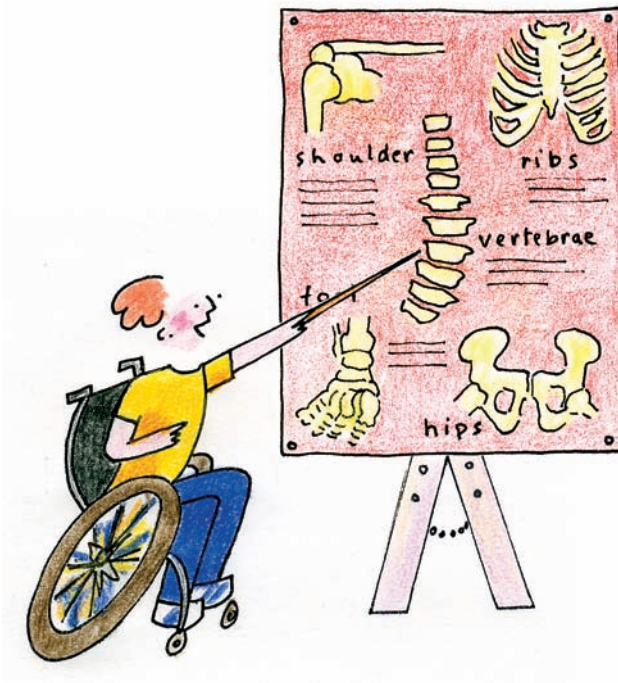
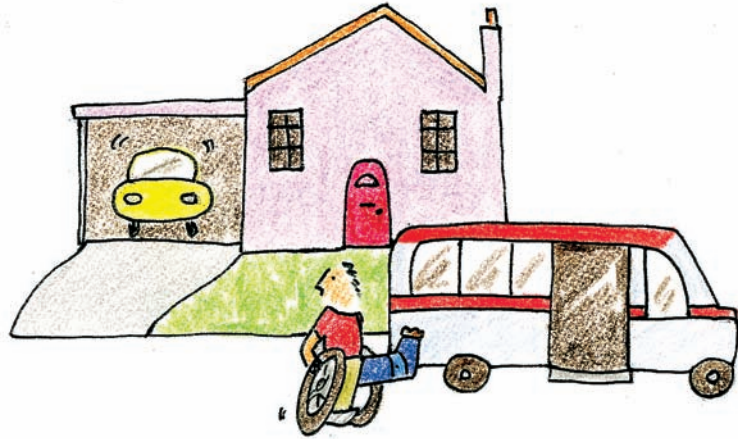


Your Bone Health

Healthy Living after Spinal Cord Injury





Ninety-eight per cent of men and women with a spinal cord injury will lose some bone mass after their injury, placing them at risk of developing osteoporosis.

This booklet will help you understand: what osteoporosis is; how osteoporosis affects someone living with a spinal cord injury; common risk factors for osteoporosis; how to find out if you have osteoporosis; how to prevent osteoporosis; some available treatments; and where to get more information about osteoporosis.

What is osteoporosis?

Osteoporosis is a bone disease in which bone mass or density and strength decline, leaving bones fragile and more easy to break. Ninety-eight per cent of men and women with a spinal cord injury will lose some bone mass after their injury, placing them at greater risk of developing osteoporosis. Most people will discover that they have osteoporosis after they break a bone. Although osteoporosis most commonly affects women over the age of 50, the disease can develop in men and women with a spinal cord injury at any age.

People with a spinal cord injury who need a wheelchair to get around are at greatest risk for breaking their legs due to osteoporosis. However, individuals with a spinal cord injury who walk may also develop osteoporosis and be at greater risk for breaking their leg.

How does bone develop?

During your childhood and into adulthood your body builds bone. As a result, your bones become thick and dense. For women, peak bone mass is reached at about age 20; for men, age 25. Starting at about the age of 40, women and men slowly begin to lose bone mass as part of the aging process. By the time you are 70 years old, your bones will have lost about one-third of their density.

Your body continually builds and breaks down bone through a process called bone remodelling. This process has two phases: resorption and formation.

