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Osteoporosis Canada
Ostéoporose Canada

October 2015

body & bones

Up close & personal

healthy bones | strength to last a lifetime

Bones are alive

Though it may not seem like it, bone is living tissue. It is continually being renewed through a process called *remodelling*, in which old bone is broken down and replaced with new bone. Between 10 and 30% of skeletal bone is replaced each year.[1]

Along with calcium, vitamin D and other bone-building nutrients—most of which are abundant in milk products—physical activity is essential for healthy bone remodelling. Bone tissue responds to appropriate nourishment and physical activity by becoming denser and stronger.

Bone building begins when we are very young and continues into our tween and teen years. By our late teens, the body will have built up about 90% of its lifetime bone mass.[2] During these years, physical activity and a bone-healthy diet are essential to ensure that young bodies build the best bones possible. It is important to work at maintaining this bone mass throughout adulthood.

The tween and teen years are a time when consumption of milk products tends to drop, which means kids this age may not be getting enough calcium and vitamin D during this critical time in their life.

Statistics Canada research has shown that 61% of teenage boys and 83% of teenage girls don't consume the recommended amount of milk products.[3]

Girls also tend to become less active at this age which may potentially cause problems later in life.

Bones need calcium

Bone mineral density is a measure of the strength or compactness of bone tissue. It reflects the strength of bones in terms of their calcium content and can be measured using a specialized X-raying technique called dual energy X-ray absorptiometry (DXA).

As we age, the two kinds of cells that maintain bone density become less efficient.[4] We also begin to absorb calcium less effectively. For those of us with fairly healthy bones, consuming enough calcium can help balance the remodelling process. In fact, studies of older adults show that getting enough calcium can slow bone loss and reduce the risk of fractures.[2]

In general, women have less bone mass than men. Moreover, at menopause, they may lose two to three percent of their bone tissue every year. This is why women are at greater risk of developing osteoporosis than men.[5] Men, meanwhile, increasingly lose bone mass from the age of 65.[6]

By approaching adulthood with strong, dense bones and by minimizing bone loss during adulthood, we may decrease our risk of developing osteoporosis and osteoporotic fractures later in life.

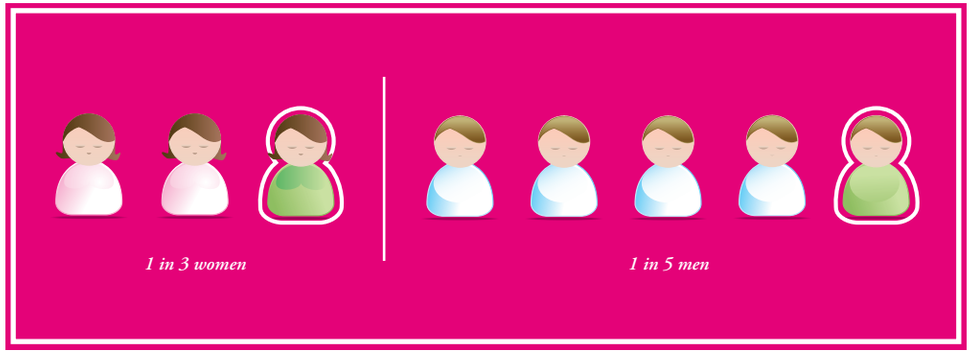
actively preventing

What is osteoporosis?

Osteoporosis is a condition that develops when bone tissue and key bone minerals (like calcium) are lost faster than they are replaced. Bones become so weak and brittle they can easily break. In extreme cases, even a simple hug or sneeze could result in a fracture.

osteoporosis

At least one in three women and one in five men will suffer a broken bone from osteoporosis during their lifetime.[5]



Reducing the risk

Reducing the risk of osteoporosis is a lifetime process. It is never too early (or too late!) to start taking care of our bones. While genetics play a large role in determining how dense our bones are, lifestyle is also important.

Regular physical activity and a balanced diet rich in calcium, vitamin D and adequate protein are essential to building and strengthening bones and thus reducing the risk of osteoporosis. Smoking and/or too much alcohol, salt or caffeine can have a negative impact on bone health, especially when accompanied by a low calcium intake.

active living | a key element of bone health

In combination with a calcium-rich diet, our bones need a lifetime of regular physical activity to maintain their strength. Regular exercise helps the body store calcium in bones.

