

Bone Loss After Spinal Cord Injury

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www.msktc.org/SCI/factsheets

SCI Factsheet

This factsheet explains how and why people with SCI lose bone, the risks of thinning bones, also known as osteoporosis, and what you can do to reduce your risk of bone loss.

What you need to know

Low bone density occurs when the body loses too much bone. This causes weak bones that are easier to break. Bone loss can occur immediately after spinal cord injury (SCI) and can continue rapidly for several years after the injury. The medical term for low bone density is osteoporosis (pronounced ah-stee-oh-por-OH-sis).

How common is bone loss for people with SCI?

- Bone loss occurs in almost everyone with SCI. This starts immediately after injury and is most severe during the next 2 years. However, bone loss continues (at a slower rate) for the rest of your life. It is unknown why bone loss is so rapid and severe in the first 2 years after injury or why bone loss slows after this point.
- Bone loss occurs in all parts of the skeleton below the level of injury. The amount of bone loss generally depends on how much motor function still exists below the site of the injury. Less function is associated with greater bone loss. This means that people with very high-level injuries usually also have bone loss in their arms and wrists. However, broken bones happen most commonly just above or below the knee (lower third of the femur and upper third of the tibia).



Why does bone loss happen to people with SCI?

- One cause of bone loss is a lack of weight-bearing activity, such as walking, which may not be possible for many people with SCI. However, bone loss after SCI occurs at much greater rates than other situations where people are not able to do weight-bearing activities, such as extended bed rest or during space flight. Paralysis is likely the reason for this, although no one completely understands why paralysis leads to so much bone loss. Possible reasons include:
 - Weight-bearing activities like walking cause muscles to “pull” on bones, making them stronger. The lack of this “pull” results in less stimulation of bones, and can lead to bone loss.
 - Bone loss may be made worse by changes in hormones produced by the body, which can occur after SCI. Similar rates of bone loss also can be seen in older adults and women who have gone through menopause.
 - Bone loss may be made worse by the use of certain medications such as drugs to treat seizures (for example Dilantin or Phenytoin) or blood thinners (for example Warfarin or Coumadin, both commonly used in SCI).
 - The spinal cord injury disrupts signals traveling to and from the brain that may be needed to maintain bone mass.

The Spinal Cord Injury Model System is sponsored by the National Institute of Disability, Independent Living, and Rehabilitation Research, U.S. Department of Health and Human Services' Administration for Community Living. (See <http://www.msktc.org/sci/model-system-centers> for more information).

What are the risks for bone fracture after SCI?

- Fracture risk increases with time since injury. About half of all people with SCI who have been injured for 10 years or more will have a bone fracture at some point after their injury.
- People with neurologically complete injuries—people without sensory or motor function below the level of injury—are at even greater risk for a fracture.



What activities can cause a bone fracture?

- Most fractures occur during wheelchair or bed transfers, usually by twisting or catching a leg or foot when moving from one location to another.
- Fractures can be caused by falls from a wheelchair or when a foot gets caught on the ground or on a front wheel while using a wheelchair.
- In more severe cases, even simple movements, such as stretching, dressing, or rolling over in bed, can cause a fracture. When bones break with little or no trauma, this is called a fragility fracture.
- Fractures also can occur when someone is helping you do an activity or holding you a certain way.

How will I know whether I have a fracture?

- Warning signs of a fracture include hearing a loud snap during ADL and mobility activities.
- There may also be redness and swelling near the site of a fracture and a low grade fever may develop.
- People with an injury above the T6 spinal cord level may experience autonomic (pronounced o-te-na-mik) dysreflexia (pronounced dis-re-FLEK-see-ah), a condition characterized by a sudden rise in blood pressure due to pain or discomfort that can result in a headache, flushed face, sweating, and a stuffy nose. This is not a complete list of the symptoms associated with autonomic dysreflexia—for more information see the MSKTC Factsheet on Autonomic Dysreflexia.

How are fractures treated?

- Fractures are usually treated with bed rest alone or a combination of bed rest and bracing of the affected limb to limit movement while the fracture heals. Surgery may be required in some cases. Fractures may not heal as well in people with SCI.



Can bone fractures cause other health problems?

- Medical complications can occur with fractures, including delayed healing of the fracture, pressure injuries (also known as pressure sores) from bracing and/or bed rest, bone infection of both fractures due to bacteria in the blood or nearby tissue, decreased range-of-motion, contractures (abnormal shortening of muscles), muscle spasticity and decreased mobility.
- Other complications include spasms, pain, autonomic dysreflexia, and abnormal build-up of calcium in the soft tissue around the fracture site.

What can I do to treat bone loss and minimize the risk of having a fracture?

There are many things that people with SCI can do to help reduce the amount of bone loss and the risk of fractures.

- Bone density (DXA) scans: Bone density can be measured using dual-energy x-ray absorptiometry (DXA) scans. DXA is useful for assessing fracture risk in people with SCI and seeing how well bones respond to treatment. Knowing the amount of bone loss is very important to clinical care providers who are considering prescribing activities that could potentially increase the risk of fracture.

- Calcium and Vitamin D: It is important for people with SCI to make sure they have plenty of calcium and vitamin D in their bodies. You may need to increase your intake of calcium in your diet or take calcium and vitamin D supplements. Ask your doctor about taking supplements and ask to have your vitamin D level checked through a simple blood test.
- Bisphosphonates (pronounced bis-FOS-fone-ayts): Bisphosphonates, such as zoledronic acid or alendronate, are used to treat bone loss in people with SCI. Drugs in this class slow down bone loss and may reduce fracture risk in the general population. We do not yet know if these drugs can help reduce fracture risk in people with SCI.
- More recently, a drug called Denosumab (deh·naa·suh·mab) has been shown to reduce bone loss in people SCI.
- Rehabilitation: Rehabilitation treatments that focus on stimulating paralyzed muscles to contract and encouraging weight-bearing can help. They can involve passive (tilt-table or standing frame) or active (walking, rowing, cycling) exercises, and electrical stimulation. However, passive rehabilitation exercises do not prevent dramatic bone loss after acute SCI in those who are more severely paralyzed and who cannot bear weight. DXA is recommended prior to initiating weight-bearing therapies.
- Self-care: It is important to be extra cautious when performing everyday activities, such as transfers and using your wheelchair, where you could catch a foot on a door, the ground, or the wheelchair itself. It is also important to watch for any signs of redness and swelling, particularly around the knee, since this may be a sign of a bone fracture. Let your doctor know right away if you think you may have a fracture so that you can have an X-ray to identify and appropriately treat a possible fracture.
- Other risk factors: The heavy use of alcohol may increase the risk of fracture in people with SCI. Alcohol may affect bone density, but drinking can also affect coordination or increase risk-taking behavior. Smoking associated with bone loss in the general population and smoking may also worsen bone loss in people with SCI.



Talk to your doctor about your risk of bone loss after SCI and how to best protect yourself from fractures.

Authorship

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