CORTICAL BINAURAL PROPERTIES AND BEHAVIORAL LATERALIZATION IN MACAQUES. M.N. Semple*, B.H. Scott and B.J. Malone. Center for Neural Science, New York University, New York, NY 10003.

Auditory researchers differentiate bilaterally excitable (EE) neurons from those excited by one ear and inhibited by the other (EI). Previous studies in non-primate models provide evidence for differential distributions of EE and EI responses throughout the central auditory neuraxis, culminating in "binaural bands" within primary auditory cortex (AI). We studied binaural properties of >300 single cells in AI and surrounding fields of two alert rhesus macaques trained to perform sound lateralization tasks. Detailed mapping provided no evidence of binaural bands in any field. Although EI cells seem ideally suited for spatial processing based on their sensitivity to interaural level differences (ILDs), we encountered fewer than 10% EI cells, and neural sensitivity to ILD was generally modest. Nevertheless, both animals readily lateralized tones behaviorally using only ILD, with thresholds <2 dB at some frequencies. Thus, ILD discrimination in primates may reflect a network process based on broad, overlapping ILD tuning of cells whose binaural interactions are not necessarily suppressive. Cells tuned to high frequencies (for which ILD is a more salient cue) are abundant in caudal AI and the adjacent caudomedial field (CM). Lateralization based on interaural phase differences (IPDs) yielded thresholds <30 degrees for tones in the range 500-2200 Hz. Although cells in the rostral and rostrotemporal fields are typically EE and tuned to low frequencies, they rarely exhibited IPD sensitivity. In contrast, at the rostral margin of AI, IPD sensitivity was ubiquitous for a broad range of low frequencies. In summary, although binaural responsiveness occurs broadly along the core, mechanisms for spatial processing are more evident in AI and CM.