Weight-bearing activities (i.e., those we do on our feet such as brisk walking, skating, dancing, hiking and aerobics) are ideal. Start-and-stop activities like tennis or badminton give our bones added beneficial challenges.

Find activities you enjoy and make active living a pleasurable part of your everyday life! Have fun being active with your friends or family.

And remember, every little bit counts:

- Take the stairs instead of the elevator
- Get off the bus a stop early and walk the rest of the way
- Take a brisk walk with a friend or colleague
- Play with the kids

Bones respond to the challenge of carrying a load, such as your body weight, by becoming stronger.

Resistance-strength training strengthens muscles in specific areas. Strong muscles tugging on bone stimulates bone strengthening. Lifting, whether it's a bag of groceries or a child, is just as effective as lifting weights when it comes to keeping bones strong.

Activities that improve flexibility, posture and balance such as yoga, tai chi and Pilates exercises can reduce the risk of falling, which is particularly important later in life. They can make it easier to do daily tasks and will likely reduce the risk of injury. If you are middle-aged or older, consult a doctor before starting any exercise plan to make sure it's right for you.

Individuals who have osteoporosis or who are at risk of fracture should also consult a kinesiologist. It is important to be careful performing activities that involve twisting or bouncing. If you are planning to attend an exercise class, verify that the instructor has had training leading classes for people with osteoporosis to ensure that the program will be safe for you.

The latest evidence suggests that for those with osteoporosis or a spine fracture, weight-bearing activity may not be enough. Strength and balance training are very important.[7]

your whole body counts

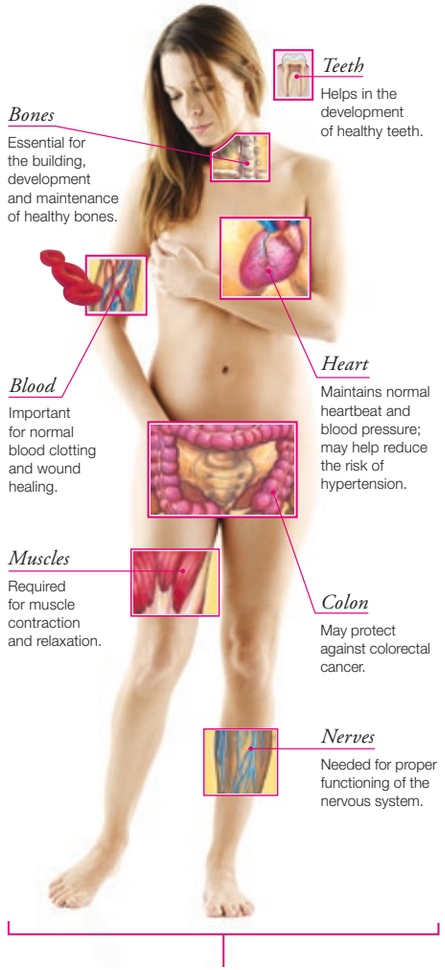
Calcium for life

The human body contains more calcium than any other mineral. About 99% is found in bones and teeth. The other 1% circulates in the blood where it supports life-sustaining functions such as maintaining normal heartbeat, nerve transmission, blood clotting, and muscle contraction.

Just about every cell in the body counts on calcium. Milk products are a nutritious source of calcium.

Always in demand

For the body to function properly, the level of calcium in our blood must stay fairly constant. The body can't make its own so calcium must be consumed every day. If not, our blood will "steal" calcium from our bones to maintain a normal blood calcium level. That's why a diet rich in calcium is so important, particularly when bones are growing and developing.



How calcium helps your body

on calcium

You can bank on it

Think of your bones as a "bank" in which your body can store calcium. If your diet is low in calcium, the body *withdraws* the calcium it needs from bones to keep blood levels normal. When your diet is rich in calcium, *deposits* are made in the "calcium bank". If calcium withdrawals exceed deposits, bones may begin to weaken and become more susceptible to breaking. That's when osteoporosis and the serious problems associated with it can result.

The best sources of calcium

While it's true that calcium is found in other foods, trying to actually meet our calcium needs without milk products can be quite a challenge.