This ongoing cycle of removing old bone (resorption) and replacing it with new bone (formation) is what keeps your bones healthy and strong throughout your lifetime. As long as your body completely replaces the bone it removes, your bone strength remains unchanged. When old bone is removed faster than new bone is made, bones become less dense and can break more easily.



The picture on the left shows the difference between healthy bone and osteoporotic bone. The healthy bone is thick and dense with a solid structure. The osteoporotic bone is weak in structure and can break more easily.

What happens to my bones after spinal cord injury?

Most men and women with a spinal cord injury will lose up to 30 per cent of their bone mass within the first year of their injury. The degree of loss of bone mass varies with the duration and severity of spinal cord injury.

Most people with a spinal cord injury develop low bone density of their hips, knees and ankles. Those who develop osteoporosis are at an increased risk of breaking their leg. This risk increases the longer you live with your injury; most fractures occur 10 or more years after injury.

What are the most common causes of fractures after spinal cord injury?

The most common causes of fracture after a spinal cord injury are rolling in bed or transferring from your wheelchair into a car. Any time your feet are planted and your hips are turning can create enough stress on your knees to cause a fracture.

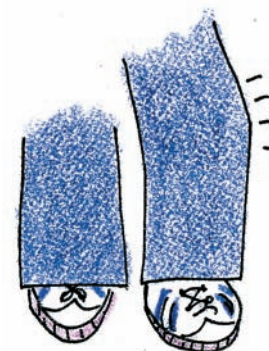


The picture shows the three most common fracture sites for people who develop osteoporosis after spinal cord injury:

1. *The thighbone just above the knee;*
2. *The shinbone just below the knee and;*
3. *The mid-thigh.*

Why should I care about fractures?

Living with a spinal cord injury can be challenging. Routine tasks like bathing and getting dressed can take a lot of time and use up a lot of your energy. Breaking your leg, for example, will only increase the challenges that you face every day.

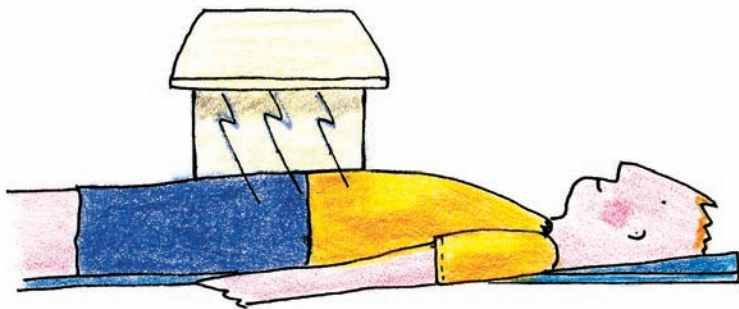


Most fractures take three to six months to heal. If you are normally independent, you may have to rely on the assistance of personal support workers while you heal. A fracture may prevent you from working, driving, or participating in leisure activities. Your limited activity may lead to deconditioning. You may also develop a pressure sore from the cast.

How can I tell if I have osteoporosis?

Osteoporosis is often called "the silent thief" because loss of bone density occurs without symptoms. Most people do not know that they have osteoporosis until after they break a bone. Knowing your risk factors and undergoing a bone density test are the keys to diagnosing osteoporosis.

A bone density test can determine whether or not you have osteoporosis. Results will also provide your physician with an indication of how likely you are to develop a fracture in the future. Like any other diagnostic test, a physician must refer you for a bone density test. This test provides a reading of how dense your bones are compared to the peak bone mass of young people of the same gender. A score of less than -2.5 indicates that you have osteoporosis and that you are 10 times more likely to have a fracture compared to someone of the same age and gender who does not have a spinal cord injury.



A bone density test is safe, painless and takes about 45 minutes to complete. During the test you lie on a padded table while the machine scans your lower back, hips and knees. The area where we expect the greatest loss of bone mass to occur in

people with a spinal cord injury is the knee. At this time, only two centres have the ability to do knee scans: Toronto Rehab's Lyndhurst Centre and Hamilton Health Sciences' Chedoke Site.

If you have a spinal cord injury, you should have a bone density test every year, whether or not you have been diagnosed with osteoporosis.

What can I do to reduce the risk of developing osteoporosis?

