



HIGHLIGHT SEMINAR SERIES

CENTRE FOR NEUROSENSORY SYSTEMS

How the Brain Connects with the Ear: Corticofugal Oscillatory Modulation of Cochlear Responses

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Evidence from vertebrates and invertebrates shows that oscillatory mechanisms in the nervous system underlie perception and cognition. Changes in amplitude and phase of brain oscillations within specific frequency bands are thought to facilitate attentional selection, enabling synchronization across various brain regions, whether locally or on a larger scale. However, the extent to which cortical oscillations influence cochlear responses at the receptor level during selective attention to visual stimuli remains unclear. In our recent studies involving humans (both control and tinnitus groups), we developed a new method to examine amplitude changes in the envelope of distortion product otoacoustic emissions (DPOAE) within the frequency range of 1 to 50 Hz, simultaneously measuring electroencephalographic (EEG) activity during a task that alternates between visual and auditory attention. Our results indicate that the switch in attention between visual and auditory modalities modulates both the amplitude and the temporal order of brain and inner ear infrasonic oscillations. Additionally, we found that oscillatory activity was preserved in tinnitus patients. Together, these findings extend the role of oscillatory activity in the nervous system during cognition to the receptor level.

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Paul Delano is a Professor of Otolaryngology and Neuroscience at the Universidad de Chile, where he earned his MD (2000) and PhD in Neuroscience (2006). After completing otolaryngology training in 2010, he joined the university's departments, leading the Neurobiology of Audition Lab. His research focuses on the brain's role in hearing, particularly the auditory efferent system, and the relationship between hearing loss, tinnitus, and cognition. He was Director of the Otolaryngology Department (2019-2022) and is now the Academic Director of the Clinical Hospital at Universidad de Chile.

