Sensory feedback control of vocal motor pathways M. Smotherman

OBJECTIVE: To identify and characterize neural substrates that integrate sensory feedback into the production of vocalizations. This presentation will compare the respective roles of the parabrachial nucleus and the basal ganglia in the control of syllable acoustics and timing.

METHODS: Because of their dependence on voice for survival, echolocating bats offer unique insights into the neural pathways and mechanisms that generate mammalian vocalizations. Electrophysiology, immunocytochemistry and pharmacology were used to reveal novel details about how sensory feedback modulates activity in the vocal motor pathways.

RESULTS: The parabrachial nucleus will be presented as an example of how midbrain and brainstem central pattern generating circuits may be modulated in real time by sensory feedback to integrate the expression of vocal motor programs with breathing. In contrast, the forebrain basal ganglia circuits provide a more flexible, context-dependent filter for the control of syllable selection, timing and acoustics.

DISCUSSION: The neuroanatomical organization and functional significance of these pathways will be discussed in the context of bat and other mammalian vocal behaviors. Understanding the neurobiology of these feedback mechanisms is essential to understanding the biological basis of speech motor disorders such as those arising from Parkinson's disease.

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