P153 MRI & EEG INDICATORS OF THE NEURAL BASES OF AUDITORY PROCESSING DISORDER (APD)

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Study 1: Active listening paradigm

N=30 older, 60-74 yrs
N=20 younger, 20-27 yrs

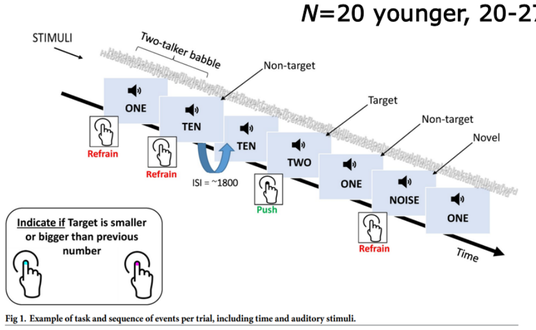


Fig 1. Example of task and sequence of events per trial, including time and auditory stimuli.

https://doi.org/10.1371/journal.pone.0273304.g001

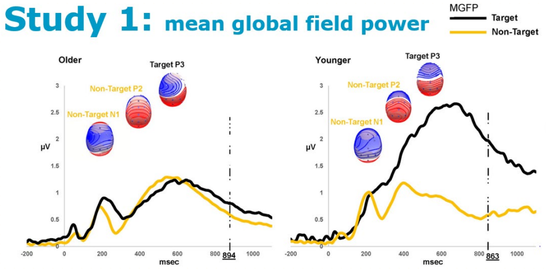
Two studies of auditory processing in children & adults

Study 1: EEG recorded during active listening paradigm – target & non-target stimuli in young & older adults with good vs. poor temporal processing and speech perception in noise [Ref.1]
Study 2: functional and structural resting state MRI, analysed using a network analysis in children with APD & control group [Ref.2,3]

Study 1: Older participants had differences in EEG scalp topography & global field power even though performance level was matched across all participants (% correct performance matched by varying signal to noise ratio)

Poorer listening > anterior shift in source activity (greater activity in prefrontal cortex) > reallocation of processing resources for demanding listening task

Study 1: mean global field power

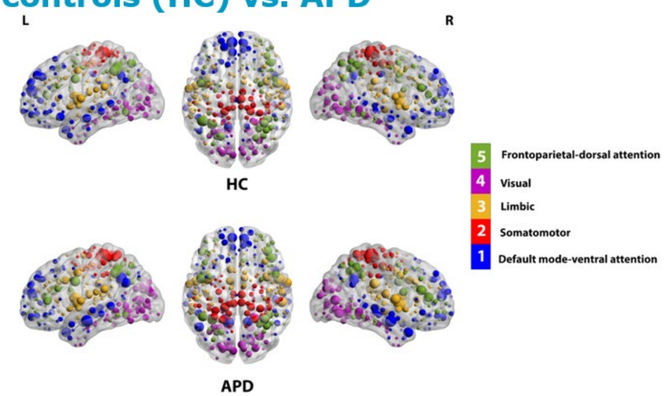


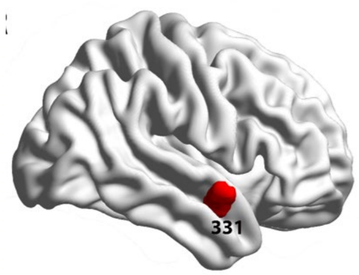
P3 ampl. & distribution differences despite matched performance across young & old

Both studies show altered distributions of brain activity associated with poorer auditory processing and robust correlations between altered neural processing and auditory performance

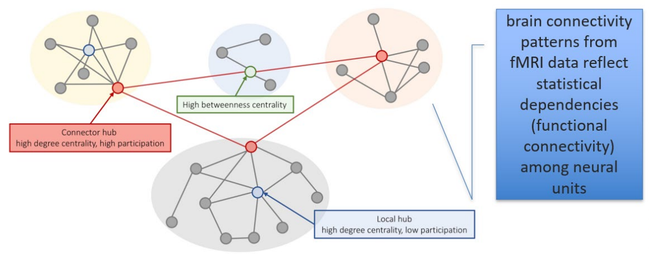
References [1] KURUVILLA-MATHEW A, THORNE PR, PURDY SC. Effects of aging on neural processing during an active listening task. *PLOS One* 17(9):e0273304, 2022; **[2]** ALVAND A, KURUVILLA-MATHEW A, KIRK IJ, ROBERTS RP, PEDERSEN M, PURDY SC. Altered brain network topology in children with auditory processing disorder: a resting-state multi-echo fMRI study *NeuroImage: Clinical* 35:03139, 2022; **[3]** ALVAND, A., KURUVILLA-MATHEW A, ROBERTS, RP, PEDERSEN M, KIRK IJ, PURDY SC. Altered structural connectome of children with auditory processing disorder: a diffusion MRI study. *Cerebral Cortex* 33(12):7727-40, 2023.

Study 2: Resting state MRI in healthy controls (HC) vs. APD





Brain regions that connect to many different networks have a high participation coefficient – significant group differences in the bilateral superior temporal gyrus



Participation Coefficient (integration of brain regions correlated with LISN-S Spatial Advantage scores in APD group (better performance with higher connectivity)

WCA 36th World Congress of Audiology 19-22 September 2026

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