

***Remember: You can live well with osteoporosis!***

## Calcium Absorption and Bone Health By Ina Ilse

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### Key Messages

1. Calcium has many functions in the body, including bone strength, muscle contraction and nerve impulse conduction.
2. If we do not get enough calcium through diet, it will be removed from bone.
3. Vitamin D helps to regulate the amount of dietary calcium absorbed in the bloodstream.

**Fracture Fact:**  
More than 99% of total body calcium is stored in the bones and teeth, where it supports their structure.

I am a volunteer at Osteoporosis Canada answering questions on the 1-800 information line. Many of the more recent questions we have dealt with are related to diet, and in particular calcium: what foods are rich in calcium and how much of it is absorbed? Also, can one type of food interfere with the absorption of the calcium in another food? To satisfy my own desire for up-to-date answers, I reviewed the latest research publications and consulted the experts at Osteoporosis Canada. Below are some of the answers I found.

### Calcium metabolism

Calcium has multiple functions in the body. Primary is its contribution to skeletal strength and integrity. Calcium is also involved in muscle contraction, nerve impulse conduction, and the regulation of many metabolic processes occurring within the cells. The body requires calcium for many of its activities, and large concentrations of calcium are required in the blood plasma and cells for ready use. How are the levels of calcium in the blood regulated?



Ina, answering a question on the 1-800 information line, September 2010

Vitamin D plays a very important role; it regulates the amount of dietary calcium absorbed into the bloodstream. However, Vitamin D is not the only hormone working on behalf of bone health. Parathyroid hormone (PTH) is the prime regulator of extra-cellular calcium. PTH is secreted by the parathyroid glands, four small oval-shaped glands about the size of a rice grain located next to the thyroid in the neck. How does this work?

PTH maintains calcium levels within a strict range at all times. When the calcium level is low, the parathyroid glands respond to the need for calcium and signal the osteoclasts (see below) to remove calcium from the bones in order to maintain calcium balance. So, if we do not take in calcium through our diet, it will be removed from our bones and is unlikely to be replaced. When calcium is removed from our bones, it is called resorption.



Osteoclasts are cells that “chew up” or resorb old bone. In contrast, osteoblasts are cells that work by laying down new bone. Unfortunately, with aging, there are more active osteoclasts present in the body than active osteoblasts, resulting in more calcium being removed from the bone than being replaced. Thus, one ends up losing bone mineral, which may be sufficient to cause osteoporosis.

In summary, calcium is absorbed by the intestines and moved into the bloodstream for ready use. The amount absorbed is determined by many factors, including:

1. Quantity and form of calcium ingested.
2. Type of food also being eaten.
3. A person’s calcium and vitamin D status (or levels).
4. A person’s age, stomach acid secretion and intestinal transit time (the length of time it takes for the food to move through the gut).

### **Dietary sources of calcium**

There are many good food sources of calcium including: milk products (the most abundant), some leafy green vegetables, legumes, canned salmon and sardines with the bones, tofu with calcium sulfate, almonds, dried figs and fortified orange juice, soy, rice and almond beverages.

Green leafy vegetables, for the most part, are rich in calcium; however, not all the calcium in these plant foods is available for absorption in the intestinal tract. It also depends on how the vegetables are prepared. For example, although spinach is very rich in calcium, it contains high levels of oxalic acid, which forms very strong bonds with the calcium. In contrast, kale, also a leafy green vegetable, has very low quantities of oxalic acid; thus, calcium absorption from kale is much higher (can be as much as 41%).

Investigators have also done absorption studies on foods such seed and nuts with large quantities of a component, called phytic acid, to see its effect on calcium absorption. They studied soy beans and some

seeds that they knew contained high levels of phytates (a form of phosphorus in the phytic acid), which is an inhibitor of calcium. They found that phytate is not as strong an inhibitor of calcium as oxalic acid. Nonetheless, these foods still provide some dietary calcium, as well as other nutrients important for health.

### **What is the role of calcium in the development and maintenance of peak bone mass?**

- Approximately 60 – 70% of our peak bone mass is determined by genetic factors.
- Until about our mid-30s, we maintain peak bone mass through dietary calcium and lifestyle.
- Calcium-regulating hormones are concerned with maintaining a level of calcium for normal functions of the body.
- Exercise is essential.
- Lifestyle – a calcium-rich diet, vitamin D intake, limited alcohol, no smoking, physical activity - can promote the development and maintenance of peak bone mass.

