

APPLICATION – please follow the format provided below.

A. Abstract: *(100 word limit using Microsoft Word – please post word count at the end of your abstract)*

Describe briefly how the funds for which you are applying will be used. If funded, the abstract will be posted to the CoTA website.

The Oxford Round Table will hold **10th Annual International Conference on Health, Aging and Nutrition** during the dates of July 27 - July 30, 2016 at Harris Manchester College in the University of Oxford, Oxford, England. Harris Manchester College is one of the thirty-eight colleges that form the University of Oxford and was founded in 1786. The Round Table has a long-held reputation with a unique format that invites a limited number (25-35) of researchers in the fields of Health, Aging and Nutrition to discuss common interests in world health problems. CoTA research grant will help defray my travel expense. (100)

B. Proposal: *(500 word limit using Microsoft Word – please post word count at the end of your proposal)*

Describe the goals of your project / activity / conference and the areas in which your project supports the strategic goals and objectives of the unit, college and university.

Focal dystonia is a debilitating neurological condition that has afflicted pianists in the prime of their career. Disruptions in sensory integration and motor planning lead to involuntary movements, or "misfires" of certain muscles during piano playing. Despite the severity of the condition, questions remain unanswered.

We examined a 50-year old professional pianist with focal dystonia in the left hand manifesting as involuntary 3rd finger extension. Biomechanics of the hand and arm were examined. Performance of temporal and dynamic touch control on the piano keys was quantified using MIDI data generated from hybrid acoustic-electronic piano. Functional MRI was captured while: (1) tapping on a flat board on his chest; and five-finger scale with the (2) affected and (3) unaffected hands. Intramuscular needle EMG (nEMG) was used to examine the activation pattern of the left extensor digitorum communis (EDC), and compared to the left extensor indicis proprius (EIP).

Dystonic posturing of left 3rd finger extension was observed during fMRI and nEMG testing. Analysis of MIDI performance data showed decreased evenness of touch control, both temporal and dynamic. fMRI analysis demonstrated enhanced activity in contralateral (right) primary sensorimotor cortex, supplementary motor area and parietal-occipital regions during simulated playing with the left hand. Ipsilateral (left) sensorimotor activity and parietal-occipital activity is also increased with the left hand. Conversely, simulated playing with the right hand revealed markedly diminished activation of the contralateral (left) sensorimotor cortex and no activation of the ipsilateral (right) sensori-motor and parieto-occipital cortices. Indwelling nEMG analysis revealed hyper-activation of the left EDC with a distinct periodic oscillatory pattern during and persisting after playing which coincided with the dystonic posturing. These patterns were not demonstrated in the EIP.

Our case demonstrated that pianist's focal dystonia was associated with increased activity in the contralateral sensory and supplemental motor areas and a distinct oscillatory EMG activity in the affected muscle (EDC). Incorporating multiple modality data sets will provide novel insights into sensory integration and motor planning.

Co-researchers are Sang-Hie Lee, PhD, School of Music, PI, Dustin Hardwick, PhD, School of Physical Therapy and Rehabilitation Sciences; Juan Sanchez-Ramos, MD, PhD, Helen Ellis Professor of Neurology University of South Florida.

This project meets the University, College, and School' strategic goals because it is multidisciplinary, has a novel approach to this mysterious symptom, and global in its scope. This project will continue to enhance my