by Robert Graham, MS, and Karen Sullivan-Kniesedt, PT

Enjoying and living life to its fullest is challenging in today’s world, and for those with limb loss the physical challenges are even greater. By consistently performing functional strength training exercises, anyone can improve their physical ability to face the demands of daily living, as well as improve at recreational or competitive activities.

Muscular strength is a vital component of being healthy, and as we get older, it decreases the risks of many conditions such as osteoporosis. Muscular strength is gained by requiring muscles to actively work. People who have an active lifestyle and receive a lot of physical demands on their bodies typically have good muscular strength. Amputees have physical limitations due to their limb loss and require adjustments in standard exercise routines. Doing functional strength training means people, especially those with limb loss, are less prone to musculoskeletal injuries and the risk of falling.

What Is Functional Training?
Functional strength training is different from traditional weightlifting. Although both lead to improved muscular strength, functional training exercises involve placing the body in positions that load muscles, simulating movements that are true to actual life or sport. Research has shown that this is the most effective way to train. It focuses on strengthening the core, which increases efficiency and agility while reducing the chance of injury. This can be done by anyone and helps lead to optimal health and fitness.

The Importance of Building Core Strength
Proper engagement of core musculature, such as the pelvic floor and the transversus abdominis, will maximize the capacity for accelerating, decelerating and transferring loads through a balanced, stable and coordinated linkage system from hands to feet. By gently activating the core muscles with intensity of 30 percent of maximum contraction, neutral spine posture can be achieved. When the core muscles are strong enough to optimally work through a person’s typical day, then the person will be able to respond to a full spectrum of dynamic challenges requiring optimal cardiovascular capacity, mobility of limbs and spine, and quick reaction to varying situations without destabilizing his or her center of gravity, hence reducing the risk of falling. A strong core allows people to meet the challenges of short bursts of high-intensity demands as well as longer endurance activities. We all need to reach the point where we can participate fully in life’s offerings, engage to the full extent in the opportunities that come our way, and react to the unexpected without incurring injury.

Creating and maintaining good core musculature is extremely important and is not easy. It takes consistent, conscious mental and physical effort. Finding a trustworthy healthcare professional and/or trainer who has the skills needed for you to perform a safe, fun, consistent program is highly recommended.

The following exercises are designed for beginning functional strength and core training.

Standing Posture
Neutral Spine Position
Good posture is important. Avoid slouching and forward head position. Maintain the natural curve in low back and align ears over shoulders, hips and ankles.

Trunk Stability
Proper Core Engagement
Lie on your back with knees bent and relaxed. Slowly tighten the deep muscle,
transversus abdominis, which comes across the front of the pelvis (below the belly button). Visualize pulling the hips together. (No movement occurs.) Hold contraction for 10 seconds. Slowly tighten the pelvic floor muscles. (No movement occurs.) Hold contraction for 10 seconds. Both core muscles should work at the same time. When muscles are fully engaged, you should be able to breathe fully and the outer muscles (abs, gluteus, quads) should remain relaxed.

**Strengthening: Stabilization/Core**

Alternate Arm/Leg Reach
Slightly flatten the lower back by tightening abdominal muscles. Hold this position while lifting one arm overhead and opposite leg up. Repeat on other side. Keep breathing normally and do not allow any movement to occur in trunk/spine (only move arms/legs). If unable to stabilize in the trunk, then keep one leg and opposite arm down.

Quadruped Arm/Leg Lift (Alternating)
Kneel on a soft surface to cushion knees. Reach opposite arm and leg out while maintaining neutral spine (do not arch neck or back). Repeat on other side. Perform with prosthesis on.

**Push-Ups**
Start in the down position with hands just wider than shoulders. Keeping knees on the floor (OK to pad with a pillow), straighten elbows while maintaining perfectly neutral spine. If your lower back arches, or if you are unable to keep your head from falling forward, then work from an incline position using a countertop, not the floor. To make it more difficult, work from the toes instead of the knees.

**Stabilization/Core**

Balance Training
Use support for safety, and it's best to start with light toe-touch on non-weight-bearing leg. Engage core muscles while standing on one leg. If able to balance for 5-8 seconds, then increase difficulty. Options: Turn head from right to left and/or look up and down. Rotate upper trunk from right to left. Close one eye/close both eyes. Slowly swing other limb forward/back or out to side.

**Strengthening**

Lateral Balance Reach/Lateral Lunge
Standing at a counter, engage core muscles and reach one leg out to the side while maintaining tall, straight posture in the trunk. Options: Keep body weight over the one leg and reach opposite leg out to the side and lightly toe touch (balance reach) or transfer body to outside leg then return (lunge).

Stand to Sit/Sit to Stand
Engage core muscles and hinge at the hips, keeping spine neutral. It's fine to have feet uneven, especially if there are movement restrictions such as having a fixed ankle.

To sit: Bend knees and lower into a secure chair; don't let gravity win and just plop down into the seat.

To stand: Scoot to front of the seat and place one foot forward. Push down into feet to stand up. Rely on the leg strength with minimal rocking to throw the head forward and back or the arms to push/pull.
Tips To Exercise Safely

- Seek permission from your physician or a trusted healthcare provider regarding your specific guidelines for exercising, especially if you have not been in a consistent exercise routine.

- Incorporate and use your prosthesis throughout exercises when appropriate.

- Stay focused and move with slow controlled movements. Engage your core with every exercise.

- Exercise does not have to hurt to be beneficial. Focusing on proper mechanics while training will carry over to proper movements during daily activities and sports.

- Start easy and build up your effort. Overstressing body tissues (muscles, tendons and ligaments) and joints is often not felt until hours after working out.

- 6-10 reps x 1-2 sets. (If 10 with good mechanics and not fatigued, then do 6 reps x 2 sets. Work up to 2 sets of 10 reps.)

- Exercise at times of the day when you feel your best.

- Exercise should not cause joint pain, but rather muscle fatigue.

- Holding your breath while exercising often results in elevated blood pressure; thus, remember to breathe during each repetition. Counting out loud during each exercise typically facilitates proper breathing.

- Have fun! Being consistent/compliant with an exercise program is essential to positive physical results. Finding an organized program or health fitness professional is highly recommended.