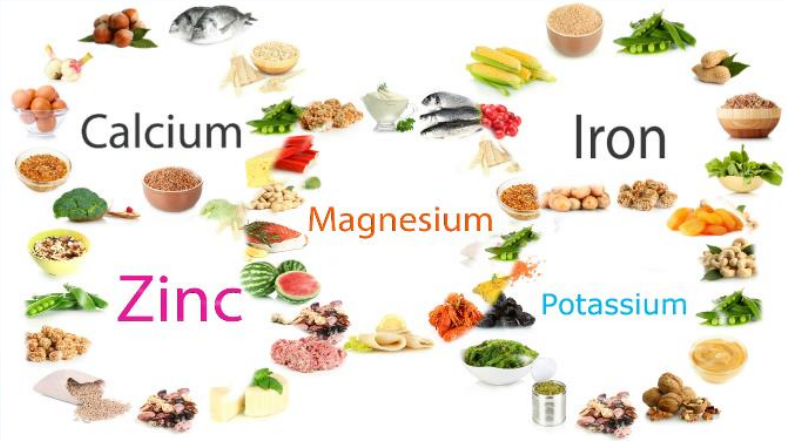
Maintaining Healthy Mineral Levels



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ALI 492

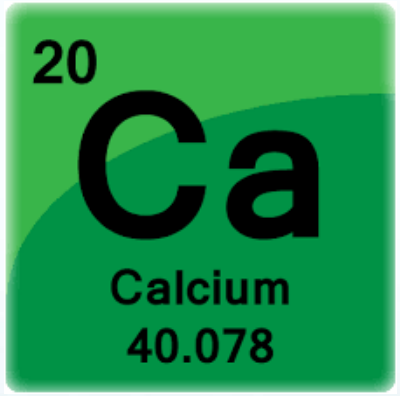
Learning Objectives

- To understand the role of minerals in the body and their importance for health.
- To learn about requirements and sources of calcium, magnesium, iron and zinc.
- To acquire tips to achieve adequate mineral intake from the diet.
- To learn the benefits and risks of mineral supplements.

What Are Minerals?

In the context of nutrition, a mineral is a chemical element required as an essential nutrient by organisms to perform functions necessary for life. Minerals originate in the earth and cannot be made by living organisms. Plants get minerals from soil. Wikipedia

Calcium



Role of Calcium

- Bone health
- Muscle function
- Nerve signaling
- Managing blood pressure
- *Adequate* calcium intake can protect against:
  - Osteopenia and Osteoporosis
  - Cancer of the colon and rectum
  - Hypertension and Preeclampsia

Calcium Requirements

Age	Daily Goal (mg)	Stay Below (mg/day)*
Men & Women 19-50	1000	2500
Women 51-70	1200	2000
Men 51-70	1000	2000
Men & Women over 71	1200	2000
Pregnant/Breastfeeding	1000	2500

* From diet and supplements

Calcium Deficiency

- No short term obvious symptoms, as blood levels of calcium are regulated by the body.
- Calcium levels can drop with other medical conditions such as renal failure and use of certain medications. Symptoms of hypocalcaemia: numbness and tingling in fingers, muscle cramps, poor appetite, abnormal heart rhythms. Death if untreated.
- Long terms inadequate calcium intake causes osteopenia followed by osteoporosis. Increased risk of bone fractures, especially in the elderly.
- Individuals at higher risk: postmenopausal women, amenorrheic women, those with milk allergies, vegans.

Osteoporosis

- Bones increase in size and weight until around age 30.
- Osteoporosis occurs when the body loses too much bone or makes too little bone or both. Bones become weak and are more likely to break.
- A bone mineral density test can be used to diagnose osteoporosis. It compares your bone density to an optimal level of a 30 year old.
- Women are at a higher risk because they have smaller skeletons than men, and they have faster bone loss after menopause.
- Adequate calcium and vitamin D intake combined with exercise (weight bearing and RT) can help maintain bone health.

Osteoporosis Facts*

- 2 million Canadians have osteoporosis.
- 1 in 3 women will suffer from an osteoporotic fracture in their life.
- Over 80% of fractures in those over 50 are due to osteoporosis.
- 28% of women who suffer a hip fracture will die within one year.

