Balance Changes after a Stroke

Balance is your ability to hold your body up and keep that position while doing other activities. Your balance keeps you from falling. Balance is controlled in your body by several systems working together sending signals and getting signals from your brain.

A stroke can affect the way these systems work together or how the signals get to and from your brain to cause you to have balance problems.

How does your body control your balance?

There are three systems in your body that work together to control your balance:

- Visual - your eyes and sight
- Vestibular - sensors or receptors in your inner ears
- Somatosensory - body sensors or receptors that make up the information loop

Your eyes and sight let your brain know where you are in your environment. You can see what is around you and how you need to move to be safe.

The sensors in your inner ear let your brain know how your head is moving. This system lets your brain know where your head is in relation to the rest of your body. Is your head centered above your shoulders or leaning to one side? This system also detects changes in the speed of your movement.
**Information Loop**

**Your body sensors** are part of the information loop. These sensors:

- Tell your brain where your legs, arms and trunk are in your environment.
- Send signals so your brain knows where each leg or arm is positioned at any time.
- Tell your brain what direction your limbs and trunk are moving.
- Take in information from your environment. This is sent to your brain so your brain can signal your body parts to tell them how to adjust.

For example, when you stand on sand the sensors in your feet sense the soft, grainy texture of the sand and the sinking of your feet. They send this information to your brain so your brain can tell the muscles in your leg to take the next step in the sand and your trunk to move so you keep your balance.

All of the information from the receptors travels to the brain so the brain can send messages back to your muscles to move in a certain way so that you do not fall. More information about how your muscles move is sensed by the receptors in your limbs and trunk. These body sensing loops or cycles happen over and over in a short period of time.
How is balance changed after a stroke?
A stroke can change your balance because of:

- An injury to one of the systems that controls your balance
- Damage to these system connections to your brain
- Injury to your brain

Some common problems after a stroke that can change your balance.

- If you cannot see clearly, you may not be able to react to what is around you as easily as you did before.
- If you cannot sense where your head or trunk is positioned, your brain may have trouble knowing what signals to send to your muscles to keep your body upright.
- If you cannot feel and sense where your limbs are moving, it is hard for your brain to be sure where to send your limbs for the next step.
- Your brain must be able to take in the information from your environment and develop a plan to adjust your body so you stay balanced. If the part of your brain in charge of this task is injured from a stroke, the information may not get processed well.
- The brain may also have trouble sending the right messages back to your muscles.

How can physical therapy help balance problems?
The parts of the brain or balance system affected by a stroke can be different for each person. Your physical therapist will work with you first to find out which system is injured to develop the right treatment plan for you.

- If you had an injury to your vision, you may need to learn how to scan your environment. You may have to learn to turn your head to make sure what is around you so you don't run into something and fall.
- If your inner ear receptors were damaged, you may need to retrain them to sense your movement and head position. This may involve turning your head from side to side, slowly while staying still in one position.
Then, you can challenge these receptors more by walking around and turning or rotating your head.

- If your body sensing system or information loop was damaged, the therapist will work with you to challenge your balance. By doing this, the receptors are retrained to pick up information. The brain relearns how to interpret the information and forms new movement plans to send out to your muscles to adjust for changes in your balance. These newly learned movement plans, over time, are stored in your brain. With lots of practice, your brain can begin to use the new movement plans in response to changes in your balance.

This balance training can be scary. You may not feel very comfortable with some of the situations you are placed in by your therapist. Know that challenging your balance is a very important part of your stroke rehabilitation. Each therapist is trained to ensure that you are safe throughout your balance training.

Your therapist will also work to stretch and strengthen your muscles. This is done so your muscles are able to complete the movement plan that your brain wants to carry out for your balance.

Talk to your doctor or others on your health care team if you have questions. You may request more written information from the Library for Health Information at (614) 293-3707 or email: health-info@osu.edu.