Health Link
Healthy living after treatment of childhood cancer

CHILDREN'S ONCOLOGY GROUP
The world's childhood cancer experts

Keeping Your Bones Healthy after Childhood Cancer

During childhood and into young adulthood, bone formation usually occurs faster than bone loss, causing bones to grow and become heavier (more dense). As a person gets older, the process of bone removal gradually overtakes bone formation, and bones slowly lose strength as part of the normal aging process. However, loss of bone strength may occur at earlier ages in childhood cancer survivors because of certain cancer treatments. Loss of bone strength may result in a condition known as osteoporosis, which is sometimes referred to as "low bone mineral density."

Osteoporosis: A Silent Disease

Osteoporosis is a disorder resulting from too little new bone formation or too much bone loss, causing bones to become weak. Most people do not have symptoms, especially in the early stages. However, as bones become weaker, the risk for fractures increases. Osteoporosis may occur in any bone, but most commonly affects the wrists, hips, spine, and leg bones.

How is osteoporosis diagnosed?

Although osteoporosis may be suspected based on a patient's symptoms and risk factors, the diagnosis is made by measuring bone density with special x-ray techniques, called DEXA or bone density scans. These scans do not expose patients to large amounts of radiation, and generally take less than 20 minutes to perform.

People who have osteoporosis should discuss treatment options with their healthcare provider. Medications, such as bisphosphonates and calcitonin, are available specifically for the treatment of low bone density. In addition, if you have low levels of male or female hormones, or low levels of growth hormone, you may also benefit from hormone replacement therapy.

What are the risk factors for osteoporosis?

Osteoporosis is more common in people with the following characteristics:

- Female (especially after menopause)
- Family history of osteoporosis
- Caucasian or Asian race
- Small, thin frame
- Older age

The following factors may also increase the risk of osteoporosis:

- Smoking
- Diet low in calcium
- Lack of weight-bearing exercise
- Too much caffeine, alcohol, or soda
- A diet high in salt

Additional causes of osteoporosis in people who have had cancer may include:

A history of treatment with:

- Corticosteroids (such as prednisone and dexamethasone)

- Methotrexate
- Radiation to weight-bearing bones (legs, hips, spine)

Conditions resulting from cancer treatment, including:

- Low levels of female or male hormones
- Growth hormone deficiency
- High levels of thyroid hormone
- Chronic graft-versus-host disease requiring prolonged therapy with corticosteroids
- Prolonged periods of inactivity (bed rest)

Other medical treatments, including:

- Certain anticonvulsants (phenytoin and barbiturates)
- Aluminum-containing antacids (such as Maalox® or Amphogel®)
- Medications such as Lupron (used for treatment of early puberty and endometriosis)
- High doses of heparin (used to prevent blood clots), especially with prolonged use
- Cholestyramine (used to control blood cholesterol)

Many of the medications on this list are essential treatments for certain medical conditions. If you are taking any of these medications, do not change your dosage or stop taking your medication without consulting with your healthcare provider.

What lowers the risk of osteoporosis?

Fortunately, there are many things you can do to reduce the risk of osteoporosis. Regular weight-bearing exercise (such as brisk walking, dancing, jazzercise and jogging) helps to develop and maintain healthy bones. Bicycling and swimming are excellent exercises for general fitness, but these are NOT weight-bearing exercises, and they do not help to build strong bones. Exercises that are especially good for bone health include higher-impact weight-bearing activities, such as hopping, jogging and jumping rope. Resistance exercises, such as light weight lifting, also help to build strong bones and are especially important for bones of the upper body, including the arms and shoulders. If you have problems with your heart, or have painful bones or joints, be sure to discuss your individual health status and cancer treatment history with your healthcare provider before starting any new exercise program.