*Osteoporosis Canada

Foods High In Calcium

Food Sources of Calcium

Food	mg Calcium
Milk (1 cup)	300
Yogurt (3/4 cup)	275
Hard Cheese (1.5 oz)	250-350
Tofu (3/4 cup)	300
Canned Salmon (2.5 oz)	200
Spinach, cooked (1/2 cup)	154
Kale, cooked (1/2 cup)	95
Almonds (1/4 cup)	93

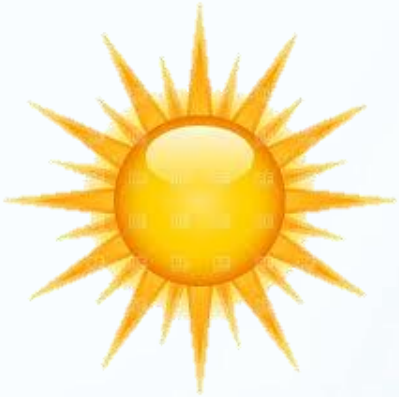
Incorporating More Calcium Into Your Diet

- Drink milk/chaas with meals or at bedtime.
- Use more milk in your chai or coffee.
- Replace water with milk in recipes for oatmeal, muffins etc.
- Have yogurt/raita with meals and use yogurt plus fruit as a snack or dessert.
- Add lower fat cheese such as cottage,

  ricotta, skim mozzarella to foods.

