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Poster

328. Auditory Processing: Mechanoreceptors and Cochlea

Location: Hall A

Time: Monday, October 19, 2015, 8:00 AM - 12:00 PM

Program#/Poster#: 328.11/O35

Topic: D.02. Auditory System

Support: The Knowles Hearing Center, Northwestern University

Title: Differential influences of visual-task performance on cochlear responses in musicians and non-musicians

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Abstract: Introduction: The corticofugal neural network from the auditory cortex influences the functioning of sub-cortical systems through auditory and cross-modal attention. Activation of this network selectively adjusts gain in the system, improving the signal-to-noise ratio of the incoming sensory stream. The final leg of this network is the medial olivocochlear system (MOC) in the brainstem, which directly inhibits cochlear activity. The strength of this cochlear inhibition appears to be greater in musicians than non-musicians when induced using only auditory stimuli. Here we asked whether cochlear responses were also differentially affected in these two populations during performance of a demanding visual task. Method: Inhibitory activity of the MOC was monitored using distortion product otoacoustic emissions (DPOAEs), sounds generated by the cochlea in response to a pure-tone pair. DPOAE levels were measured in the right ear of participants. Musicians had received formal musical training, and currently practiced music >3 hours/week. Non-musicians had not received formal musical training or played music regularly in the last 4 years. The demanding visual task was Rapid Serial Visual Presentation (RSVP), in which images were presented in rapid succession and participants were required to respond upon detecting a repeated image. DPOAEs were measured in three conditions: with no visual task (baseline), while performing the visual task (RSVP), and immediately after performing the visual task (afterRSVP). DPOAE level differences between the baseline and the RSVP condition provided a metric of visual-task mediated changes in the cochlea, while those between the baseline and the afterRSVP condition quantified the decay of the influence of the prior visual task. Results: In preliminary data, DPOAE levels were significantly lower in musicians (n=4) than non-musicians (n=5) across all three conditions. Performing the RSVP task reduced the DPOAE level for both groups (re: each group's baseline), but the reduction was significantly smaller in musicians compared to non-musicians. The

influence of the visual task did not persist in the afterRSVP condition for either group.
Conclusion: The smaller influence of the visual task, combined with the overall lower DPOAE levels, in musicians than non-musicians, raises the possibility that efferent inhibition at the cochlea in musicians may be at a constant maximum. This state could result from the extended auditory-visual training in musicians. In contrast, in non-musicians, the tonic level of cochlear efferent inhibition may be low and increase only as required by task demands.

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Poster

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Title: The use of electrocochleography in the diagnosis endolymphatic hydrops without vertigo

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Abstract: Introduction Electrocochleography has been extensively studied in the diagnosis of Meniere disease (MD). The different categories of MD are well described by the American Academy of Otolaryngology- Head and neck surgery (AAO-HNS). The main criteria are vertigo, ear fullness, tinnitus and fluctuating sensorineural hearing loss. All the categories of MD described by AAO-HNS have a common symptom: vertigo. Although, many patients report ear fullness without vertigo, not caused by external or middle ear pathology, and therefore are often misdiagnosed. Electrocochleography (ECochG), using SP/AP amplitude ratio and SP/AP area ratio, has been demonstrated as a specific and sensible objective tool in the diagnosis of endolymphatic hydrops in MD. Objective and hypothesis The main objective of the study is to use ECochG to differentiate subjects that report ear fullness without vertigo, compared to controls. We believe that the use of SP/AP area ratio will allow differentiating between controls and the ear fullness group. Methodology 40 patients were recruited for the present study (20 controls and 20 with ear fullness). We recorded ECochG using an extra-tympanic electrode in each of these patients and studied the SP/AP amplitude ratio and the SP/AP area ratio. We then