PROCESSING OF SINUSOIDAL MODULATIONS OF AMPLITUDE AND FREQUENCY IN THE AUDITORY CORTEX OF ALERT RHESUS MACAQUES.

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Amplitude and frequency modulation are important features of natural sounds and communication signals. We examined the responses of single auditory cortical neurons to sinusoidally amplitude (SAM) and frequency (SFM) modulated tones presented dichotically to awake monkeys via electrostatic speakers coupled to ear inserts. Tuning to modulation frequency (MF) was assessed over a range from .1 to 1000 Hz. Modulation depth for SAM was generally 100%; modulation depth for SFM was determined by the responses to varying depths at an effective (typically low) MF (e.g. 5 Hz). The shapes of modulation transfer functions based on response rate (rMTFs) and synchrony (tMTFs) varied substantially between neurons, but most cells in our sample had rate- and synchrony-defined peaks in the range 5-20 Hz. Significant synchrony to the envelopes of SAM/SFM could extend to MFs >100 Hz, particularly in primary auditory cortex. rMTFs commonly showed regions of enhancement, suppression, and recovery (relative to an unmodulated pure tone) with increasing MFs, though many cells showed only enhancement or suppression over a particular range of MF. Sharply tuned r/tMTFs could also be observed for cells that were inhibited by long duration tones and SAM/SFM. Peaks of the rMTFs and tMTFs did not necessarily coincide, and a given cell could exhibit rate tuning in the absence of significant synchrony, particularly in more rostral locations. The fact that rMTF and tMTF shapes obtained with SAM and SFM were generally consistent suggests an underlying similarity in the processing of spectrally dissimilar acoustic signals with a common temporal modulation profile. Supported by: NIMH Grant MH12293