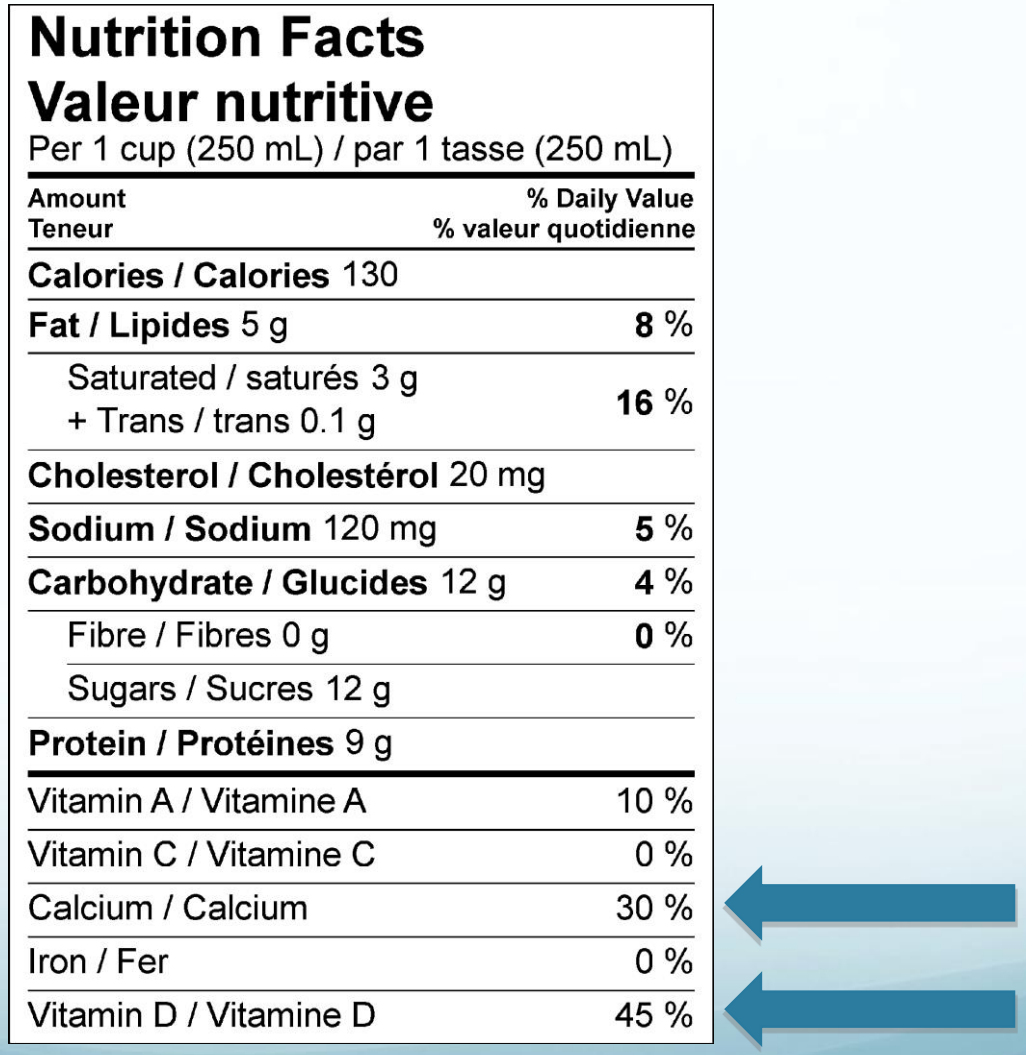
Enhancing Calcium Absorption

- Age and life stage determine amount of calcium humans absorb from food: as high as 60% in young children and as low as 15% in older adults.
- **Vitamin D improves calcium absorption**
  - Sunlight
  - Supplements for adults living in northern climates such as Canada



- Oxalic acid found in foods such as spinach, sweet potato and beans and phytic acid found in whole grains, soy, beans and nuts can reduce calcium absorption. However, these are accounted for in the calcium requirements, and for most people eating a balanced diet they are insignificant.
- Caffeine, protein and phosphate intake have little net effect on calcium status.

Calcium on Labels

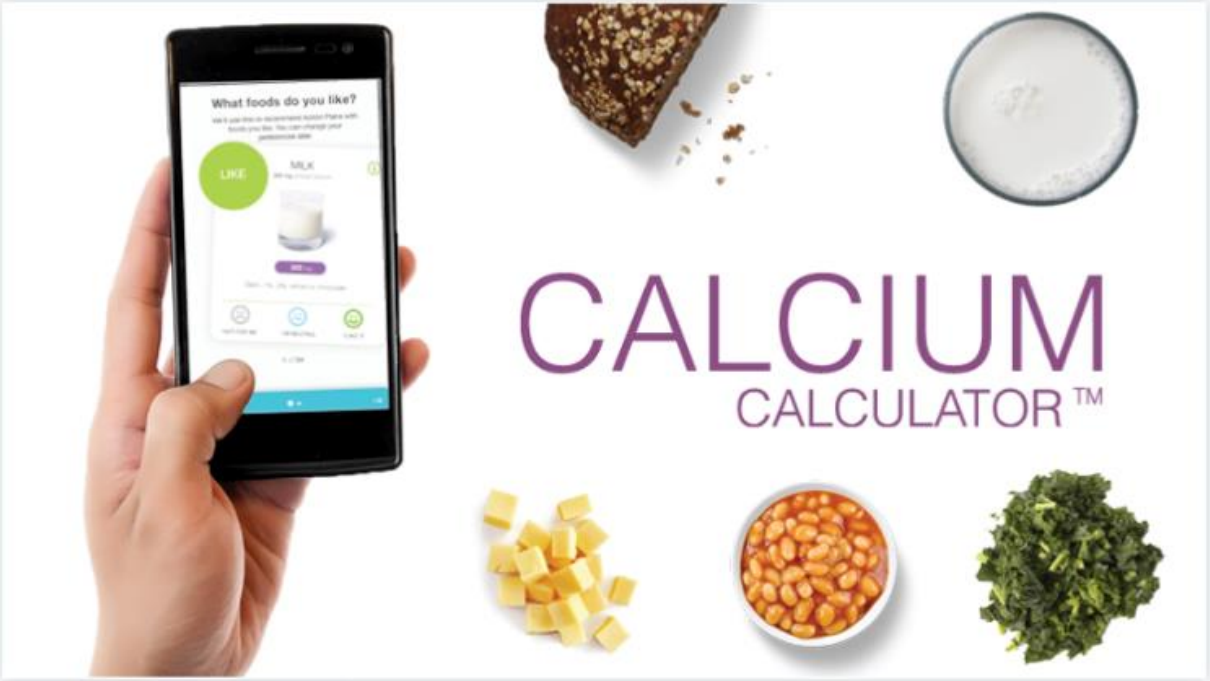


Nutrition Facts
Valeur nutritive
Per 1 cup (250 mL) / par 1 tasse (250 mL)

Amount / Teneur	% Daily Value / % valeur quotidienne
Calories / Calories 130	
Fat / Lipides 5 g	**8** %
Saturated / saturés 3 g + Trans / trans 0.1 g	**16** %
Cholesterol / Cholestérol 20 mg	
Sodium / Sodium 120 mg	**5** %
Carbohydrate / Glucides 12 g	**4** %
Fibre / Fibres 0 g	**0** %
Sugars / Sucres 12 g	
Protein / Protéines 9 g	
Vitamin A / Vitamine A	10 %
Vitamin C / Vitamine C	0 %
Calcium / Calcium	30 %
Iron / Fer	0 %
Vitamin D / Vitamine D	45 %

Calcium Calculator™ – Now a mobile app!

