

# Exercises to Improve Balance

Strengthening and functional exercises can help improve balance problems related to an immunodeficiency or autoimmune disease.

By Matthew D. Hansen, DPT, MPT, BSPTS

**THE BAD NEWS** is there isn't always a clear-cut solution to improving balance. This is because a number of factors can contribute to poor equilibrium, including conditions that impact the inner ear and vestibular system; central nervous system involvement (e.g., cranial nerves, the cerebellum and other regions of the brain); neuropathies of the peripheral nerves; genetic and acquired neuromuscular conditions; impaired vision; alterations in blood sugar and/or blood pressure levels; and reduced muscle strength due to deconditioning. Nonetheless, the good news is even though the solution may not be straightforward, just about everyone can develop better balance.

Improving balance often begins with a visit to a primary care physician to investigate the root cause(s) of the issue. Patients should not be afraid to share their own impressions and ask plenty of questions. A good health interview specific to the complaint should be conducted, including asking if/when dizziness or vertigo occurs and whether the patient can describe any possible patterns or contributing factors. The physician should check the patient's heart rate and blood pressure both while sitting and standing to test for orthostatic hypotension. The physician may also conduct some simple balance tests in the office, order medical labs or refer patients for diagnostic imaging or other additional

testing. Patients may want to ask their primary care physician if their community has a specialized balance and vestibular clinic. Many medium and large communities do.

Though exercise is not the most appropriate treatment for some health conditions that affect balance, it can have a significant impact on those whose balance problems are related to an immunodeficiency or autoimmune disease. There are four general types of exercise people can perform at home depending on the source of the problem: strengthening exercises that target a muscle group in isolation, functional exercises, habituation activities and gaze stabilization activities.

This article focuses on only strengthening and functional exercises related to balance. It does not include habituation and gaze stabilization activities that are part of vestibular rehabilitation programs designed to improve symptoms related to inner ear

disorders (e.g., vertigo/dizziness, imbalance, visual disturbances) and secondary symptoms such as nausea and vomiting. Such activities are customized to address a patient's specific problems, and should not be prescribed

without a thorough clinical exam.

The muscle groups most involved in maintaining balance include the ankle musculature, hip and knee extensors, hip and trunk flexors and hip abductors. Three sets of 10 repetitions should be performed of each exercise unless otherwise indicated. If an individual is unable to perform at least six consecutive repetitions of a strengthening exercise, it's too difficult. If a person can easily perform 12 or more repetitions, the exercise is too easy. [See "Exercise for CIDP," *IG Living* magazine, August-September 2010, for more on modifying exercises at [www.igliving.com/magazine/articles/IGL\\_2010-08\\_AR\\_Exercise-for-CIDP.pdf](http://www.igliving.com/magazine/articles/IGL_2010-08_AR_Exercise-for-CIDP.pdf)]

While exercising, remember to use upper-extremity support to increase safety by holding onto a stable surface or handrail for all activities. And, breathe properly by inhaling prior to performing the exercise, and exhaling slowly through pursed lips as the exercise is performed. Take another breath between repetitions.

## Ankle Exercises

The ankle is normally the first part of the body to react when balance is challenged. You can feel this in action by holding onto a stable surface with two hands and then standing on one leg. To maintain balance, you'll likely feel and see your ankle

**Figure 1. Ankle Exercise with Band or Tubing**



teeter back and forth. If you don't, try balancing with just one hand on the surface or without holding on at all, but only if it is safe to do so.

Standing on one leg for up to 10 seconds at a time, three times on each side, is a good way to exercise the ankle musculature. Support can be varied to make it more or less difficult. To exercise the muscles in isolation, you can write the letters of the alphabet with your foot in the air or in a tub of water. A resistive therapy band or surgical tubing can be used to add resistance. Place the looped band around the foot on one end and grasp or loop the other end to stable furniture. Move the foot/ankle opposite to the direction of pull from the band or tubing (Figure 1).

## Hip and Knee Exercises

When the body moves far enough outside of the base of support, ankle movement will not be sufficient to remain upright, and the body will subconsciously attempt to maintain balance using the hips. The hip and trunk flexors help to prevent backward falls, while the hip extensors, dominated by the gluteus maximus, assist with preventing forward falls.

