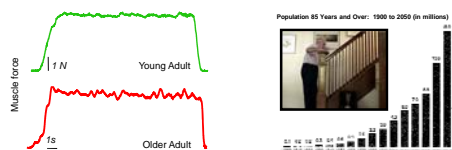


OUR RESEARCH MISSION

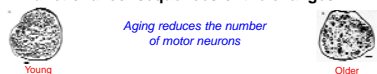
Declining neuromuscular function affects physical function and quality of life

A loss of muscle control in older adults

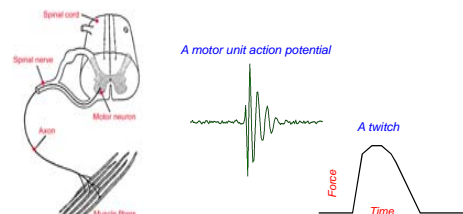
A dramatic impact on the growing number of older adults



We are examining the mechanisms that explain neuromuscular decline with aging and the physical functional consequences of the changes



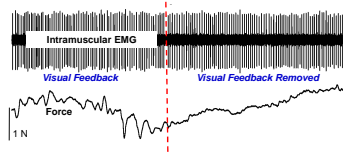
The quality of the signals from the nervous system to muscle is affected by aging



The **Motor Unit** converts nervous system impulses into useful force:

- Variability in **motor unit** firing rates may contribute to unsteadiness of force seen in aging. This decreased ability to control muscle force may lead to disability, falls, and injury.

- Additionally, processing during force-matching tasks contributes variability to the descending drive to motor neurons and to muscle force.



Our lab is interested in the neural processes associated with correction of force (**keeping steady**) and the contribution of motor unit discharge variability to neuromuscular dyscontrol in aging adults.

OUR RESEARCH METHODS AND CAPABILITIES

EXPERIMENTAL APPARATUS

- Our custom-designed experimental chair allows the measurement of many different muscles of the upper and lower extremity.
- Knee extensors/flexors, ankle plantarflexors or dorsiflexors, shoulder muscles, elbow flexors/extensors, wrist muscles, extrinsic and intrinsic hand muscles.

FORCE CONTROL

- Load cells, accelerometers, and electronic goniometers are used to measure neuromuscular output during experimental tasks.
- Subjects usually either exert maximal forces to measure muscle strength, or submaximal forces to measure the ability to control force.

ELECTROMYOGRAM (EMG)

- We measure the electrical activity of the muscle in two different ways:
 - Surface EMG with electrodes on the skin
 - Intramuscular EMG with fine-wire electrodes inserted into the muscle

FUNCTIONAL ACTIVITIES

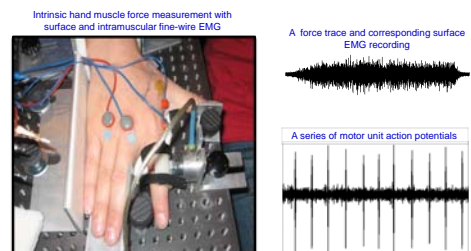
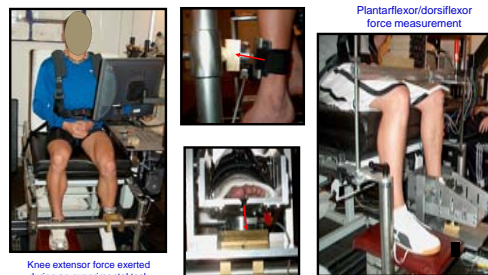
- To assess physical function, we conduct a variety of standardized measures of physical function and performance.
- Gait speed, agility, reaction time, sensory acuity, functional reach, grip strength, hand dexterity, balance, step testing, stair climbing, visual acuity, cognitive speed and function.

POSTURAL STABILITY

- Subject perform various standing tasks on two force plates.
- We measure the fluctuations in posture by recording the reaction forces underneath the feet in the forward/backward and right/left directions.
- Performed in the Clinical Biomechanics Lab (Dr. Reiser, Director)

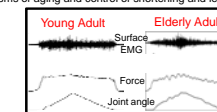
ACTIVE RESEARCH PROJECTS

- Determining the neural mechanisms that underlie the control of large and small muscles of aging adults**
 - Potential subjects: Either healthy or frail older adults (65-90yrs), sedentary, and free of neurological health complications
- Effect of diabetic peripheral neuropathy on ankle muscle control and postural stability in older adults**
 - Potential subjects: Healthy older adults (65-95yrs), diagnosed with foot neuropathy, and free of other neurological health complications
- Ankle control, balance, locomotion, and physical function after lower-limb nerve decompression surgery in neuropathy patients**



COLLABORATORS/FUTURE STUDIES

- Occupational Therapy Department, CSU. Dr. Matt Malcolm, Director of the NeuroRehabilitation Research Lab.
 - Stroke, rehabilitation training, brain stimulation, and hand function.
- Center on Aging, CSU. Dr. Manfred Diehl, Director
 - Frailty, physical function, health behavior, and aging.
 - Wi-Fi balance training for older adults.
- Psychology Department, CSU. Drs. Ben Clegg, Dave McCabe, Lucy Troup.
 - Cognitive processing speed and cognitive function
- Health and Exercise Science Department, CSU. Drs. Raoul Reiser, Chris Bell.
 - Biomechanics, sympathetic nervous system function
- Poudre Valley Foot and Ankle Clinic. Dr. Jim Anderson, DPM
 - Neuromuscular and functional impact of lower limb nerve decompression
- Physical Therapy Department, Univ. of Utah. Dr. Paul Lastayo
 - Effects of eccentric training on physical function, fall-risk, and neural control
- Ankle muscle control, postural stability, and physical function in frail older adults.
- Neural mechanisms of aging and control of shortening and lengthening contractions



WANT TO BE A SUBJECT?

- Subject benefits often include a whole body bone density scan and financial compensation for your time.
- Please contact the Lab regarding more participant information.

CONTACT INFORMATION

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Lab members: Top (left to right)- Brian Tracy, Megan Endrizzi, Leah Hitchcock, Roger Paxton, Crystal Massie, Anna Jones, Bottom- Jackie Long, Megan Trabert, Abbey Keene