Calcium content of some common foods[8]

Food	Portion	Calcium (mg)
Cheese, Cheddar	1½ oz | 50 g	**360**
Milk | whole, 2%, 1%, skim, chocolate or lactose-reduced	1 cup | 250 mL	**300**
Sardines with bones	2½ oz | 75 g	**286**
Cheese, Mozzarella	1½ oz | 50 g	**269**
Flavoured yogurt | 2-4% MF	¾ cup | 175 g	**227**
Salmon with bones | canned	2½ oz | 75 g	**208**
Bok choy | cooked	½ cup | 125 mL	**84**
Almonds	¼ cup | 60 mL	**79**
Kale | cooked	½ cup | 125 mL	**49**
Kidney beans | cooked	¾ cup | 175 mL	**46**
Broccoli | cooked	½ cup | 125 mL	**33**

more about calcium

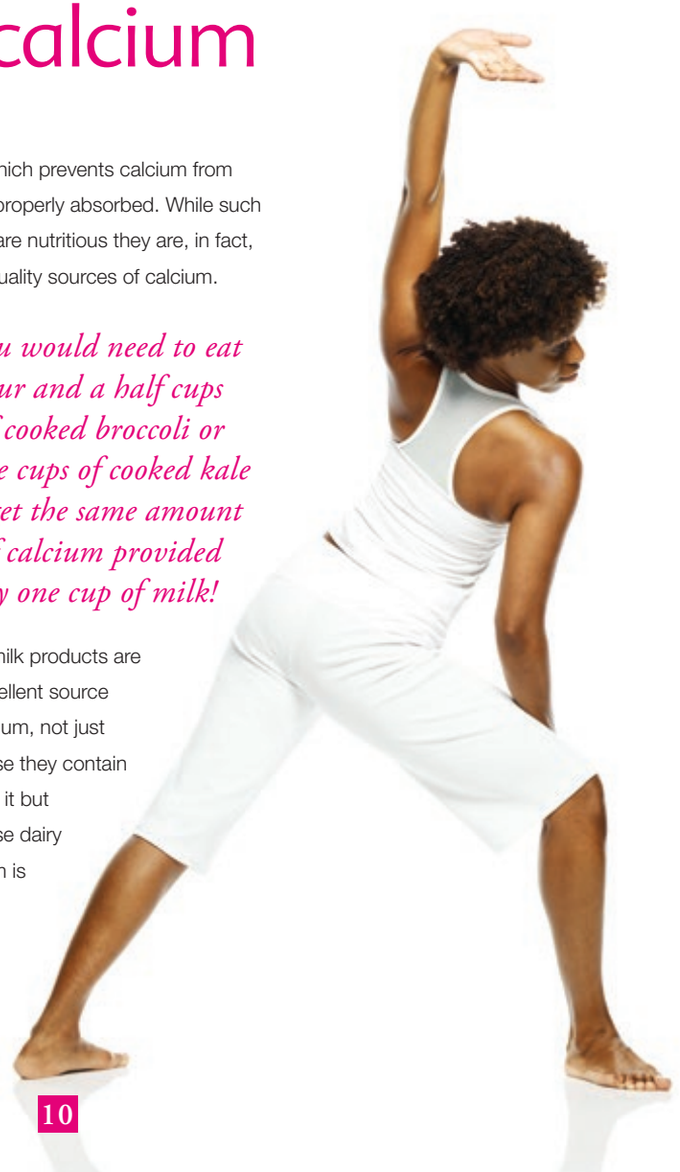
Calcium absorption

How well our bodies absorb calcium depends on a number of things, for example: our individual calcium needs, how much calcium we consume, and most importantly, how much we're absorbing from foods we eat. Calcium from foods such as milk, cheese or yogurt is well absorbed; so is calcium from broccoli and kale.

However it would be very challenging to meet all of our calcium needs from green vegetables as the amount they contain is relatively small and, in many cases, much of the calcium they do contain is not well absorbed by the body. Some compounds in certain foods bind to calcium making it unavailable for absorption by the body. Vegetables such as beet greens, spinach and rhubarb contain calcium, but they also contain *oxalic acid* which prevents calcium from being properly absorbed. While such foods are nutritious they are, in fact, poor quality sources of calcium.

You would need to eat four and a half cups of cooked broccoli or three cups of cooked kale to get the same amount of calcium provided by one cup of milk!