*Hip and knee extension.* The quadriceps muscle group (made up of four muscles) is the primary extensor of the knee. The quads are also partially responsible for flexing the hip. Activity in the muscle group isn't as prominent as in other muscles when balance is challenged, but the quads are key to preventing the knees from collapsing during stance when they are bent even slightly, whether walking or standing still. Together with the hip extensors, the quads are also very important for standing up and stepping up (e.g., climbing stairs).

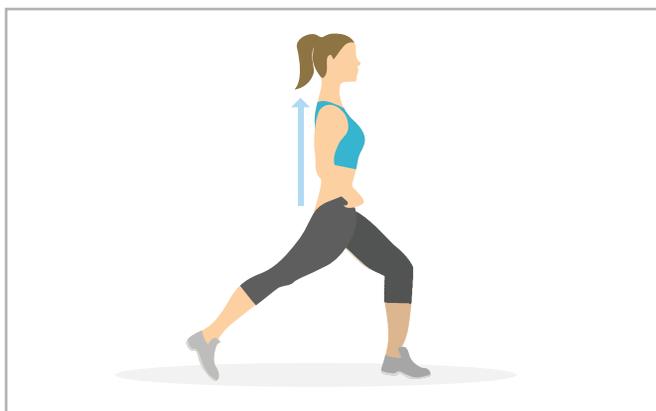
The following activities are good dynamic exercises for knee and hip extensors:

- **Mini-squats:** Stand with the legs shoulder-width apart and slowly bend your knees until they completely eclipse the tip of your toes. If you aren't able to see your toes, position your arms at the side of your body (bent at the elbow to a right angle with closed fists), and bend your knees until they are directly under your fists. It's important to not bend too deeply because of the pressure that is placed on the joints, as well as the risk of going too far and not being able to get back up.

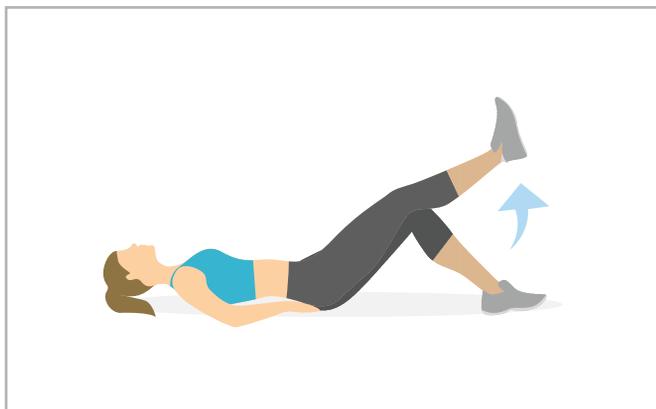
- **Mini-lunges:** To make the exercise a mini-lunge, take a half step forward and shift your weight over the leading leg (Figure 2). Repeat the knee bend to the point that the leading knee eclipses the toes beneath it.

- **Step-ups:** From a standing position below a flight of stairs, step up onto the bottom step and return. Alternate foot leads, so that both sides get a workout.

**Figure 2. Mini-Lunges**



**Figure 3. Straight Leg Raise**



*Hip and trunk flexion.* The rectus femoris of the quadriceps, as well as a number of other muscles, help to flex (or lift) the leg. When the feet are planted on the ground, these muscles help to stabilize the hip and pelvis. If someone begins to fall backward, the trunk flexors can bend the spine forward in an attempt to regain control, but strengthening the abdominal muscles, which are responsible for the action, is not typically a focus of balance programs. Abdominal crunches (*not* traditional sit-ups) are the best way to exercise the abdominals if you do decide to make trunk flexion a part of your regular exercise routine.

