RESPONSE PROPERTIES OF THE ROSTRAL MARGIN OF CORE AUDITORY CORTEX IN THE ALERT MONKEY. B.J. Malone, B.H. Scott and MN Semple. Center for Neural Science, New York University, New York, NY 10003.

Previous anatomical and physiological evidence suggests that primate auditory cortex is organized into a diffuse belt area surrounding a central tonotopic core comprising primary auditory cortex (AI), and a rostral (R) and rostrotemporal (RT) field. The properties of AI and R have been described in previous physiological studies, but little is known about the physiology of RT. In this study, we characterized the responses of single neurons in the rostral auditory cortex of an awake rhesus monkey (maccaca mulatta) trained extensively on a range of lateralization tasks involving both static and dynamic binaural stimuli. Calibrated acoustic stimuli were generated digitally and presented dichotically via electrostatic speakers coupled to ear inserts. Within daily sessions, the animal's task alternated between passive listening and active discrimination based on the stimulus parameters under study physiologically. Clear responsiveness to tonal and narrowband stimuli was confined to a narrow (3 mm) peninsula of tissue flanked rostrally and medially by regions exhibiting exquisite sensitivity to very complex sounds (such as faint finger snapping or the opening of a door) and no consistent responses to the standard battery of test stimuli (tones, bandpass noise, binaural beats, sinusoidal or trapezoidal modulation of tonal amplitude (AM), frequency (FM) or phase). On the basis of this arrangement, the long latency of the responses (typically >50 ms), and the suggestion of a rostral to caudal tonotopic progression from low to high frequencies opposite that reported elsewhere for field R, we concluded that the region was most likely field RT. Neurons within RT were predominantly sensitive to low (<2 kHz) frequencies, responses were often very difficult to elicit, and habituation was common in response to repeated presentations of a given stimulus. We often found, however, that vigorous responses could be obtained by careful selection of the stimulus parameters, including frequency, noise bandwith, modulation frequency, level, and even stimulus duration, for which sharp tuning was commonly observed. Although minimum initial discharge latency was typically long or locked to stimulus offset, a subset of RT neurons which responded reliably at short (<20 ms) latencies were powerfully driven in terms of both rate (>100 Hz) and synchrony by long (>3 sec) sinusoidal AM and FM stimuli. Tuning for stimulus duration, in constrast, appeared to be more characteristic of neurons responding at longer latencies. The responsiveness of RT neurons appeared to depend primarily on the appropriate selection of stimulus paramters rather than on the behavioral context (listening versus discrminating) in which stimuli appeared.