

Spectral and temporal dependencies of information processing in the auditory midbrain

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Most biologically significant sounds have complex spectral and temporal properties. In this talk I will consider how one particular category of complex sound, amplitude modulation, is processed in the inferior colliculus, the midbrain nucleus of the auditory pathway. The processing of such signals depends in part on the spectral response properties of the neurons involved. In my lab we have used single unit recording and iontophoresis of neurotransmitters and their antagonists to define the spectral receptive field properties of neurons in the IC. These methods allow us to dissect out the contribution of specific inputs and tell us about the interplay between the excitation and inhibition that determines the neurons responses. However, recent experiments with multicomponent amplitude-modulated stimuli suggest that response areas defined with pure tones may provide only a partial description of a neuron's responses to the more complex sounds that animals normally encounter in the real world. Experiments using stimuli with more than one component reveal features of the frequency receptive field that are not apparent when mapped with pure-tone stimuli alone. These results may provide evidence for across frequency integration in the inferior colliculus.