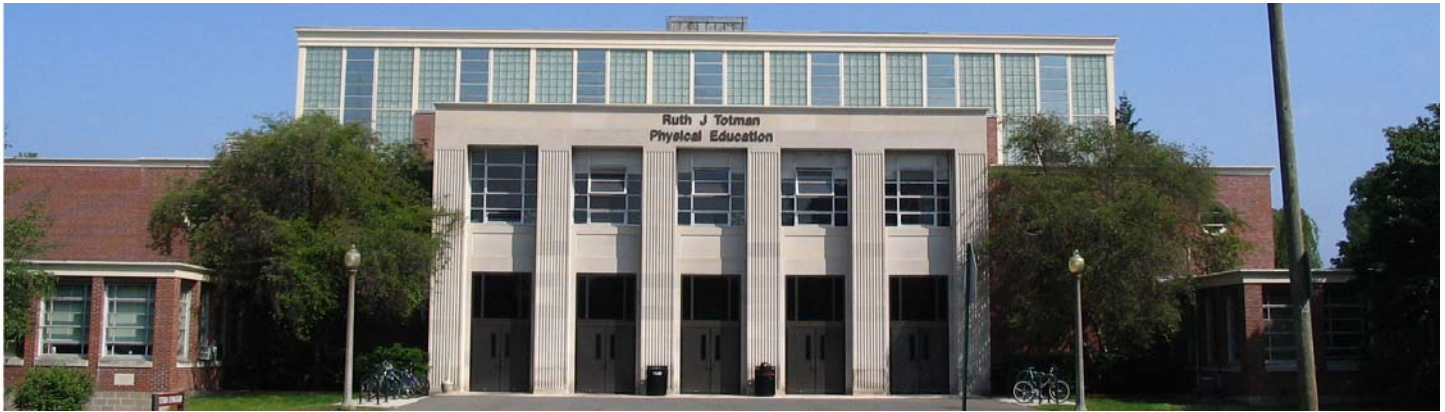




# Healthy Living



## Muscle Physiology Laboratory: Fall Update!

With summer drawing to an end, we in the Muscle Physiology Laboratory are gearing up for an exciting and busy academic year! Over the past few months, our lab calendar has been filled with data collection sessions, writing and publishing manuscripts describing the results of our studies, and giving talks to local senior centers about healthy aging. As we look ahead to the Fall semester, we are sure that the fun will continue.

We are nearing the completion of a five-year project, funded by the National Institute of Health, comparing the causes of muscle fatigue in young and older healthy men and women. An important concept that has been highlighted in our studies is the influence that physical activity has on muscle and overall physical function. Our work has shown that individuals

who spent more time performing moderate-to-vigorous physical activity had larger muscles and performed better on tests of physical function.

We are committed to translating the results of recent research to practical information for community members. In keeping with this mission, we presented some information on balance and fall prevention to some local senior citizen groups. This newsletter summarizes those presentations. We hope you find it interesting and informative. See the additional resources, listed on page 2, for more information about preventing falls. Enjoy!

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## ***Balance and Fall Prevention***

The word balance can mean many things, but everyone understands the link between maintaining balance and preventing falls. Maintaining balance can become more difficult, and the risk of falling increases, with advancing age. In this article, we will discuss how we maintain our balance, why balance declines as we get older, and what you can do to reduce your risk of falling.

### **What is Balance?**

Balance is a complex process involving the sensory (visual, vestibular, and somatosensory), nervous, and musculoskeletal systems. To maintain balance, we must perform the following three steps:

- 1) **SENSE** the position of the body and the support surface
- 2) **CHOOSE** an appropriate movement, or “postural adjustment” to maintain balance
- 3) **PERFORM** the postural adjustment adequately.

To understand these steps, imagine standing on a train. You **SENSE** the position of your body and of the surface that you are standing on; your feet feel the floor of the train underneath you, and your eyes see the floor and any obstacles in your way. When the train begins to move, you sense that the acceleration

For more information on how you can reduce your risk of falls, consult the following resources, or contact us at the Muscle Physiology Lab at (413)-545-5305:

### **Centers for Disease Control**

([www.cdc.gov/HomeandRecreationalSafety/Falls/fallsmaterial.html](http://www.cdc.gov/HomeandRecreationalSafety/Falls/fallsmaterial.html)) – See the brochure entitled “Check for Safety: A Home Fall Prevention Checklist for Older Adults”

### **National Institutes of Aging**

([www.nia.nih.gov](http://www.nia.nih.gov)) – Follow the “Publications” link to the “Healthy Aging” page. See the booklet entitled “Exercise & Physical Activity” for full description and color pictures of many exercises for strength and balance.

### **American College of Sports Medicine**

([www.acsm.org](http://www.acsm.org)) – Click the “Physical Activity and Public Health Guidelines” link for more info about exercise guidelines.

of the train pulls you forward. To keep from falling backward, your nervous system must very quickly CHOOSE an appropriate postural adjustment, such as stepping backward. Once the postural adjustment is chosen, your nervous system sends signals to your muscles telling them to move your leg. Your muscles must then PERFORM the movement quickly, and contract strongly enough so that your leg can support the weight of your body. If you are unable to SENSE the loss of balance or to CHOOSE or PERFORM the appropriate postural adjustment, you will fall.

Advancing age can affect our ability to perform each of these three steps. As we age, our ability to sense the position of our body or to see obstacles in our way declines, reaction time slows, and our ability to quickly choose a postural adjustment diminishes. Additionally, our muscles become smaller and weaker, making it more difficult to adequately perform postural adjustments. As a result of these changes, one out of every three people over the age of 65 falls each year. The susceptibility to injury increases with age, so falling can have serious health consequences for older adults. Fortunately, there are many things you can do to reduce your risk of falls. The first step is to *know your risk factors!*

## Upcoming Events!

### Translating Research in Kinesiology

**(TReK) Day:** Saturday, October 17 at 1pm-4pm.

For more information check the kinesiology department website.