Most milk products are an excellent source of calcium, not just because they contain a lot of it but because dairy calcium is



well absorbed by the body. We can consume these foods—and, therefore get our calcium—in a variety of forms throughout the day. It is worth noting that tricalcium phosphate (the calcium form added to some soy beverages) is absorbed at only 75% the rate of the calcium found naturally in milk.[9]

Calcium loss

Calcium loss is something else to be aware of. For example, consuming excessive amounts of caffeine may increase the amount of calcium lost from the body in urine, especially if the intake of calcium is low. Coffee, tea, cola beverages and popular energy drinks all contain caffeine. So it is all about balance—if your calcium intake is adequate, moderate amounts of caffeine-containing drinks can safely be consumed without affecting your bone health.[10]

Too much sodium (salt) can also increase calcium loss in urine. Most of the sodium we consume comes from processed foods including commercial soups and sauces, frozen dinners, luncheon meats, snack foods such as potato chips, pickles and condiments, sauce mixes, prepared salad dressings, and just about all fast foods. The salt shaker is not always the culprit!

Our daily calcium needs

Our calcium requirements vary throughout life. As you can see from the table, our body's demand for calcium increases when we—and our bones—are growing and then later in life to help maintain bone health.

Age (yrs)	Recommended calcium intake for Canadians[11]
1-3	700 mg
4-8	1000 mg
9-18	1300 mg
19-30	1000 mg
31-50	1000 mg
51-70	Women: 1200 mg Men: 1000 mg
71+	1200 mg

Institute of Medicine. Dietary Reference Intakes for Calcium and Vitamin D. 2011.

Osteoporosis Canada recommends that adults over age 50 consume 1200 mg of calcium daily.

Calcium supplements

It is important to consume as much calcium as we can each day from food sources. Besides supplying calcium, food sources provide our body with other important bone-building nutrients such as vitamins A, K and B_{12}, phosphorus, magnesium and zinc.

Calcium supplements are recommended for individuals who can't meet their calcium needs from food alone. In most cases, each calcium supplement contains 500 mg of calcium. Calcium supplements should be taken with lots of water and with food to help ensure that the calcium is well absorbed. However, calcium citrate does not need to be consumed with food to be absorbed, but with lots of water.

Intake of supplements and calcium-rich foods should be spread out through the day to provide the body with a steady calcium supply.

the importance of vitamin D

D is key

Vitamin D is critical for helping the body use calcium. It increases calcium absorption[12] and helps regulate whether calcium is deposited into or withdrawn from the bone "bank".

Recent research suggests that vitamin D may be associated with many other health benefits as well, including the prevention of certain cancers.

The sunshine vitamin

When our skin is exposed to ultraviolet light from the sun, it produces vitamin D. The amount of sunlight we need to produce enough vitamin D depends on age, diet, skin colour, where we live and how strong the sun is.[13]

In Canada, between October and March, we don't get enough sunlight to enable our bodies to produce vitamin D.

Even in the summer months, we may not produce enough of this important vitamin. The sunscreen we slather on to protect ourselves from too much ultraviolet light also prevents the production of vitamin D. In some cases, all we need is just a few minutes a day of unprotected sun exposure,[13] so it's important to achieve a balance between too much and not enough.

Getting vitamin D from our diet is a healthy alternative to unprotected sunlight but, unfortunately, vitamin D is quite rare in food. To help ensure that we consume an adequate amount, all fluid milk in Canada is vitamin D-fortified. This is one reason why *Canada's Food Guide* recommends that Canadians drink milk every day.

Encourage your family to follow *Canada's Food Guide*, making sure they consume the recommended number of servings of Milk & Alternatives. Drinking milk with meals is always a great idea.

Recommended daily vitamin D intake

Age (yrs)	Recommended vitamin D intake[11] for Canadians
1-3	600 IU
4-8	600 IU
9-18	600 IU
19-30*†	600 IU
31-50*†	600 IU
51-70**	600 IU
71+**	800 IU

Institute of Medicine. Dietary Reference Intakes for Calcium and Vitamin D. 2011.

Osteoporosis Canada recommends routine daily supplementation of Vitamin D all year round:
*19 to 50 years of age: 400 IU-1000 IU
**50+ years of age: 800 IU-2000 IU

† Includes pregnant or breast-feeding women

Health Canada encourages adults over 50 years of age to take a daily vitamin D supplement of 400 IU.

