

Basilar membrane mechanics at the base of the chinchilla cochlea. II.

Responses to low-frequency tones and relationship to microphonics and spike initiation in the VIII Nerve)

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Low-frequency stimuli (40-to 1000-Hz tones) have been used to correlate the motion of the 8-to 9-kHz place of the chinchilla basilar membrane with the cochlear microphonics recorded at the round window and with the responses of auditory nerve fibers with appropriate characteristic frequency. At the lowest stimulus frequencies, maximum displacement of the basilar membrane toward scala tympani occurs in near synchrony with maximum rarefaction at the eardrum and maximum negativity at the round window; at higher frequencies, the mechanical and microphonic response phases progressively lag rarefaction, reaching ≈ 240 deg at 1000 Hz. At most frequencies (40-1000 Hz) near-threshold neural responses, once corrected for neural travel-time and synaptic delays, somewhat lead (by some 40 deg) maximal scala tympani displacement and maximal negativity of the round window microphonics. The variation of sensitivity with frequency is similar for basilar membrane displacement and microphonic responses: