

# Spinal Cord Injury and Gait Training



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Difficulty walking is very common following a spinal cord injury (SCI). People with an “incomplete” SCI have more potential to regain walking than those with a “complete” SCI, but people with both types of SCI may have gait training included in their therapy plans.

Gait training is practicing walking (also called ambulation) with assistive devices and braces as needed. The following categories are used by health professionals to describe the kind of walking you are able to do.

- **Community:** You are able to walk at home and in the community.
- **Household:** You can walk within the home and use a wheelchair as the primary way to get around in the community.
- **Exercise:** You use a wheelchair in the community and at home, and you walk with assistance once or twice a day for exercise.
- **Non-ambulatory:** You only use a wheelchair for mobility. You may also walk while doing gait training with the therapist in the therapy gym only.

## Why is gait training needed?

A spinal cord injury damages nerve cells and can prevent movement signals from the brain to the muscles. It can also disrupt the signals that do reach the muscles, making the muscles “jump” on their own. Therefore, a SCI can create weakness and spasticity in the feet, legs, hips, and trunk, as well as in the hands and arms. The injury can also damage and disrupt nerve signals for sensation (feeling) so that parts of the body are without sensation or have abnormal sensations, such as burning or tingling. Each of these problems can lead to difficulty walking.

## Is gait training right for you?

A physical therapist (PT) or other clinician will determine if gait training is right for you by using a variety of tests. He/she will test your strength, sensation, ability to stand up, balance while standing, spasticity or stiffness, and range of motion at your hips, knees, ankles, and trunk. If you are able to take some steps, the clinician will watch you walk to look for safety issues.

The clinician may also provide you assistive devices and/or braces to give you better balance, protect your joints, and ensure your safety as you walk. He/she may then test your walking speed, endurance, and balance with these devices and braces to keep track of your therapy progress.

Gait training can require a lot of work and be a long process, so it is important for your PT or other clinician to tell you what you can expect. Some

people with SCI work on balance and other “pre-gait” activities many times a week for over 6 months before they start actual gait training (involving walking). Gait training may not be appropriate early in your recovery, but it may be at a later point when you are stronger and have better balance.

## Gait training treatment options

### Early Gait Training

You may take your first steps after the SCI using a variety of equipment including parallel bars, a pool, or a body-weight support device. A body-weight support device lifts part of your weight through a harness you wear as you try to take some steps. Some of these devices roll on the ground and some are placed over a treadmill. Your therapist, a therapy team, or a robotic-device may help with your balance and stepping movements. It is very beneficial to be upright and moving as soon as your doctor says it is OK.

### Later Gait Training

Depending on your SCI, your therapist may begin to work with you on the ground without a body-weight support device or parallel bars. You may also be given assistive devices and/or braces to improve your balance and help you walk safely. A device may be more or less appropriate depending on your strength and balance. It is helpful to experiment with different assistive devices and braces to find what is right for you.

### Assistive devices may include:

- special walkers that have safety straps at your hips and trunk
- a standard walker with no wheels on the legs
- a rolling walker (walker with 2 wheels on front legs), if your balance is a little better
- a rolling walker with forearm platforms, if you have weak arms
- a rollator walker (walker with 4 wheels and a basket), if you have good enough balance to walk in the community

- one or two forearm(or “Loftstrand”) crutches, if you have better strength and balance, but a weak grip
- one or two quad canes with four tips at the bottom, if you have pretty good strength and balance and at least a fair grip
- one or two straight canes with a single tip at the bottom, if you only need a little help with your balance and have a good grip

If you are able to use crutches and canes, you will likely start with two, using one in each hand. Sometimes you will train with a crutch or cane in only one hand to be able to use your other hand to carry things, open doors, etc. However, you should be careful when using only one crutch or cane. Many people who use a device in only one hand tend to lean on it too much and develop a limp to that side. Using a device in each hand helps to keep your posture straight and your steps even.

### Braces

Braces can have many benefits such as the following:

- Protecting weak joints and preventing knee hyperextension by keeping your joints in the proper alignment as you put weight on them during walking.
- Reducing the risk of falling by helping to keep your knee straight and your toes up as you take a step.
- Increasing your walking speed and how long you are able to walk.

