, each bone was implanted with one of a number of different electrode array prototypes. Individual bones were then rescanned and radial reformatted images created though each individual electrode along the modiolar axis. Distances between each electrode and the modiolus were measured using computerized software. The bones were then cut in a radial fashion, and gross histological measurements were compared to radiographic measurements using several predetermined standardized reference electrodes.

Main Outcome Measure: Correlation of radial distances, depth of insertion, and intrascalar trauma between CT imaging and histologic evaluation.

Results: The quality of the flat-panel CT images was excellent with little artifact produced.

Conclusion: Our results demonstrate that flat-panel CT imaging of implanted temporal bones not only allows for improved evaluation of intrascalar electrode position with minimal signal artifact, but yields accurate measurements when compared with histological evaluation. This ex vivo study may help to validate the use of flat-panel CT to evaluate electrode positioning following cochlear implantation.