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Acoustic transmission properties of the eustachian tube

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Purpose: The human eustachian tube is poorly understood, despite being the cause of most chronic middle ear disease. There are few non-invasive tests of function. A new methods of assessment is sonotubometry, but the acoustic characteristics of the ET are poorly understood. Knowing how the ET and mastoid shape sound presented to the nasopharynx is important to developing these tests further. These parameters are also important for understanding patulous ET.

Methods: The acoustic transmission properties of the ET were measured in 1: A simple physical model of the ET and mastoid 2: Cadaveric hemi-heads 3: Explanted cadaveric ETs 4: Fresh human mastoids 5: Embalmed human mastoids.

Results: The simple physical model showed strong resonances which depended on the size of the mastoid cavity modeled. The cadaveric half-heads showed much more damped responses. The explanted cadaveric ET showed resonances similar to the physical model. The mastoid frequency response was much flatter than a simple syringe version of the same volume, and explains the damping of the resonances of the hemi-head compared to the simple physical model

Conclusions: The mastoid does not resonate in the same manner as a simple syringe cavity of the same size. This makes it difficult to use the resonant peaks of the ET as a measure of ET opening.