

Study title: **Acoustic and perceptual effects of WDRC amplification**

NIH/NIDCD R01 DC 006014

Status: Awarded, start date April 1, 2010

### **1. Objectives**

The goal of this work is to understand the effects of wide dynamic range compression (WDRC) amplification on temporal cues for speech recognition.

### **2. Plan:**

Experimental work will involve groups of younger and older listeners with a range of peripheral auditory sensitivity. Each listener will participate in a range of experiments, with the goal of each being to understand how temporal alteration of a speech signal impacts intelligibility.

### **3. Methods:**

All testing and data management will occur at Northwestern University in Dr. Souza's laboratory. Dr. Gallun will be involved in the analysis of deidentified data and computational modeling, as well as the preparation of manuscripts and presentations.

### **4. Findings to Date:**

This work is beginning its tenth year of uninterrupted funding, and the results have strongly supported the hypothesis that temporal information is essential to speech understanding. Computational models and synthetic stimuli have been used to demonstrate the range of temporal distortions that can be tolerated by normally-hearing and hearing-impaired listeners.

### **5. Clinical Relevance**

Hearing loss is one of our most pervasive health problems but the only treatment option for most of those with hearing loss is a hearing aid. To improve hearing aid satisfaction and benefit and avoid distorting important speech cues, we need to choose appropriate processing parameters for each individual. The focus of this project is to determine hearing aid settings that will provide the best possible speech recognition for each individual under a variety of listening conditions.

### **6. Relevance to VA Mission**

In 2010, VA Audiology Service dispensed over 561,000 hearing aids, at a cost of \$197,000,000, accounting for 20% of the U.S. market in hearing aids. Altogether, the cost of devices, services, and compensation was well over \$1 billion. Even though many older Veterans have hearing loss, and the VA spends over a billion dollars each year on the problem of hearing impairment, progress is slow to lessen the impact of aging and insults such as noise exposure on hearing health. For many decades, work has focused primarily on sensitivity to pure tones, which has resulted in a high level of sophistication in hearing aids, which are the primary method of rehabilitation. With the advent of digital hearing aids, it has become clear that providing audibility is not always sufficient to restore understanding of speech in complex environments. This work seeks to improve the performance of hearing aids, and thus the hearing health care provided to our nation's Veterans.

**MESH Terms:** Auditory perception, hearing aid, speech intelligibility