<http://www.umass.edu/sphhs/kinesiology/index.html>

### Muscle Physiology Open House:

Interact with members of the lab to learn more about our research.

Check our website for future date.

**Medical Risk Factors:** Diseases that affect the *heart, eyes, muscles, and feet* are known to increase the risk of falls. Diseases of the heart can cause blood pressure to fall, particularly when you first stand up, leading to fainting and falls. Diseases that affect vision and sensation in the feet can decrease the sensory input that is necessary to maintain balance, and muscle weakness can decrease the effectiveness of postural adjustments. In addition, some medications or combinations of medications can make you dizzy or sleepy. Furthermore, taking more than 4 medications per day increases

your risk of falls. Steps you can take to minimize your medical risk factors include the following:

- 1) Have your vision checked regularly.
- 2) Work with your doctor to ensure that all health problems are appropriately managed.
- 3) Keep an updated list of your medications, including over the counter medications and supplements. Review this list with your doctor regularly to make sure that all medications are necessary and appropriate.

**Environmental Risk Factors:** Most falls occur in the home. There are many steps you can take to make your home safer, including:

- 1) Remove clutter from stairs and walkways.
- 2) Remove throw rugs, or secure them with double-sided tape.
- 3) Improve the lighting in your home. Keep a lamp within easy reach of your bed, and make sure the pathway between your bed and the bathroom is well lit and that light switches are easily accessible.
- 4) Keep frequently-used objects in cabinets that you can easily reach without a step stool.
- 5) Have handrails and lights put in all

staircases, and have light switches installed at the top and bottom of all stairs.

- 6) Use non-slip mats in the bathtub and have grab bars installed in the shower and near the toilet.

**Physical Risk Factors:** If you have problems with your walking or balance, talk to your doctor. You may benefit from physical therapy or an assistive device, such as a cane or a walker. In addition, exercise is an excellent way to reduce your risk of falling. You should perform exercises that improve balance and coordination, like those described below, as well as strengthening and endurance exercises, such as walking or cycling.

#### Other Tips

- Get up slowly after you sit or lie down.
- Wear shoes inside and outside the house. Shoes should be thin-soled with good traction.
- Put a phone near the floor, or carry a phone with you in case you fall and can't get up.
- Paint a contrasting color on the top edge of all steps so you can see the stairs better.

**Balance Exercises:** Below are some exercises to improve your balance and coordination. Start with the least challenging position and progress to the more challenging positions as your balance and coordination improve. Use the pictures as a guide.

- **Stand on one foot** – Stand with both hands supported on a counter or sturdy table. Stand on one foot for up to 10 seconds. Repeat with other leg.

- CHALLENGE - use only 1 hand for support, or just your finger tips.



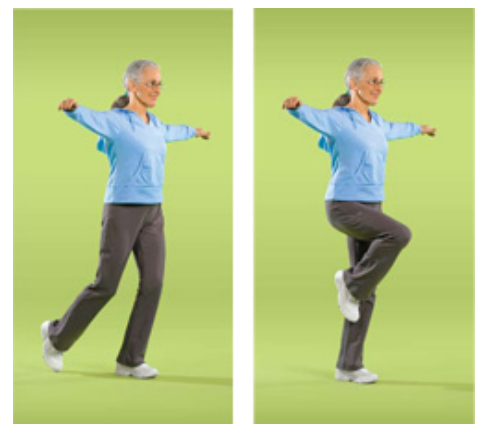
- **Heel-to-toe walk** – Stand against or close to a wall for support. Position one foot next to the other so that the ball of one foot is next to the heel of the other foot. Focusing on a spot in front of you, step forward with your rear foot, placing the heel of the foot next to the ball of the standing foot. Repeat for 20 steps.

- CHALLENGE – Position one foot directly in front of the other so that the heel and toes are almost touching. Focusing on a spot in front of you, step forward with your rear foot, placing the heel just in front of the other foot. Repeat for 20 steps.



- **Balance Walk** – Raise arms to shoulder height. Focus on a spot ahead of you and walk in a straight line. As you walk, lift your back leg. Pause for 1 second before stepping forward. Repeat for 20 steps.

- CHALLENGE – With your back leg still in the air, pause for 5 seconds before stepping forward. Repeat for 20 steps.



Keep in mind that exercises should be:

- 1) **TAILORED** to your needs and abilities.
- 2) **PROGRESSIVE** - the exercise should get harder as you improve. Exercises to increase muscle strength should fatigue your muscle after 10 to 15 repetitions. Once you can lift a weight 15 times, increase the weight.
- 3) **REGULAR** - balance and strength exercises should be performed 2 or 3 times a week. Endurance exercises should be performed 3 to 5 days a week.
- 4) **SUSTAINED** - The benefits stop once the exercise stops, so keep doing it!

The Muscle Physiology Lab is dedicated to quantifying age, gender, and activity based changes in human skeletal muscle function.

For more information about our studies, please see our website ([www.people.umass.edu/muscle/](http://www.people.umass.edu/muscle/)) or call us at 413-545-5305.

Members of the muscle physiology lab: doctoral students Damien Callahan, Linda Chung, Stephen Foulis, and Ryan Larsen; post-doctoral fellows Michael Tevald and Anita Christie; study coordinator Bryce Jones, and director Jane Kent-Braun



**“You don't stop laughing because you grow old. You grow old because you stop laughing.” - Michael Pritchard**