STEADY STATE EVOKED POTENTIALS TO AMPLITUDE MODULATED TONES

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Evoked responses have been recorded from the scalp of normal human subjects to continuous sinusoidally-modulated amplitude-modulated tones. Phase locking the computer to the modulation envelope enabled an averaging technique to be used to improve the signal to noise ratio. The responses were found to be periodic with the same fundamental frequency as the modulation envelope. Fourier analysis was used to quantify the amplitude and phase of the first and second harmonic components of the responses.

The variation of the response amplitude with SPL depended on the modulation and carrier frequency. At modulation frequencies of less than 20Hz and carrier frequencies of less than 1KHz, the amplitude of a response increases up to 50dBSPL but remains invariant at higher levels. At higher modulation frequencies, the response amplitude is uniform to 60-80dBSPL and then increases very rapidly, sometimes by as much as a factor of 20 for a 20dB increase in SPL. This is particularly true of high carrier frequencies. These amplitude growth functions can be explained in part by neural tuning curves. Phase locked responses can be recorded down to 30dBSPL at most modulation rates and carrier frequencies.

Estimates of latencies of these potentials were made by measuring the phase change of the first and second harmonic components whilst changing the modulation frequency. The latencies varied with modulation frequency, carrier frequency and SPL. Latencies of both first and second harmonic components fall into 14 discrete groups from 3msec up to 104msec, with the majority of responses having latencies of 9msec to 33msec. The origin of some of these responses is likely to be the auditory cortex.

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