

# Osteoporosis and Eating Disorders

If you have an eating disorder, you may be at increased risk of developing bone loss. Although it is very easy to think of osteoporosis as a disease that only affects older persons, about half of young female patients with anorexia nervosa have osteoporosis. Further, about 85% of partially recovered anorexia nervosa patients have bone mineral deficiencies, even if they have regained their periods and are within 10% of ideal body weight.

Patients with bulimia nervosa or eating disorders not otherwise specified (EDNOS) are also at risk of osteoporosis, especially if they have had anorexia nervosa in the past or have had episodes of amenorrhea or significant weight loss. Female athletes who restrict their eating or who have amenorrhea may also be at increased risk of developing bone loss. Also, not only women develop osteoporosis, men with anorexia nervosa are also at risk.

The damage caused by osteoporosis is often silent. Hip fractures are painful and easily detected, but fractures of the lumbar spine may initially be painless. Osteoporosis is, for the most part, a silent, ongoing disorder, discovered only after fractures occur.

## What is Osteoporosis?

In osteoporosis, the bones are weakened by loss of bone tissue (a condition called osteopenia, pronounced oste-o-peen-ia), making a person much more susceptible to fractures. Osteoporosis is defined by the World Health Organization as bone mineral deficiency that is 2.5 standard deviations (SD) below the mean peak value in young adults (T score). Osteopenia is a T score between 1 and 2.5 SD below the mean peak value.

Although we think of bone as solid and stable, in reality our bones are constantly being remodeled as bone is reabsorbed and new bone is laid down. In fact, about 10% of the bone in our bodies is replaced each year. Bone mineral mass increases during childhood and adolescence, and near peak bone mass is reached by about age 15. A smaller amount is produced until about age 30; after this, we lose about 1% of our bone mass per year. Bone loss can accelerate at any age, and can do so with excessive weight loss (as in anorexia nervosa) and excessive exercise. Throughout our lives, there is a dynamic balance between bone formation and bone resorption. This balance can be upset by many factors, including lack of adequate nutrition and hormonal influences.

Exercise can also influence bone mineral density. Moderate weight-bearing aerobic exercises, such as walking, can slow bone loss, but very strenuous exercise can speed bone loss.

## Diagnosing Osteoporosis

Several diagnostic aids are now available to diagnose osteoporosis. Certain chemicals act as markers of bone formation and bone resorption and can be measured with blood tests. Markers that indicate lower-than-normal levels of bone formation include calcitonin, a hormone secreted by the thyroid gland, and type-1 procollagen carboxy terminal propeptide. Markers of bone resorption that have been found to be increased in women with anorexia nervosa include serum type-1 collagen carboxy terminal telopeptide.

Another helpful blood test measures serum estradiol levels; estradiol is the strongest of the naturally occurring estrogens.

In women at risk, an x-ray test can clearly show bone loss. Dual energy x-ray absorptiometry, or DEXA, is used to examine two areas at greatest risk, the hip and lumbar spine (low back). DEXA is a little more expensive than regular x-rays, and less expensive than CAT scans, but is more precise and you are exposed to much lower levels of radiation. The test is quick, easy, and painless, and involves a scan of the hip and lower spine.

## Treatment

The mainstays of current treatment are weight restoration, normalizing body composition (particularly fat content), and use of calcium and vitamin D supplements. Estrogen supplementation (without weight gain) does not stop further bone

(OVER)

### Calcium Content of Some Common Foods

Food	Serving size	Calcium (mg)
Milk, skim	1 cup	302
Yogurt, nonfat	8 oz	300
Swiss cheese	1 oz	287
Figs, dried	10 figs	269
Tofu, raw, firm	+ cup	258
"Total" Cereal (whole grain)	+ cup	250
Orange juice with calcium	8 fluid oz	300
Nutri-Grain Cereal Bars	1 bar	200
Honey Wheat Bagels	1	200
Blackstrap molasses	1 Tbsp	172
Sardines, canned in oil	2 sardines	92
Mustard greens	+ cup	52
Broccoli, boiled	+ cup	36

Tip: Read labels! Many foods are now fortified and it is easy to find high-calcium foods in most supermarkets.

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loss or correct low bone mineral density.

**Restoring weight.** For young teens, body fat content should be at least 17%; adult women should aim for a body fat composition between 22% and 25%. Gaining weight helps, but may not fully restore bone mass.

**Calcium intake.** The average American consumes less than 800 mg of calcium per day. The National Academy of Sciences recommends 1300 mg of calcium/day for children 9 to 18, 1000 mg per day for adults 19 to 50, including pregnant and lactating women, and 1200 mg/day for everyone over 50 years of age.

Although it hasn't been proved that calcium can help restore bone in patients with anorexia nervosa, the current recommendation is that patients eat 1,500 mg per day of calcium, preferably in calcium-rich foods such as milk (see Table 1, "Calcium Content of Some Common Foods"). Also, many non-dairy foods are now fortified with calcium. If it isn't possible to get the full requirement from food alone, oral calcium supplements may be the answer. Vitamin D, 400 international units (IU)/day, is also recommended because it helps the body absorb calcium. Calcium tablets are usually easy to take and cause few symptoms. Sometimes calcium carbonate tablets may cause constipation, bloating, and excess gas. If this is the case, individuals should switch to a different brand and increase your fluid intake. People who have a tendency to form calcium stones in the urinary tract are usually advised not to take calcium supplements.

Calcium supplements come in a variety of forms. Some come from natural products such as oyster shell or bone. Others are marketed mainly as antacids (like Tums, for example). Calcium carbonate and phosphate preparations have the highest amount of elemental calcium, about 40%. Calcium citrate contains 21% elemental calcium; calcium lactate and calcium gluconate contain 13 and 9% elemental calcium, respectively. There is little evidence that one type of calcium is more effective than another in preventing osteoporotic fractures; calcium citrate may be better absorbed, however.

**Moderate exercise.** Moderate exercise, such as walking or yoga may be helpful—once your weight is restored. Strength training may also be useful. It is a real challenge: exercise may lessen appetite and slow continuing weight gain in a person recovering from anorexia. Also, some patients may become compulsive about exercise.

Is there any good news about osteoporosis? The good news is that increased awareness can lead to earlier diagnosis and treatment. Media campaigns promoting getting adequate calcium in the diet and the importance of moderate exercise are helping raise awareness of this devastating disease.

(Note: Dr. Pauline Powers contributed to this patient information sheet.)

## Bone Disease Websites

### ***NIH Osteoporosis and Related Bone Diseases-National Resource Center***

Try <http://www.oste.org/>, the official website of the NIH-ORBD-NRC. This website gives information about many aspects of osteoporosis and offers links to other bone-disease-related websites. It also provides a "Bibliographies" page, which offers a selection of references related to subjects such as eating disorders and bone density, sodium fluoride and osteoporosis, and men and osteoporosis.

### ***The National Osteoporosis Foundation (NOF)***

The official website of the NOF is <http://www.nof.org>. This easy-to-use website is designed more for patients than clinicians, and offers advice on a wide range of topics, including maintenance of a healthy diet, patient support groups, and ways of preventing or slowing the progress of osteoporosis. This site is specially geared to health-care professionals, and offers information on many aspects of osteoporosis, including an online version of "Osteoporosis Clinical Practice Guidelines."

### ***American Society for Bone and Mineral Research***

This website, <http://www.asbmr.org/>, is the official website for the American Society for Bone and Mineral Research, and is aimed at researchers. The website lists future conferences, grants and awards, employment opportunities as well as online access to abstracts of the latest issues and back issues of the Society's journals. (Full access requires membership in the Society.)