



Current Perspective on Vitamin D

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Chances are you've heard at least one news story lately about the virtues of vitamin D, the "sunshine vitamin." More and more scientific evidence seems to show promise beyond its well-known value for bone health. But with different health agencies and news outlets providing different advice, it's not surprising if you're not sure what to do. Are you getting enough of this vitamin? Do you need to take supplements? If so, what's the right amount? Read on for the current perspective.

What's the Role of Vitamin D?

Bone health—The role of vitamin D in bone health is well established. Vitamin D helps maintain healthy blood levels of calcium and phosphorus, the key bone minerals. It helps the body to absorb and use these minerals to form and maintain strong bones.

Non-bone functions—Vitamin D appears to have an important role in all of the body's organs (e.g. immune cells, brain, heart, pancreas, intestine). Some research now suggests that vitamin D may play a role in protection from chronic diseases including cancer, multiple sclerosis, diabetes and schizophrenia. Research also suggests that dietary intake of vitamin D at critical points during pregnancy may impact the programming of fetal health and the likelihood of developing chronic diseases later in life. However, more research is required to fully explain the links between vitamin D and development of chronic diseases.

How Do We Get Vitamin D?

Sunlight—We can produce vitamin D ourselves, when the skin is exposed to the sun's ultraviolet B (UVB) radiation. In Canada, however, for large parts of the year (October to March; even longer in the far north) the sun's rays are not strong enough to produce the vitamin. Not only do we cover up

Sample Foods	Vitamin D (IU)
Salmon (75 grams cooked)	200–680
Canned fish (tuna < sardines < salmon) (75 grams)	60–585
Fortified cows milk (250 ml)	100
Fortified plant beverages (soy, rice) (250 ml)	85
Fortified orange juice (125 ml)	50
Yogurt made with fortified cows milk (100 grams)	25
Margarine (1 teaspoon)	25
Egg yolk (1)	25
Beef (75 grams cooked)	20
Shiitake mushrooms, dried (10 g)	165 (vitamin D ₂)
Infant vitamin D syrup/drops (1 ml)	400
Infant formula (250 ml)	100

Source: Canadian Nutrient File, 2007b, and *Guide to Food Labelling and Advertising*, 2003.

to keep warm during the winter months, but the angle of the sun is too low to generate much vitamin D.

Foods—For that reason, Canadians need a dietary source of vitamin D. Few foods are naturally rich in vitamin D. Seafood, particularly fatty fish, is the most significant natural source of vitamin D in the Canadian diet. It's also found in eggs and beef. The major sources of vitamin D are fortified foods—in Canada, cows' milk and margarine must be fortified with vitamin D. Goats' milk, fortified

plant-based beverages (such as fortified soy beverages) and calcium-fortified orange juices can also be fortified with vitamin D. Yogurt and cheese can be made with vitamin D-fortified milk.

Supplements—Another way to get vitamin D is through supplements. In addition to multivitamins, supplements of vitamin D can range from 200 IU to 1000 IU per tablet. Although the traditional cod liver oil is rich in vitamin D, it has too much vitamin A for regular use.

The kidneys convert vitamin D from sunlight, foods or supplements to an active form that the body can use.





How Much Do We Need?

Dietary recommendations are designed to safely meet the needs of almost everyone. The guidelines jointly issued by U.S. and Canadian governments in 1997 recommend an intake of 200 to 600 IU of vitamin D daily, depending on age. Vitamin D needs increase with age in part because the skin becomes less efficient at producing vitamin D.

Dietary Reference Intakes (DRIs) for Vitamin D		
Life Stage Group	Adequate Intake	Upper Intake
<i>Males and Females</i>		
0 to 1 year	200 IU/day	1000 IU/day
1 to 50 years	200 IU/day	2000 IU/day
51 to 70 years	400 IU/day	2000 IU/day
>70 years	600 IU/day	2000 IU/day
<i>Pregnancy and Lactation</i>		
≤18 to 50 years	200 IU/day	2000 IU/day

In fact, Canada's Food Guide now advises that all Canadians over the age of 50 years take a daily vitamin D supplement of 400 IU in recognition that their vitamin D needs are higher than can be reasonably obtained from food. This combined with diet should provide a daily intake of 600 IU.

Health Canada also recommends that breastfed infants receive a supplement of 400 IU each day until they can get this much through foods. This advice is based on evidence of rickets in Canada, a condition where bones are soft and malformed.

What If We Don't Get Enough?

Vitamin D status is best measured using the blood level of calcidiol (25(OH)D). Deficiency is thought to occur at levels below 37.5 nmol/L for adults and 27.5 nmol/L for infants and children.

A deficiency in children can lead to rickets. In adults, low levels of vitamin D can cause osteoporosis, a disease that decreases bone mass and bone tissue, putting people at risk of fractures.

Should Intakes Be Higher?

Although most Canadians appear to be meeting the Adequate Intake (AI) recommendations, deficiency has been found among all age groups. This suggests

that the AI may not be high enough to meet the needs of all Canadians.