There are many risk factors that play a role in the development of osteoporosis. Some factors you cannot change, but other factors you can.

Check the lists below to see which risk factors you have. Risk factors in blue are the most common in people with spinal cord injuries.

Risk factors you cannot change:

- **Spinal cord injury**
- **Wheelchair mobility**
- **A prior fragility fracture**
- **Family history of osteoporosis or a family member with a hip or wrist fracture**
- **Caucasian or Eurasian ancestry**
- **Post menopause (women only)**
- **Gender – women are at greater risk of developing osteoporosis**
- **Low testosterone (men only)**

- Long-term (more than three months) use of prednisone
- Hyperthyroidism
- Parathyroid disease
- Celiac disease or Crohn's disease
- Rheumatoid arthritis
- Prolonged use of anti-seizure medications
- Removal of the ovaries without hormone therapy

Risk factors that are preventable:

- A diet low in calcium
- Body weight less than 57 kg or 125 lbs
- Low vitamin D
- Lack of weight-bearing exercise
- Smoking
- Drinking too much caffeine (consistently more than three 8-ounce servings a day of coffee, tea or cola)
- Drinking too much alcohol (consistently more than two drinks a day)
- A diet high in salt

The more risk factors you have, the greater your chances of developing osteoporosis. If you have at least four risk factors, you are at high risk for osteoporosis.

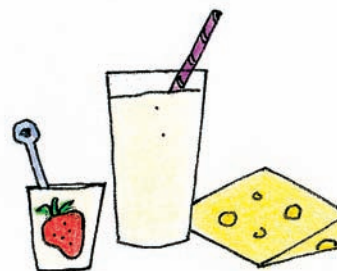
What can I do to reduce my risk of developing osteoporosis?

Follow these nine steps to prevent or reduce your risk of developing osteoporosis:

I. Eat a well-balanced diet with calcium-rich foods

Calcium is a mineral important to the formation of strong healthy bones. Ninety-nine per cent of the calcium in your body is in your bones. Calcium also keeps your heart, nerves

and muscles healthy. If your body does not absorb enough calcium from the foods you eat, your body will take the calcium from your bones in order to get the amount it needs, resulting in loss of bone mass.



Toronto Rehab's standard of care for osteoporosis after spinal cord injury is 1000 mg of calcium daily.

Common Foods	Portion	Calcium Content
Milk—2%, 1%, skim, chocolate	1 cup / 250 ml	300 mg
Cheddar, Edam or Gouda cheese	1 1/4 inch / 3cm cube	245 mg
Yogurt – plain	3/4 cup / 185ml	295 mg
Canned salmon with bones	1/2 can / 105g	240 mg
Fortified orange juice, rice or soy beverage	1 cup / 250 ml	300 mg

If you find it hard to eat the recommended amounts of calcium-rich foods, your doctor may recommend calcium supplements. Too much calcium can cause constipation, bladder stones or kidney stones. Talk to your doctor, pharmacist or dietician about your calcium intake.

2. Get enough vitamin D3



Vitamin D3 helps your body absorb calcium from the foods that you eat. Your body can produce vitamin D3 by being out in the sun, but often this is not enough. If you do not get enough vitamin D3, you can lose bone mass because your body is unable to absorb all of the calcium that it needs.

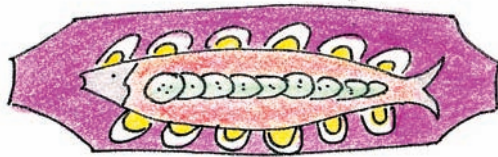
Toronto Rehab's standard of care for osteoporosis after spinal cord injury is 800 IUs of vitamin D3 daily during the winter months and 400 IUs of vitamin D3 daily during the summer months.

Milk fortified with vitamin D3 contains 100 IUs

per 250 mL glass. Vitamin D3 is only found in a few foods.

Margarine, eggs, chicken livers, salmon, sardines, herring, mackerel, swordfish and fish oils (halibut and cod liver oils) contain small amounts of vitamin D3.

Since it is hard to get enough vitamin D3 from food alone, you may need to take supplements. Too much vitamin D3 can cause heterotopic ossification — the development of bone in soft tissues around a joint, usually the hip. Talk to your doctor, pharmacist or dietician about vitamin D3.