Do you get enough calcium from the foods you eat? Many people don't. Try the Calcium Calculator™ app—your body will thank you!



Calcium Calculator™ mobile app—a fun way to find out how much calcium you get from your food & to make a plan to eat better.

click to tweet

What About Supplements?

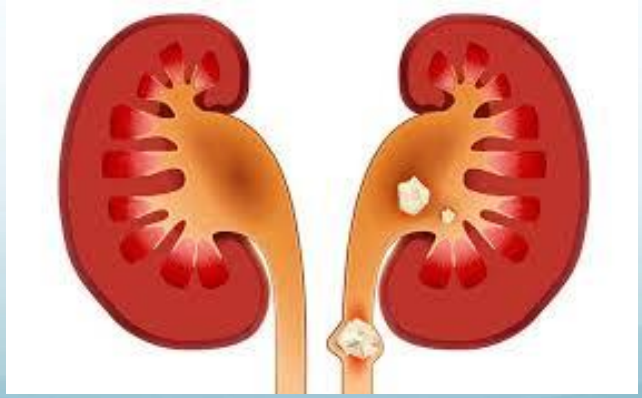
- Individual nutrients found in supplements do not have the same health benefits as whole foods.
- Foods also contain other compounds such as phytochemicals and antioxidants that work beyond the vitamin and mineral content.
- Taking high dose supplements can cause more harm than good. They can also react with medications.
- Always speak to your health care provider before starting a supplement.

Calcium Supplements

- Calcium carbonate – Inexpensive. Should be taken with food.
- Calcium citrate – Can be taken with or without food. May cause fewer side effects.
- Highest absorption at doses <500 mg – split larger doses into 2 or 3.
- Side effects: gas, bloating, constipation.
- Can interact with certain medications.
- Increased CVD risk?

Calcium and Kidney Stones

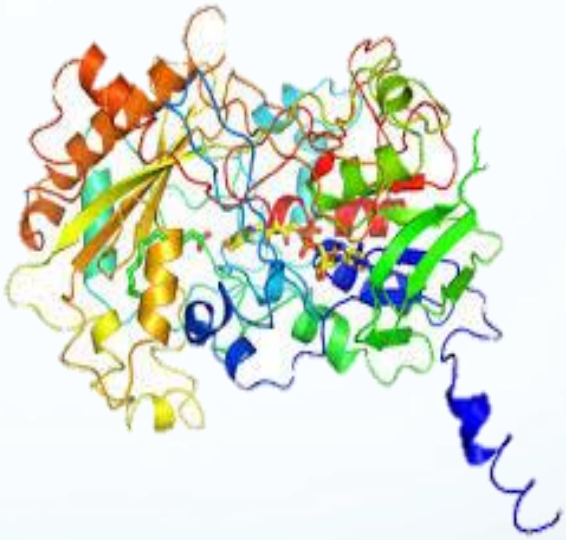
- *Dietary calcium does not cause kidney stones.*
- High oxalate intake, low fluid intake play a bigger role.
- Some studies suggest calcium supplements are associated with kidney stones (these studies are part of the findings behind upper limits for total calcium intake).



