

Title: The association between auditory function and serum aldosterone levels in older age

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Introduction: Aldosterone (ALD) is a steroid hormone secreted by the adrenal glands and plays an important role in regulating sodium (Na⁺) and potassium (K⁺) levels and reabsorption of water in the kidneys. In addition, ALD contributes to cochlear homeostasis by regulating Na⁺ and K⁺ levels through Na/K-ATPase in the stria vascularis. Unfortunately, ALD is known to decrease with advancing age. Both animal and human studies have shown a significant positive relationship between hearing performance, auditory function and ALD levels, but little is known about how the relationships change over time. The goal of this longitudinal study is to characterize the relation between auditory function and ALD levels in older adults over time. Based on previous studies, we hypothesize that higher ALD levels will correlate with lower hearing thresholds, better hearing-in-noise performance, and more robust physiological responses. Here, we report results on a battery of measures from our first-year data.

Methods: Sixty participants (40 females, 20 males) were enrolled, ages 57 to 76 years (mean = 66.6 yrs), with normal to mild/moderate high frequency loss (mean = 18 to 42 dBHL, 250 to 12,500 Hz) and normal middle ear function. All participants completed a battery of tests including audiometry, tympanometry, Words-in-Noise (WIN), Hearing-in-Noise Test (HINT), temporal fine structure test (monaural FM discrimination), temporal gap detection test, click-ABR, speech-ABR, DPOAE-gram, DPOAE input/output function (at 3000 Hz), and blood draw (Basic Metabolic Panel, Aldosterone).

Results: Data from the initial year of the study showed the following; first, increasing age was positively correlated with increasing audiometric thresholds at high frequencies (4000 – 8000 Hz). Second, WIN scores declined with increasing age, where the relationship was explained by changes in threshold from mid to high frequencies (1000 – 8000 Hz). Third, poorer thresholds at high frequencies (4000 – 8000 Hz) were also correlated with poorer HINT performance. Fourth, increasing age was correlated with a significant delay in wave V latency using click ABR. Finally, there was no significant relationship between any of the measures and ALD levels or between ALD and age.

Conclusion: Age and hearing loss, especially at higher frequencies, were significant predictors of speech-in-noise performance (WIN and HINT). Based only on the first year of data collection, there was no measurable relationship between any of the test measures and aldosterone levels; however, it is possible that a relationship may be observed between aldosterone and hearing performance in subsequent years of this longitudinal study.

Acknowledgement: The study is supported by NIH/NIA, P01-AG09524

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