A diet high in calcium also is important in preventing osteoporosis. Most healthcare professionals recommend 1000–1500 mg a day, which means a diet rich in dairy products (milk, cheese, yogurt) and leafy green vegetables. Talking with a dietitian may help you design a healthy diet. Over-the-counter calcium supplements also may be useful. See Tables 1 and 2 for recommendations for calcium intake. Additional information about calcium-rich diets is available at ***www.nationaldairycouncil.org***.

Vitamin D is needed in order to absorb calcium. Skin makes this vitamin naturally when exposed to sunlight. Many dairy products also contain vitamin D. In general, at least 400 units of Vitamin D is recommended daily. You should not take more than 800 units of Vitamin D per day unless your health care provider has recommended a higher dose for you. Taking too much vitamin D may be harmful, so it's important to check with your healthcare provider before taking any vitamin D supplements.

What screening is recommended?

After reviewing your treatment history and risk factors, your healthcare provider can advise you regarding the need for bone density testing. For those at risk, a baseline bone density scan is recommended for childhood cancer survivors when they enter long-term follow-up (2 or more years after completion of therapy). Follow-up scans may be needed for ongoing monitoring of bone density in some patients.

Table 1: Recommendations for Adequate Dietary Calcium Intake in the United States

Age	Recommended Calcium Intake
1–3 years	500 mg per day
4–8 years	800 mg per day
9–18 years	1300 mg per day
19–50 years	1000 mg per day
50–70+ years	1200 mg per day

(from the Food and Nutritional Board, Institute of Medicine, 1997)

Table 2: Common Foods that are Good Sources of Calcium

Food	Serving Size	Calcium Content	Number of servings to equal calcium in 1 cup low-fat milk
Dairy foods			
Whole milk	1 cup (244 g)	246 mg	1.0
Low-fat (1%) milk	1 cup (244 g)	264 mg	1.0
Nonfat milk	1 cup (245 g)	223 mg	1.2
Yogurt, nonfat, fruit variety	6 oz (170 g)	258 mg	1.0
Frozen yogurt, vanilla, soft serve	½ cup (72 g)	103 mg	2.6
Cheese	1 1-oz slice (28 g)	202 mg	1.3
Cheese, pasteurized, processed	1 ¾-oz slice (21 g)	144 mg	1.8
Cheese, ricotta, part skim milk	½ cup (124 g)	337 mg	0.7
Nondairy foods			
Salmon, sockeye canned, drained, with bones	3 oz (85 g)	203 mg	1.3
Tofu, firm, prepared with calcium sulfate and magnesium chloride	½ cup (126 g)	204 mg	1.3
White beans, cooked, boiled	1 cup (179 g)	161 mg	1.6
Broccoli, cooked	1 cup, chopped (156 g)	62 mg	4.3
Collards, cooked, boiled, drained	1 cup, chopped (190 g)	266 mg	1.0
Baked beans, canned	1 cup (253 g)	127 mg	2.1
Tomatoes, canned, stewed	1 cup (255 g)	87 mg	3.0

Table 2 (continued)

Food	Serving Size	Calcium Content	Number of servings to equal calcium in 1 cup low-fat milk
Foods fortified with calcium			
Calcium-fortified orange juice	1 cup (240 ml)	300 mg	0.9
Selected fortified breakfast cereals	¾–1 cup (30 g)	100 mg	2.6
Instant oatmeal, fortified, plain, prepared with water	½ cup (117 g)	65 mg	4.1
English muffin, plain, enriched, with calcium propionate	1 muffin (57 g)	99 mg	2.7
Calcium-fortified soy milk	1 cup (240 ml)	200–500 mg	0.5–1.3

(from the U.S. Department of Agriculture Research Service, 2005)

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Additional health information for childhood cancer survivors is available at *www.survivorshipguidelines.org*

Note: Throughout this *Health Links* series, the term "childhood cancer" is used to designate pediatric cancers that may occur during childhood, adolescence, or young adulthood. Health Links are designed to provide health information for survivors of pediatric cancer, regardless of whether the cancer occurred during childhood, adolescence, or young adulthood.