Osteoporosis, Nutrition, and The Casein Connection

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Introduction

Osteoporosis is the medical term for bones that have lost calcium and become thin or "less dense". It is a decrease in "bone mineral density" (BMD). It is a normal process of aging; however, we now know that the course it takes can be improved by engaging in weight bearing exercise and what we eat.

We measure *Bone Mineral Density (BMD)* by utilizing a special scanner to obtain what is called a *Dexa scan.* There are alternative ways to determine the density of the bone but this is the most accurate method.

Osteoporosis has become a popular topic in the past fifteen years because of the decline in use of hormone replacement therapy (HRT). HRT is a combination of estrogen and progesterone commonly given to women when they reach menopause. HRT ameliorated many of the unpleasant side effects of menopause such as hot flashes and was also very effective in maintaining bone mass. Estrogen helps build bone and limit calcium loss and thus when it was less widely used the rate of osteoporosis increased.

Many medical studies concluded that it was logical to decrease the dosages commonly prescribed because women utilizing hormone replacement therapy (HRT) were at increased risk for a variety of medical conditions. HRT has been associated with an increased risk of breast cancer, heart attack, deep vein clots, and gallbladder disease (1, 2, and 3). There are now a multitude of drugs to treat osteoporosis effectively but nutrition also plays a significant role. A deficiency of calcium and vitamin D3 is known to be associated with osteoporosis.

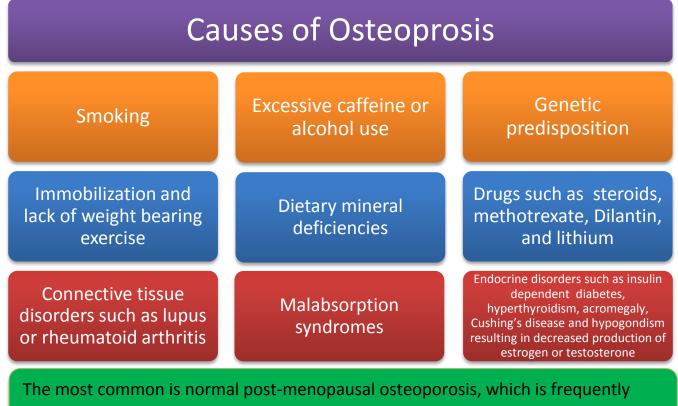
Osteoporosis

Osteoporosis is known as a "silent disease" because the first sign a person experiences is usually a fracture. More than one million fractures per year in the United States are the result of osteoporosis (12) and twenty five million people have osteoporosis. Of these 80% are women, predominantly postmenopausal. Men and young women may also be affected.

The good news is that this disease is treatable if you take the time to be tested for it. Don't wait for a fracture! The three most common sites of fracture are the vertebrae, hip, and wrist (12).

Unfortunately the consequences of osteoporosis are frequently fatal in elderly people who fracture a hip. Death is usually due to the medical complications that follow surgery. Almost 50% of elderly women who fracture a hip and undergo surgery die within one year from medical complications such as heart failure and blood clots to the lung (pulmonary embolus) associated with general anesthesia and immobilization following surgery.

There are a multitude of etiologies for developing osteoporosis. The most common is normal postmenopausal osteoporosis. Below is a partial list of additional causes of osteoporosis.



associated with living a nice long life and not being attentive to being tested

Calcium

Calcium is a critical mineral. It not only plays a role in bone formation but is necessary for basic activities such as muscle contraction, nerve conduction, and proper functioning of the heart. There is a definite correlation between higher calcium intakes and increased bone mineral density in children, young adults, and post-menopausal women (4). It has been documented that decreased calcium intake is also associated with an increased incidence of diseases such as colon cancer, breast cancer, diabetes, and hypertension (5).

The recommended daily intake of calcium for an adult is 1,000mg. per day. Some feel that postmenopausal women should have an intake of 1,200mg. per day. The diet of the average American contains approximately 600mg. per day of calcium, which is far less than what we need. Supplementation is therefore important to make up the difference. A recent study in New Zealand casts doubt on the effectiveness of calcium and vitamin D supplementation (23).

Vitamin D3

Vitamin D3 is also known as Calcitriol and 1, 25-dihydroxycholecalciferol. It is the active form of Vitamin D and is necessary for absorption of calcium from the intestinal tract.

In the past it was widely believed by the medical profession that 15 to 30 minutes of sun exposure per day was adequate for Vitamin D production. We now know that is incorrect and at least 30-50% of the

general population is deficient in Vitamin D3 (6). Blood tests can and should be done to check your level. Supplements are readily available. Many people take a Vitamin D3 supplement prophylactically.

Calcium Absorption and the Casein Connection

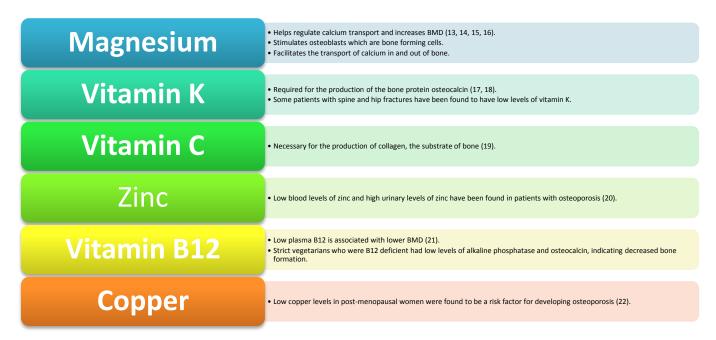
Milk and dairy products are the principal sources of calcium in our diet (7). Approximately two-thirds of milk calcium is bound to casein proteins (8). Milk products such as skimmed milk and yogurt retain almost all their original calcium present before processing, whereas cheeses retain approximately 80% (8). Ingestion of various dairy sources of calcium is linked to increased bone mineral density and reduction in rates of fracture (9).

It is important that we not only consume foods rich in calcium but that we are able to absorb the calcium from those foods. Casein plays a unique role in the transportation of calcium complexes, thus making calcium available for absorption, predominantly in the small intestine (8).

Two interesting studies were published in the British Journal of Nutrition. Lee found that rats fed a casein diet had higher rates of calcium absorption than those fed a diet containing egg albumin, soy protein, or an amino acid mixture. It was concluded that casein phosphopeptides prevented the formation of insoluble calcium salts (10). The other study by Tsuchita suggested that the addition of casein phosphopeptides to calcium fortified milk facilitated the absorption of calcium (11) from the intestine.

Casein helps to keep calcium in a soluble form until it reaches the part of the intestine where it is absorbed. Studies were done comparing whey and casein with regard to their effect on mineralization of bone. Casein was found to be superior (8).

Vitamins and Minerals Affecting Bone Density (a partial list)



Summary

There is no doubt that nutrition plays a critical role in the evolution of osteoporosis. Ensuring the adequacy of many nutrients besides calcium is essential for bone health, just as weight bearing exercise is critical for the maintenance of bone mass. Dairy products are excellent sources of calcium. Individual requirements vary with age, prescribed medications, dietary preferences and the presence or absence of other diseases.

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