### Types of braces:

- ankle-foot-orthosis (AFO)
- knee-ankle-foot-orthosis (KAFO)
- hip-knee-ankle-foot-orthosis (HKAFO)
- floor reaction orthosis for people with knees that buckle
- supra-malleolar orthosis (SMO) at just the ankle to keep you from “turning your ankle”

Braces may be made of plastic and metal, just plastic, or carbon fiber. They may be “off-the-shelf” pre-made braces, or they may be custom made by an orthotist to fit you. Some newer ankle-foot-orthosis designs, such as the lateral strut braces, try to fit more people with a more versatile and open pre-made shape.

It is recommended that you get evaluated by your therapist or orthotist to determine the best brace for you, especially if you cannot feel where the brace will go.

Always be sure you check your skin before you put the brace on and after you take it off, looking for reddened areas on your skin or open wounds. If the brace has caused a pressure sore, do not wear it again until your therapist or orthotist can modify it for you.

### Body-weight support device

If you are eventually able to walk with assistive devices or braces, you may still continue gait training on a body-weight support device to help increase your speed and improve your balance and the timing, coordination, and symmetry of your steps. This is performed without using walking devices or braces. You will receive verbal instructions and manual assistance from your therapist and team. All levels of gait training activities can be practiced safely in the harness of these devices, because you cannot fall.

Transferring what you have practiced in the harness to the ground is very important. Assistive devices and braces may still be required to protect your joints and prevent you from falling while transferring to the ground.

Continued gait training with your therapist will hopefully improve your balance and strength so that you can rely less on devices or braces.

### Will gait training be effective for you?

The ultimate goal of gait training is to be able to walk in any community environment without assistive devices or braces, but many people will still need one or the other, or both.

Every individual makes progress in therapy at their own pace. Some people may learn to walk

well in a few months, and others may take years. Still others are unable to progress beyond just walking in therapy.

### Safety

If you experience falls while walking with or without assistive devices, be sure to tell your health professional as you may need different walking supports and/or more training. People with SCI can have fragile bones due to lack of physical movement, so falling can cause broken bones. Preventing falls is a top priority during gait training and walking in the community.

### Outcomes of Gait Training

The ability to walk after a spinal cord injury depends on many factors including your:

- level of injury
- severity of injury
- time since injury
- age
- level of fitness
- other injuries
- level of sensation
- other related problems such as spasticity and joint problems (contractures)
- level of pain

Therefore, it is difficult to predict if a person with SCI will regain walking abilities.

Looking at severity of injury as a factor, the following numbers show the percentage of people in a study who walked with some kind of assistive device and/or braces but no physical assistance from another person, at the time of discharge from inpatient rehabilitation. The ASIA Impairment Scale (AIS) classification level was made when patients were admitted to the hospital.

Proportion of people with SCI who walked at inpatient discharge with devices/braces and without physical assistance:

- ASIA A (motor and sensory complete): 6.4%
- ASIA B (motor complete, sensory incomplete): 23.5%
- ASIA C (motor and sensory incomplete, generally weaker legs): 51.4%
- ASIA D (motor and sensory incomplete, generally stronger legs): 88.9%

Those with the most severe, “complete” SCIs may experience that walking with their assistive devices and braces is very difficult and slow. They often decide to use a wheelchair to maneuver quickly and efficiently through their daily lives, and practice walking with devices and braces for exercise only. Regarding level of injury, those with a complete injury level below T11 have greater potential to walk in the community while using devices and braces.

People with incomplete SCIs have greater potential than those with complete SCIs to regain function and walking. Those with the “incomplete” injuries Brown-Séquard Syndrome (left or right half of the spinal cord is injured) or with Central Cord Syndrome (the arms are more affected than the legs) have the greatest potential to regain walking. People with SCI who have more accurate sensation also have a better chance of walking.

## Resources

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## Disclaimer

This information is not meant to replace the advice from a medical professional. You should consult your health care provider regarding specific medical concerns or treatment.

## Source

Our health information content is based on research evidence whenever available and represents the consensus of expert opinion of the SCI Model System directors.

## Authorship

SCI & Gait Training was developed by Leslie VanHiel, BME, MSPT, CCRC., in collaboration with the Model Systems Knowledge Translation Center.