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On the frequency limit of interaural time difference sensitivity for pure tones

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ABSTRACT

Pure tones with different interaural time differences (ITDs) can be discriminated due to their differently lateralized perception. For young normal hearing listeners, previous studies have identified a frequency limit very close to 1400 Hz where an abrupt cliff-like increase in threshold ITD is observed. Published data only reports thresholds at certain correct rates but does not report the correct rates decline with increasing frequencies. Here, we report threshold ITDs as well as correct rates for a broader range of age and hearing status. We investigate if individual high-frequency limits much below 1400 Hz are still cliff-like or more gradual. Most existing models cannot account for the abrupt sensitivity decline without an explicit change of parametrization between 1400 and 1500 Hz. A physiologically inspired model of the auditory pathway suggests that the duration of the excitatory input to the medial superior olive causes the steep upper frequency limit in young normal hearing listeners. Individual data can be fitted by varying the excitatory postsynaptic potential duration along with peripheral parameters.

Keywords: Binaural, High Frequency Limit, Interaural Time Difference, MSO

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