

Using the Cochlea and Vestibular Apparatus for Fine-Tuning Trigeminal and Acoustic Neuroma CT-MR Fusion

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Abstract

Objectives: To demonstrate the use of the co-located bony and soft-tissue anatomy of the cochlea and labyrinth for CT-MR cranial fusion optimization.

Methods: The positioning of the structures and orthogonal arrangement of the semicircular canals provide optimal fine-tuning of roll, yaw and pitch in CT-MR fusion. Simulation CT of the head with contiguous 1.25 mm axial scans and MRI of the brain with thin-slice gradient echo sequences such as constructive interference in steady state (CISS), or fast imaging employing steady-state acquisition (FIESTA) were employed.

Results: The anatomy of the vestibular apparatus is briefly reviewed using illustrations and gross CT and MR cross-sections. Thin cross-sectional cuts are illustrated schematically and anatomically to understand the appearance of the semicircular canals and cochlea in the axial, coronal and sagittal views. The importance of beginning with and then alternating between global fusion markers and local labyrinthine details is stressed. Fusion sequences are presented in successive cuts demonstrating the technique. Relative locations of the trigeminal nerve and cerebellopontine angle/internal auditory canal are reviewed.

Conclusions: Ideally, use of cochlea and labyrinth anatomy along with typical global cranial fusion markers can provide trustworthy fusions to the level of the CT and MR visual resolution. These fusions can then be used for decisive trigeminal neuralgia, acoustic neuroma or other contouring.

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Abstract

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