Magnesium

Role of Magnesium

- Co-factor in hundreds and hundreds of enzyme systems
- Energy production
- Regulates protein synthesis
- Regulates muscle and nerve function
- Involved in blood glucose control
- Helps regulate blood pressure
- Contributes to bone development
- *Adequate* magnesium intake can protect against:
  - Heart Disease and Stroke
  - Type 2 Diabetes
  - Osteoporosis
  - Migraines
  - Sleep disorders



Magnesium Requirements

Age	Daily Goal (mg)*	Stay Below (mg/day)**
Men & Women 19-30	400	350
Women 19-30	310	350
Men over 31	420	350
Women over 31	320	350
Pregnant Women 19-30	350	350
Pregnant Women over 30	360	350
Breastfeeding 19-30	310	350
Breastfeeding over 30	320	350

* From food and supplements

**From supplements

Magnesium Deficiency

- Difficult to assess magnesium status in the body because most is inside cells and in bones – serum levels may not indicate total body levels.
- Kidneys limit excretion of magnesium when levels are low.
- Certain condition such as gastrointestinal disorders like Crohn's and Celiac as well as certain medications can lead to magnesium loss.
- In Type II Diabetes or insulin resistance, there is more urinary magnesium excretion.
- Older adults tend to have lower magnesium absorption.
- Early signs of deficiency include loss of appetite, nausea, fatigue and weakness. This progresses to cramps, seizures, personality changes, abnormal heart rhythm.
- Severe deficiency can also cause low calcium and potassium levels as mineral balance regulation is disrupted.

Foods High In Magnesium

Foods that contain fibre also contain magnesium

Food Sources of Magnesium

Food	mg Magnesium
Pumpkin seeds (1/4 cup)	317
Almonds (1/4 cup)	88-109
Peanut Butter (2 Tbsp.)	52-55
Black-eyed peas, cooked (3/4 cup)	121
Lentils, cooked (3/4 cup)	52
Bran cereal (30 g)	85-97
Quinoa, cooked (1/2 cup)	63
Spinach, cooked (1/2 cup)	83

Incorporating More Magnesium Into Your Diet

- Cook with legumes (beans, lentils, chickpeas, tofu) at least 2-3 times per week.
  - Make daal, add lentils or beans to soups
  - Use chickpeas on salads and make hummus
- Snack on nuts and seeds and add them to cereals and salads.
- Choose whole grains daily: breads, brown rice, oatmeal, cereals, pasta.

Magnesium Supplements

- Available as magnesium oxide, citrate and chloride.
- Supplements that dissolve well in liquids are better absorbed than more solid forms.
- Can cause diarrhea, nausea, cramping (often an ingredient in laxatives).
- Can interact with medications.
- Greater chance of magnesium toxicity if kidney functi is impaired.

Iron

Role of Iron

- Component of hemoglobin – a protein that transfers oxygen from the lungs to other cells of the body.
- Component of myoglobin that provides oxygen to muscles.
- Necessary for growth, development and normal cell function.

Iron Requirements

Age	Daily Goal (mg)	Stay Below (mg/day)*
Men 19 and older	8	45
Women 19-50	18	45
Women 51 and older	8	45
Pregnant	27	45
Breastfeeding	9	45

* From diet and supplements

Iron Deficiency

- Mild: Serum ferritin decreased.
- Iron deficiency anemia: Iron stores exhausted, hematocrit and hemoglobin levels low.
- Symptoms include fatigue, gastrointestinal disturbances, impaired cognitive function, decreased immune function, impaired body temperature regulation.
- Risk increases in pregnancy, pre-term infants, young children, women with heavy periods, people with cancer, kidney disease, gastrointestinal disorders and heart failure.

Foods High In Iron

Forms of Iron

- **Nonheme:** Found in plants and fortified foods such as wheat products.

- **Heme:** Found in meat, seafood and poultry. Higher absorption.

Food Sources of Iron

Food	mg Iron
Beef (2.5 oz.)	1.4-3.3
Chicken (2.5 oz.)	0.4-2.0
Oatmeal, cooked (3/4 cup)	4.5-6.6
Cereal, Dry (30 g)	4.0-4.3
Lentils (3/4 cup)	4.1-4.9
Chickpeas (3/4 cup)	1.9-3.5
Blackstrap molasses (1 Tbsp.)	3.6
Spinach, cooked (1/2 cup)	2.0-3.4

Enhancing Iron Absorption

- Vitamin C (ascorbic acid) can increase the absorption of nonheme iron.
- Combine heme and nonheme sources at a meal.
- Phytates found in grains and beans, as well as calcium may reduce absorption. However in a typical mixed diet, they usually have very little effect on most people's iron status.
- Drink coffee and tea after meals as they may decrease iron abosorption.