3. Decrease your alcohol consumption

Alcohol consumption should be limited to a maximum of two drinks a day.



4. Decrease your caffeine consumption



Caffeine consumption should be limited to three 8-ounce servings a day. This includes coffee, tea, hot

chocolate and cola. Caffeine increases the amount of calcium excreted in your urine, resulting in your body absorbing less calcium.

5. Stop smoking

Nicotine harms bone-building cells.



6. Exercise regularly

An active lifestyle is an important factor in maintaining bone health. The types of exercise most beneficial for preventing or treating osteoporosis are weight-bearing and resistance exercises. You should exercise three times a week for 30 minutes without pain.

Weight-bearing exercises are those that involve your bones and muscles working against the force of gravity. These include standing, walking, dancing, and horseback riding.

Resistance exercises involve moving objects or your own weight to create resistance. This may be done through the use of hand-held weights, weight-training machines, exercise bands, biking, seated aerobics, swimming, or other wheelchair sports.

For more information refer to the SCI and Standing Devices booklet available from Toronto Rehab.

7. Talk to your doctor

A number of prescription medications are used to treat osteoporosis. The primary aim of these medications is to maintain bone mass and reduce your risk of fragility fracture.

Bisphosphonates are prescription medications that attach permanently to the surface of the bones and slow down the activity of cells that break down bone. This allows the bone-building cells to work more effectively. Bisphosphonates are available in a daily or weekly pill, or intravenous form.

Calcitonin is a hormone found naturally in our bodies. Calcitonin slows down the cells that break down bone, allowing bone-building cells to work more effectively. A manufactured form of calcitonin is available by needle or nasal spray.

Parathyroid Hormone (PTH) increases the activity of bone-building cells. This activation generates new bone faster than old bone is broken down. A manufactured form of PTH is available through injection.



Speak to your physician to assess the risks and benefits of each treatment option before choosing the best treatment for you.

No matter what therapy you choose, remember that a healthy lifestyle and a diet rich in calcium and vitamin D are required to maintain healthy bones.

8. Check your hormone status

For women only:

Estrogen helps to build and maintain bone density. During menopause, a woman's estrogen level decreases and leads to a loss in bone mass.

Selective estrogen receptor modulators (SERMs) are a family of non-hormonal prescription medications that act like the hormone estrogen in some parts of the body, such as the bones and heart. They come in pill form.



Hormone replacement therapy (HRT) can be used to help supplement the hormones estrogen and/or progesterone to the lowest level required to prevent bone loss. HRT medications are available in a pill, cream or patch form.



Many young women will miss their period or have irregular periods for the first year after spinal cord injury. If you are a premenopausal woman and have not had a blood clot, your doctor may prescribe a birth control pill to help make your bones stronger and more dense.

For men only:

Testosterone helps to build and maintain bone density in men. Testosterone levels can drop gradually in men with aging. Low levels of male hormones or hypogonadism can put men at risk of osteoporosis at any age. Androgen replacement in men improves sexual function, mood and bone mass and decreases body fat. Testosterone replacement is available in a gel, pill or patch.

9. Learn more about osteoporosis

Osteoporosis Society of Canada

www.osteoporosis.ca

Toronto Chapter Phone: 416-696-2663 ext. 275

Canada's Physical Activity Guide

www.phac-aspc.gc.ca/pau-uap/paguide

Canadian Health Network

www.canadian-health-network.ca

International Osteoporosis Foundation

www.osteofound.org

Canadian Council of Food and Nutrition

www.ccfm.ca

Osteoporosis and Related Bone Diseases: National Resource Center (US) www.osteoporosis.org

Wheelchair accessible bone density tests for people with spinal cord injuries are available at:

Toronto Rehab, Lyndhurst Centre

520 Sutherland Drive, Toronto, Ontario M4G 3V9

Bone Density Lab, Room B5

Phone: 416-597-3422 extension 6357

Fax: 416-422-1981

Hamilton Health Sciences, Chedoke Site, Wilcox Building
Sanitorium Road

Hamilton, Ontario L8N 3Z5

Phone: 905-521-2100 extension 7748

Fax: 905-521-2621



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