The volume of research related to vitamin D has increased vastly since the introduction of the DRIs in 1997. It is widely believed that the amount of dietary vitamin D required for optimal health is greater than that required to prevent a deficiency.

The suggested target for optimal blood levels of 25(OH)D in adults is at least 75 nmol/L, although this hasn't been confirmed in infants and children. This target is based on dose-response studies of vitamin D supplementation where the level of parathyroid hormone (PTH) reached a plateau. PTH is the hormone that controls conversion of 25(OH)D to its active form. Optimal intakes of vitamin D₂ or D₃ needed to achieve these levels are not yet known.

The two types of dietary vitamin D

- **Vitamin D₂** (ergocalciferol)—present in a few plant sources such as mushrooms and fortified plant beverages. Compared with D₃, it is not as potent and has a shorter duration of action.
- **Vitamin D₃** (cholecalciferol)—from animal-based foods; the form found in most food sources and supplements in Canada. Also the form made by skin exposed to sunlight.

Many health organizations, including the Canadian Pediatric Society, Canadian Osteoporosis Society and Canadian Cancer Society, have issued recommendations for higher vitamin D intakes, ranging from 800 IU/d for infants living in the north, to 2000 IU/d for pregnant and lactating women.

How Much Is Too Much?

Despite the potential benefits, Health Canada cautions that you can get too much of a good thing. Vitamin D is a fat-soluble nutrient that can build up in your body. Children and adults should not exceed 2000 IU of vitamin D daily from all sources (food and supplements). For infants up to one year of age, the upper limit is 1000 IU. These "Upper Intake" limits are designed to help people avoid getting more than they need. Mild symptoms of too much vitamin D intake are nausea, vomiting, cramping and diarrhea. Too much vitamin D over a period of time can lead to kidney stones as well as damage to the heart, lungs and blood vessels.





What's Next?

To optimize the vitamin D status of Canadians, Canada's current health policy, food fortification policy and food supply will likely require updating. The challenge is that any policy change must also ensure safety, yet many knowledge gaps exist.

Some of the research questions

- What blood level of 25(OH)D indicates optimal vitamin D status?
- What benefits can be achieved and how much daily vitamin D is needed to achieve them?
- Can food fortification programs safely and successfully enhance vitamin D status?

Significant research and policy advances are expected over the next few years. Health Canada will be working with the US Institute of Medicine to update all of the DRIs, including vitamin D, to consider both benefits and safety. A conference held in September 2007 was an important first step toward this process.

If the proposed policy is adopted, the levels of vitamin D allowed in fortified foods would be increased and industry would have the option to add the vitamin to more foods, including breakfast cereals and fruit juices.

Getting enough vitamin D

A child or adult who drinks 2 cups of fortified milk or fortified soy beverage each day and eats a 75-gram serving of salmon each week would meet the current recommendation of 200 IU of vitamin D per day.

Where to Learn More

- Eating Well with Canada's Food Guide
www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php
- Canada's Food Guide—vitamin D for people over the age of age 50
www.hc-sc.gc.ca/fn-an/food-guide-aliment/choose-choix/advice-conseil/adult50-eng.php
- Nutrition labelling, Health Canada
www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/index-eng.php
- Addition of vitamins and minerals to food
www.hc-sc.gc.ca/fn-an/nutrition/vitamin/index-eng.php
- Sun safety, Health Canada
www.hc-sc.gc.ca/cps-spc/person/sun-sol/index-eng.php

The Bottom Line

Here are some practical tips to safely boost your intake of vitamin D.

- ✓ Follow Canada's Food Guide and be active every day to reduce the risk of chronic diseases such as heart disease, osteoporosis, cancer, and type 2 diabetes.
- ✓ Have 500 mL (2 cups) of milk every day. Choose other foods that have vitamin D, too.
- ✓ If you're over 50, take a daily supplement of 400 IU (10 µg) of vitamin D.
- ✓ Check the labels for the amount of vitamin D₃ if you're thinking of taking supplements.
- ✓ Don't exceed 2000 IU/day of vitamin D from food and supplements combined unless advised by your doctor.
- ✓ Infants who are breastfed should be given a daily supplement of 400 IU vitamin D until they're getting 400 IU/day from foods.
- ✓ People who aren't exposed to the sun, or who don't regularly consume milk and other foods with vitamin D, should consult a health professional for advice on how to get enough.
- ✓ Practice sensible sun habits. While there's no scientific consensus, health professionals generally recommend that 10 to 15 minutes outdoors without sunscreen at least twice a week is adequate and safe for most people.

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Developed by:
Canadian Council of Food and Nutrition (CCFN)
www.ccfm.ca 08/2008, updated 04/2009.

This factsheet has been developed by CCFN to support consumers and health professionals on key topics. It is based on a Report and a Watching Brief prepared for CCFN by Hope Weiler, PhD, RD. All documents were reviewed by at least three members from among CCFN's Policy and Communication Committees and Board of Trustees. Sheryl Conrad, RD, assisted in preparing the Watching Brief and edited the more extensive report.

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