



Building Better Bone Density

by Mary Sowa

Osteoporosis, known as the silent epidemic, is a metabolic disease characterized by an excessive loss of bone mineral mass. Osteoporosis most commonly effects elderly women. It is estimated that 1.5 million fractures occur each year resulting in over \$10 billion in medical costs. Why is this important? There is no cure for osteoporosis; prevention is crucial.

Bone mineral mass is continually formed from infancy to young adulthood. Peak bone mass, the highest level of bone mineral density accumulated, is achieved by the age of 30. However, most bone density accumulation occurs during the adolescent growth spurt. Optimizing bone mass accretion will help lessen the risk of fractures as women age.

There are a number of factors that influence the attainment of peak bone mass. Heredity accounts for 60 to 80 percent of bone mineral accretion. Nutrition and exercise habits can be modified to enhance bone mineral density.

The Food and Nutrition Board of the National Academy of Science released new Dietary Reference Intakes (DRI) for calcium, phosphorus and vitamin D in August of 1997. All of these nutrients are important in bone health. Ninety-nine percent of body calcium is found in the skeleton. Phosphorus is an equally important mineral in bone density. Vitamin D is a precursor to calcitriol, a hormone that stimulates calcium absorption and bone remodeling. These new recommendations reflect the latest research in relation to optimizing bone density. Calcium is of particular concern because of the diminished intake seen in adolescents. Recent studies have revealed that teens are only consuming ~800 mg calcium/day compared to the new recommendation of 1300 mg/day. Teens, especially females, start to shy away from dairy products at this time as they tend to choose more empty calorie beverages.

Another modifiable factor that enhances bone density is weight bearing exercise. Weight bearing exercise provides mechanical loads to the skeleton that helps stimulate bone mineralization. Gymnastics is an example of a weight bearing exercise that can improve bone mineral density.

There are a number of published studies that demonstrate this effect. Investigators from Children's Hospital Medical Center, Cincinnati, Ohio, examined bone mineral density (BMD) in females 7-9 years of age. The investigators compared BMD of 14 gymnasts, 14 swimmers and 17 control subjects. The gymnasts were either level 5 or 6 competitors and the swimmers were either synchronized or speed swimmers. The control subjects were not involved in sports on a year around basis. Total body BMD was significantly greater in the gymnasts than the other two groups.

Investigators from the Department of Kinesiology and the Department of Nutrition and Food Sciences from Texas Woman's University examined BMD in college-aged females. Bone mineral density was measured in 11 gymnasts and 11 control subjects. Bone mineral density (lumbar and femoral neck regions) was found to be significantly higher in the gymnasts than the controls. These are only two examples of a number of studies that show the positive effects of gymnastics. The mechanical loads of gymnastics, result in higher BMD in females at a variety of ages.

The nutrition and exercise habits of pre-adolescent and adolescent females can affect their ability to achieve peak bone mass. Gymnasts are involved in a sport that enhances BMD. Emphasizing the importance of a diet adequate in calcium, along with other nutrients, will help optimize the accretion of bone mineral density. The following is provided as a handout for your gymnasts to assess their calcium intake. If you do not cover nutrition on a regular basis at your gym, consult the USA Gymnastics Referral Network (list can be found on www.usa-gymnastics.org/wellness/) for a Registered Dietitian in your area or contact the American Dietetic Association for an appropriate referral.

References:

- *Nutrition & the M.D.*, Vol. 22, No. 7, July 1996.
- Nichols, et al., The effects of gymnasts training on bone mineral density. *Medicine and Science in Sports and Exercise*, Vol. 26, No. 10, pp. 1220-1225, 1994.
- Cassell, et al., Bone mineral density in elite 7- to 9-yr-old female gymnasts and swimmers. *Medicine and Science in Sports and Exercise*, Vol. 28, No. 10 pp. 1243-1246, 1996.
- Food and Nutrition board, Institute of Medicine, (1997). Dietary reference intakes: Calcium, phosphorus, magnesium, vitamin D and fluoride. Washington DC: National Academy Press.

Why should calcium be important to you?

FUNCTIONS:

- Essential for building strong bones and teeth.
- Helps muscles contract and relax during gymnastics practice and other activities.
- Helps cuts and scrapes to stop bleeding.

CALCIUM CONTENT IN FOODS:

High Calcium Foods

300 mg/serving
 1 cup milk
 1 cup yogurt
 1 cup reduced lactose milk
 (ex. Lactaid milk)
 1 cup pudding

Medium Calcium Foods

200 mg/serving
 1 cup lactose free drink (ex. Vitamite or Edensoy Extra)
 1 cup calcium fortified orange juice
 2 slices American cheese
 1 cup cottage cheese
 1 cup ice cream
 4 oz. salmon
 1 cup kidney beans
 1 cup tofu with calcium

** Note: 2 cups cooked broccoli or 1-1/2 cups cooked spinach has about 200 mg of calcium, so it takes a lot of vegetables to get enough calcium. (Vegetables also have substances called oxalates and phytates which bind calcium, so it isn't absorbed as well.)*

** Calcium is better absorbed with vitamin C, which is found in citrus fruits, (ex. oranges, grapefruits, strawberries, lemons and tomatoes.)*

How much calcium do you need each day?

DRIs (Dietary Reference Intakes) are:

- Ages 4-8 - 800 mg/day
- Ages 9-13 - 1300 mg/day
- Ages 14-18 - 1300 mg/day
- Ages 19-30 - 1000 mg/day

Take a minute to write down what you ate for breakfast, lunch, dinner and snacks yesterday. Add up the amount of calcium you consumed. Are you reaching your target? If you do not reach your target on a daily basis, talk to your doctor or registered dietitian to see if a calcium supplement is right for you. **Calcium supplements:** * The amount of calcium varies in each tablet so check the labels. Calcium citrate is a fairly common form of calcium and is likely better absorbed than calcium carbonate supplements.

Here are a few sports nutrition websites:

American College of Sports Medicine www.ascm.org
 American Dietetic Association www.eatright.org
 Gatorade Sports Science Institute <http://gssiweb.com>
 National Strength & Conditioning Association www.ncsa-lift.org