Main food sources of vitamin D[8]

Food	Portion	IU
Salmon | baked or broiled	2½ oz | 75 g	**204 - 699**
Herring | baked or broiled	2½ oz | 75 g	**161**
Sardines with bones | canned	2½ oz | 75 g	**70 - 145**
Halibut, Atlantic or Pacific | baked or broiled	2½ oz | 75 g	**144**
Tuna, yellow fin (albacore, ahi) | baked or broiled	2½ oz | 75 g	**105**
Milk | 2%	1 cup | 250 mL	**103**
Mackerel, Atlantic | baked or broiled	2½ oz | 75 g	**78**
Tuna | canned in water/drained, unsalted	2½ oz | 75 g	**36 - 60**
Egg | boiled, hard-cooked	2 large	**52**

the power of protein

Protein is necessary to build and repair bone tissue. In fact, our bones are comprised of about 50% protein. Protein and calcium work together to build bone, and an adequate amount of both is needed to keep bones healthy. With age, protein continues to be important to maintain bone mass and help fractures heal.

It is a good idea to include some protein in every meal. Protein is found in Meat and Alternatives like beef, chicken, fish, legumes and eggs, as well as in milk products.

Milk products have the advantage of supplying high-quality calcium as well as protein and many other nutrients important for bone health. That's why they are considered an ideal food when it comes to nourishing our bones.

up to 16 essential nutrients

Milk products every day

Milk, cheese and yogurt are an important part of our diet because they provide up to 16 essential nutrients. And that can help keep our bones healthy.

Look at what a glass of milk contains

for your health

Nutrients needed for healthy bone growth and development

	Nutrients	Functions
Bone-building nutrients	**Calcium**	Builds bones, both in length and strength
	Protein	Forms the collagen matrix upon which minerals like calcium and phosphorus build hard bones
	Magnesium	Hardens bone by linking with calcium and phosphorus
	Phosphorus	Bonds with the calcium in bone for strength
	Vitamin A	Enables bone remodelling (breaks down and rebuilds bone)
	Vitamin D	Aids in calcium and phosphorus absorption
Other essential nutrients	**Vitamin B_6**	Needed for the body to metabolize protein
	Vitamin B_{12}	Needed for growth, maintenance of nerve tissue and normal blood formation
	Folate	Helps the body grow and is required for DNA synthesis
	Thiamin	Needed to help the body convert carbohydrates into energy
	Riboflavin	Helps convert food into energy
	Niacin	Needed for carbohydrate utilization and to help tissues in the body take in oxygen
	Pantothenic acid	Needed to help the body convert fatty acids into energy metabolism
	Zinc	Essential for growth and development, wound healing, immunity and other physiological processes
	Potassium	Essential for maintaining the body's vital fluid balance and important for the proper functioning of nerves and muscles
	Selenium	Acts like an antioxidant, thereby contributing to the protection of the cells and is essential for the proper functioning of the thyroid gland

following *Canada's Food Guide*

Healthy bones the natural way

Eating a balanced diet based on *Canada's Food Guide* provides a sound foundation to keeping your bones healthy year after year. Consuming the right number of Food Guide Servings from the Milk & Alternatives food group helps you get the calcium and vitamin D you need every day, along with other important nutrients such as protein.

- **Vegetables and Fruit:** Vitamins, minerals and other nutrients help build and maintain healthy bones.
- **Grain Products:** Carbohydrates and many B vitamins provide energy for bone-healthy physical activity.
- **Milk and Alternatives:** Calcium, protein and other bone-healthy nutrients help build, strengthen and maintain bones.
- **Meat and Alternatives:** Protein and other nutrients help build, maintain and repair bones.

Food Guide

	Children			Teens		Adults			
Age (years)	2-3	4-8	9-13	14-18		19-50		51+	
Sex	Girls & Boys			Female	Male	Female	Male	Female	Male
MILK AND ALTERNATIVES	2	2	3-4	3-4	3-4	2	2	3	3

Eating Well with Canada's Food Guide, 2011.

Sizing up: what constitutes a serving

- 1 cup/250 mL milk
- ¾ cup/175 g yogurt | almost two 100 g single-serving containers
- ½ cup/125 mL grated cheese
- 1½ oz/50 g firm cheese | a piece 2 x 2 x 9 cm or about the size of ½ a deck of playing cards