

Ph.D. Program in Speech-Language-Hearing Sciences

Fall 2017 Colloquium

Wednesday, October 11, 2017

2:45 p.m. - 4:00 p.m., Room 7102

Dr. Sunil Puria

**Harvard Medical School; Massachusetts Eye
and Ear**

*“Cochlear Amplification and Otoacoustic Emission
Generation within a Finite Element Model of the
Mouse Cochlea.”*

Abstract:



We developed a finite element model of the mouse cochlea and tested it against basilar membrane and reticular lamina motion measurements from low-frequency apical and high frequency basal regions. The model is used to demonstrate that the basally-tilted outer hair cells and apically-tilted phalangeal process both attached to the Deiter's cell are elements of Y-shaped building blocks in the organ of Corti that can have a profound effect on cochlear amplification. The model predicts that alteration of both the geometry and material properties of the Y-shaped elements significantly affects the sensitivity and sharpness-of-tuning characteristics of the cochlea and thus the input to the auditory-nerve. The model is used for understanding how individual outer hair cells, each with a small amount of gain, are coupled together to produce the high sensitivity and frequency selectivity of mammalian hearing. In addition, random perturbations around the baseline model parameters were studied. Consistent with experimental measurements, the model successfully produces stimulus frequency otoacoustic emission (SFOAE) magnitudes and phase delays, without significantly affecting cochlear tuning.

**The Graduate Center
365 Fifth Avenue
New York, NY**