NIH Award from the National Institute on Deafness and Other Communication Disorders

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- **Project:** Sensory Mechanisms of Voice Control
- **Start Date:** July 17, 2009
- **Total Award Amount:** $259,531

**How the results of this project will benefit society:**
Voice disorders are among the most prevalent disorders affecting people with communication disabilities. People afflicted with these disorders have difficulty communicating with others, the disorders may adversely affect their careers, and the people often become socially isolated. There is little we can do to prevent these disorders without a solid understanding of their cause. Part of the reason for this lack of understanding is because of the lack of basic knowledge of normal voice control mechanisms. This research project will improve our understanding of brain mechanisms involved in voice control. This understanding will lead to new diagnostic and therapeutic procedures for patients suffering from voice disorders.

**The problem the project is trying to solve:**
Recent research has shown that sensory feedback plays an important role in voice control. The overall goal of this research project is to understand the neural mechanisms involved in voice control. We have learned over the past several years that as people are vocalizing or speaking, that experimental manipulation of their voice auditory feedback causes a reflexive change in their voice fundamental frequency (F0) or amplitude. We have also learned that people with Parkinson’s disease or children with autism have unusually large responses to these manipulations. These observations indicate that neural mechanisms involved in generating responses to perturbations in voice auditory feedback are abnormal in some neurological disorders. For this reason it is necessary to learn how the brain controls the responses to perturbations in voice feedback.

**How this project will work:**
In the proposed studies, we will record electrical potentials from the brain surface in patients being treated with epilepsy. We will also obtain images of the blood flow changes in subjects as they respond to perturbations in voice auditory feedback (fMRI). We will then magnetically stimulate those areas of the brain shown to be active in this process, which will temporarily change neural functioning in those areas known to be active during the reflexes. We will develop a model, based on the responses to magnetic stimulation, of the connections within the brain that are involved in the reflexive responses. These data will allow us to develop more specific hypotheses on how each one of several areas of the brain is involved in the responses to perturbations in voice auditory feedback.

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