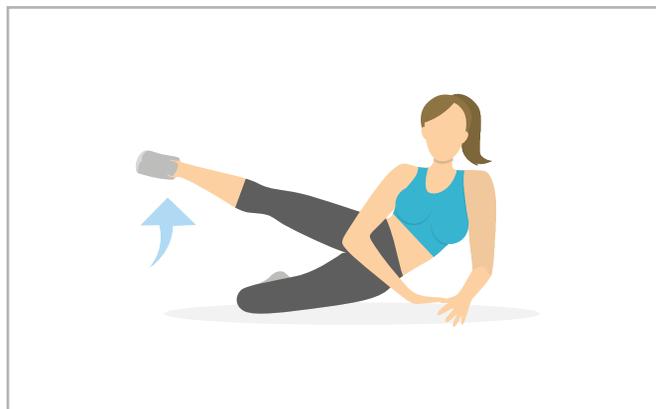
There aren't any great balance exercises focusing on the hip flexors that can safely be performed on one's own. The best activity may simply be walking backward, accompanied by a companion for safety. Walking backward uses the hip extensors to walk, but the hip and trunk flexors are utilized for stabilization. Speed and step length can be varied to make the task more or less difficult.

To exercise the hip flexors in isolation, march in place or perform a straight leg raise by lying flat on your back and raising a straight leg 6 to 12 inches off of the surface (Figure 3). Maintaining a bent knee on the opposite side can help to take strain off of the back.

*Hip abduction.* The hip abductors, highlighted by the gluteus medius (which can be felt over the ball of the hip when they are actively working), are responsible for side-to-side stability. Two of the activities already presented — mini-lunges and step-ups — also exercise the hip abductors. Another great functional activity is side-stepping while holding onto the wall or a countertop for support. Once you've made it down the length of the hallway or countertop, reverse direction so the other leg is leading.

To exercise the hip abductors in isolation, stand at a countertop or lie on your side, slowly lift the leg out to the side and then return to center (Figure 4). When performed while standing, the

**Figure 4. Hip Abduction**



exercise actually works both sets of hip abductors, because while one set is working to move the leg, the other side is stabilizing the pelvis to prevent you from falling over to the side.

### Modifications and Other Functional Balance Activities

All of the static (stationary) or static-dynamic (moving in place) functional activities found in this article can be cautiously modified to challenge balance further and/or to make the exercise more difficult.

It's a common occurrence that many falls happen at night when lighting is absent or insufficient. This is particularly true for those who experience lost or diminished sensation in their lower extremities (feet and legs) associated with neuropathy. When sensation is impaired, sense of sight becomes more important to help orient a body in space. If vision is also impaired, the risk of missteps and falls increases substantially. Hence the importance of sufficient lighting, including use of night lights when getting up to go to the bathroom.

Obscuring vision can also be used as a technique to challenge and train balance further when it's used in a controlled environment. To do so, try closing your eyes while holding onto a stable surface or using a friend or family member to serve as a "spotter" while performing one of the static or static-dynamic activities (mini-squats, mini-lunges, hip abduction or marching in place).

The demands on balance can also be enhanced (with or without eyes closed) by performing the exercises on a compliant surface like a foam pad or pillow. This forces stabilization muscles to work harder to prevent deviations from the body's base of support.

In addition, the following are two higher-level functional balance activities for your consideration:

- **Diagonal stepping (Figure 5):** To perform this activity, place masking tape or Velcro on the floor in the form of a cross to create an area of four equally sized quadrants. Keep the left foot planted in the middle of the cross and take a step forward along the line with the right foot. Return to center with the right foot and take another step, this time to a point midway in the first quadrant. Follow this pattern in a clockwise manner until you have taken a step backward along the tape line directly behind you (i.e., halfway around the cross). Then, switch sides by planting your right foot in the center of the cross, and taking steps clockwise around the rest of the cross with your left foot.

- **Stepping over obstacles:** Set up a line of stacked books (3 to 8 inches tall and spaced 3 to 5 feet apart) down the length of a

**Figure 5. Quadrant for Diagonal Stepping**



hallway so you have a wall to support yourself if you begin to lose balance. Walk slowly down the hallway, trying to alternate your leading foot, as you step over the obstacles in the pathway.

### Better Balance Can Be Achieved

Notably, there is some investigative support to suggest a home exercise program consisting of functional activities is more effective for helping to prevent falls than one that is comprised solely of strengthening exercises that target a muscle in isolation. Considering this, if someone is able to incorporate functional activities into their exercise routine, I would recommend doing so. If there are restrictions on exercising while standing due to safety concerns or increased pain, non-weight-bearing strengthening exercises are a good alternative.

Just about everyone can develop better balance. Proper diagnosis, learning what can be done to make the home environment safer and an appropriately designed exercise program are a good start. ❏

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