Incorporating More Iron Into Your Diet

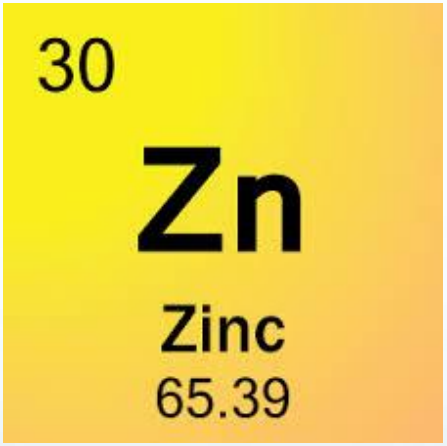
- Include lean meats a few times per week.
- Include legumes often.
- Choose dark green vegetables regularly.

- Choose fortified whole grain breads and cereals. Look for products that have 15% or more Daily Value for iron on the label.
- Add vitamin C rich foods to your meatless meals: salads, broccoli, kale, peppers. Add berries or kiwi to your cereal. Have fruit with breakfast.

Iron Supplements

- Various forms including ferrous and ferric sulfate, gluconate, citrate and sulfate. They vary in the amount of elemental iron they contain. Many women's formula multivitamins contain 18 mg of iron (100% of DV).
- Ferrous forms are more bioavailable than ferric forms.
- Higher doses can cause nausea, constipation, abdominal pain.
- Forms such as heme iron polypeptides, carbonyl iron and polysaccharide-iron complexes may have fewer side effects.
- Calcium can interfere with iron absorption, so take iron and calcium supplements at different times.
- Too much iron can reduce zinc absorption and interfere with the absorption of certain medications.

Zinc



Role of Zinc

- Helps the immune system
- Helps make proteins and DNA
- Essential for growth during pregnancy, infancy and childhood
- Helps with wound healing
- Skin health
- Proper taste and smell senses
- Slows macular degeneration

Zinc Requirements

Age	Daily Goal (mg)	Stay Below (mg/day)*
Men 19 and older	11	40
Women 19 and older	8	40
Pregnant 19 and older	11	40
Breastfeeding 19 and older	12	40

* From diet and supplements

Zinc Deficiency

- Rare in North America.
- Can cause slow growth in infants and children.
- Weakened immune system. – higher risk of infections.
- Impotence in men.
- Other symptoms include: diarrhea, hair loss, eye and skin sores, slow wound healing, loss of taste.
- Vegetarians are at higher risk and may need more than the recommended amounts.

Does Zinc Help Fight Colds?

- Some research shows zinc may shorten the duration of a cold.
- Zinc does not prevent colds or ease symptoms.
- Be careful of getting too much zinc – stay under 40 mg per day.

Foods High In Zinc

Food Sources of Zinc

Food*	mg Zinc
Beef (2.5 oz.)	4.0-8.6
Lamb (2.5 oz.)	2.0-6.5
Chicken (2.5 oz.)	1.3-2.2
Pumpkin Seeds (1/4 cup)	2.7-4.4
Wheat Germ (2 Tbsp.)	2.4
Lentils (3/4 cup)	1.9
Chickpeas (3/4 cup)	1.1-1.9
Ricotta Cheese (1/2 cup)	1.8

*oysters are very high in zinc, but not halal

Incorporating More Zinc Into Your Diet

- Include lean meat, chicken and fish several times per week.
- Include legumes often.
- Choose fortified breakfast cereals.
- Sprinkle pumpkin seeds on salads and cereal.

Zinc Supplements

- Comes as zinc gluconate, sulfate and acetate.
- No clear advantage of one form over another.
- Found in almost all multivitamin/mineral supplements.
- Often found in products for colds such as nasal sprays (can cause loss of smell) and lozenges.
- Excessive zinc intake can lead to copper deficiency, lower immunity, low HDL and can cause neurological problems.
- Can interfere with medications and antibiotics.

Foods In The Holy Quran & Islamic Medical Wisdom

Resources

- *unlockfood.ca* (formerly EatRightOntario) for reliable nutrition information.
- *cookspiration.com*/cookspiration app for healthy recipes.
- Telehealth Ontario 1-866-797-0000 to speak to a registered dietitian.
- cardiacollege.ca for videos on label reading and grocery shopping.