Optimal calcium intake is the amount of calcium that would supply the body with sufficient calcium, both during the growth period and during adulthood. Osteoporosis Canada recommends the following intake levels per day of calcium and vitamin D:

1. Prepubertal (4-8 years) ----- calcium 1000mg, vitamin D 600IU (Health Canada)
2. Adolescents (9-18 years) --- calcium 1300mg, vitamin D 600IU (Health Canada)
3. Women and men (19-50 years) --- calcium 1000mg, vitamin D 400-1000IU
4. Women and men over 50 --- calcium 1200mg, vitamin D 800-2000IU
5. Pregnant or lactating women ( $\geq 18$  years) --- calcium 1000mg, vitamin D 400-1000IU

### **Summary**

Ideally, calcium needs should be met through food. Only take calcium supplements if food sources are inadequate and only after consultation with your healthcare provider. Regarding vitamin D, there are few food sources and the sun is an unreliable source. Therefore, Osteoporosis Canada recommends vitamin D supplementation for those with osteoporosis or at risk for osteoporotic fractures. That said, all Canadians need to ensure they are getting enough vitamin D.

### **Useful resources**

For the calcium content of some common foods, go to <https://osteoporosis.ca/bone-health-osteoporosis/nutrition/calcium-requirements/>. To calculate your calcium, go to <https://osteoporosis.ca/bone-health-osteoporosis/calcium-calculator/#page-1>. For Osteoporosis Canada's response to the new Canada's Food Guide, go to <https://osteoporosis.ca/eating-for-bone-health-with-the-new-canadas-food-guide/>.

I hope that my research has provided the readers with some answers to their questions regarding the role of calcium in the body.

**BONE MATTERS**  
Take charge of your bone health



## WEBINAR

Fracture Risk Assessment:  
From Basics to Baffling

### FEATURED SPEAKER:

William D. Leslie MD, MSc, FRCPC  
Professor, University of Manitoba  
Department of Medicine, Department of Radiology

**WEDNESDAY, JUNE 5, 2019**  
**1:00 PM - 2:00 PM ET**

**OSTEOPOROSIS**



## Upcoming Presentation Fracture Risk Assessment: From Basics to Baffling

Join us for a virtual presentation with Dr. William D. Leslie where he'll discuss:

- What is fracture risk assessment?
- How has the focus on fracture risk assessment improved patient care?
- What are the consequences of fracture?
- What is the care gap?
- Who requires medication?

To view register for the webinar [click here](#).

## Feeling inspired to make a difference?

Our growing team of volunteers strives to make a real difference in the lives of Canadians at risk for and living with osteoporosis. If you are someone looking to make a difference in your community and are passionate about helping to spread the word on preventing fractures, then we need you! With your help, we teach Canadians how to improve their bone health so osteoporosis can never take hold and we support those already diagnosed, working to improve their quality of life.

Take action. Apply today at [osteoporosis.ca/volunteer](http://osteoporosis.ca/volunteer).  
Together, we will help **make Canadians unbreakable**.

## We Welcome Your Feedback

- Have a question?
- Is there an osteoporosis-related topic that you would like to see featured in the newsletter?
- Looking for a great volunteer opportunity?

Please contact us by calling Osteoporosis Canada's toll-free number **1-800-463-6842** or emailing [copn@osteoporosis.ca](mailto:copn@osteoporosis.ca).

## FUNNY BONE:

I hate housework! You make the beds, you do the dishes – and six months later you have to start all over again. - Joan Rivers

## OC Recipe of the Issue

# BRAISED BEEF & FETA GREMOLATA

**Preparation Time:** 15 mins

**Cook Time:** 2.5 hrs

**Serves:** 4

**Calcium:** 16% DV\*



Did you know? Whole or sliced, leeks can be stored in the refrigerator for about two weeks. Once blanched, leeks can be kept in the freezer for up to a year.

### Ingredients

1 tbsp (15 mL) butter  
2 lb (900 g) boneless beef blade roast  
Salt and freshly ground pepper  
2 – 3 leeks  
1 Canadian blonde beer  
1 bay leaf

Feta gremolata:

1 cup (250 mL) Canadian Feta, crumbled  
1/3 cup (75 mL) fresh parsley, coarsely chopped  
1 – 2 tsp (5-10 mL) lemon zest  
2 tsp (10 mL) pink peppercorns, crushed  
1 clove garlic, chopped

### Preparation

Preheat oven to 325°F (160°C).

In a Dutch oven, melt butter on high heat and brown meat for 3–4 min on each side. Season generously with salt and pepper.

Pour beer over beef. Top with bay leaf and leeks.

Bring to a boil and continue cooking, covered, in the oven for 2 h 30 min.

Half an hour before end of cooking, mix Feta gremolata ingredients in a bowl. Set aside at room temperature.

To serve, divide leeks among plates and top with some meat. Drizzle with cooking juice and garnish generously with Feta gremolata.

For more information, [click here](#) to view the recipe online.

\*The percentage of calcium is based on the Osteoporosis Canada's daily calcium requirement for people under 50 years of age of 1000 mg.