Aging Research at Georgia Tech

Submitted by Professor Minoru "Shino" Shinohara, PhD

Cognitive and motor abilities decline with age. As a result, older individuals sometimes have difficulty performing everyday tasks such as writing a check or balancing while standing. The Georgia Institute of Technology's Neurosensory Physiology Lab (School of Applied Physiology) is undertaking a number of aging research projects to understand the functional mechanisms behind these phenomena.

The lab is currently studying healthy elderly adults who are interested in being involved in an aging research project.

Professor Minoru "Shino" Shinohara, PhD, is the director of the lab, which also has an appointment at the Rehabilitation R&D Center for Excellence for Aging Veterans with Vision Loss (Atlanta VA Medical Center) and at the Department of Physiology (Emory University School of Medicine). With an ultimate goal of helping improve the quality of life in aging adults, Shinohara has been studying physiological mechanisms for movement control in young and elderly adults for over 20 years. He utilizes the state-of-the-art noninvasive techniques including transcranial magnetic stimulation (TMS), functional magnetic resonance imaging (fMRI), functional ultrasound imaging, and evoked potential in his own lab and in his domestic and international collaborations.

Currently, two aging research projects are ongoing in the Neurosensory Physiology Lab—a hand function project and a balance project. For the hand function project, Shinohara has found that elderly adults often have difficulties in controlling their finger force, especially when both hands are used at the same time. Human activity requires divided attention. The lab is now trying to understand how divided attention influences the age-related decline in hand and finger functions by looking at the brain and muscle activity in healthy elderly adults.

In the hand research, the participants are asked to perform multi-task that divide their attention. In one condition, they are asked to produce small finger force as steady as possible in their right hand while performing basic addition and subtraction in their mind. In another condition, they are asked to do the same thing in their right hand while matching their finger force at a varying target in their left hand. Their muscle and brain activities during these tasks are recorded with miniature electrodes that are attached to the skin overlaying the brain and muscle. The muscle and brain activities are analyzed using a computer to elucidate common features across individuals. The results obtained in this study can be used to identify elderly individuals who may be at risk of cognitive or motor impairment.

The balance project is performed in collaboration with the Neurosensory Center (Director Professor Lenn H. Ting, PhD, Biomedical Engineering) at Georgia Tech Faculty. The project originated from Shinohara's previous findings that very small vibrations to the foot improve balance in young adults during one-leg standing. It is proposed that certain vibrations can enhance sensory function. The lab is now testing if such vibrations can improve balance in healthy elderly adults and individuals with Peripheral Neuropathy.

During the balance study, participants stand on a platform that is equipped with computer-controlled vibrators. They are asked to stand quietly with their feet together for no longer than 1 minute at a time. Various kinds of small vibrations (too small that most people cannot feel them) are turned on and off to the foot. The effects of the small vibrations on the person's balance are measured using force plates and a variety of techniques. The results obtained in this study would eventually be used for the improvement of balance for elderly individuals that have difficulties in postural control.

The Neurosensory Physiology Lab is inviting interested healthy elderly adults to be involved in one or both of these studies that would lead to improving the quality of life in aging adults. Both studies are non-invasive and require a one-time visit to the Georgia Institute of Technology campus (Atlanta, GA). All study participants are volunteers and will be compensated for their time (~2.5 hours) and travel expenses. To be admitted to the study, you must be over the age of 60 and healthy. Other inclusion criteria may be clarified by contacting the Neurosensory Physiology Lab.

If you are interested in learning more, please call 404-885-9958 (Neurosensory Physiology Lab) or email L. Ting (We related study) at lting@engr.gatech.edu or Varsity (re: balance study) gsg724@netmail.gatech.edu. The website of the Neurosensory Physiology Lab can be found at http://www.aps.gatech.edu.