

# The Downing Clinic Osteoporosis Prevention Guide

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Osteoporosis is the silent loss of bone that usually becomes apparent in women as they reach their 60's, 70's or older when bone fracture rates sharply escalate.

**Osteoporosis is a thinning of the bones.** The osteoporosis process starts gradually in the early 30's, when women typically begin to lose 1% of their bone mass annually. This bone loss accelerates in the 5-10 years after normal or surgical menopause when estrogen levels drop. Rate of bone loss stabilizes again after that to about 1% bone loss per year. One fifth of women in the United States will develop osteoporosis over a lifetime.

## Men get osteoporosis too!

Women are not the only ones who get osteoporosis, men also may lose bone, but at a much slower rate and to a far lesser degree. Whether a person develops osteoporosis or not depends upon heredity, hormones, nutrition and lifestyle. Bone loss for both sexes typically begins in the spine, and later in the hip, wrist, and long bones of the arms and legs.

Broken bones occur more easily when bone is thinner and when bone protein fibers become drier and less flexible. The most common fractures occur in the wrist, hip, or spine where the bones contain more of a weaker honeycomb type of bone and less of the hard, dense outer bone. Often a fracture is the first sign of osteoporosis.

Spinal vertebrae are normally cylindrical bones that give us structural support for upright posture. With osteoporosis, these vertebrae can flatten, leading to loss of height and low back pain. They may also become wedge-

shaped, leading to exaggerated curvature in the upper back, called Dowager's hump. Maintaining good posture and strength of back muscles is important.

## Mineral Reserves

Minerals are deposited and bone density and length rapidly accrue during the teenage growth spurt until about age 23 years or so. This occurs partly due to increased levels of human growth hormone, estrogens, progesterone, and androgens. The bone minerals laid down early in life comprise the lifetime mineral reserves that the body draws upon whenever alkaline minerals are needed later on.

The most notable of these minerals is calcium, which is tightly regulated by hormones and Vitamin D. But bone contains a huge array of other minerals, such as phosphorus, magnesium, boron, manganese, strontium, silicon, zinc, potassium, sodium and Vitamin K.

## Estrogen Protects Bone

When the supply of estrogen falls, bone is lost. This happens in the postmenopausal period and after surgery to remove the ovaries. It also happens among young women when they over exercise, under eat, or become very stressed. When a young woman stops menstruating or has irregular periods, it is a sign that estrogen levels may be low, setting her up for osteoporosis later in life. Bones may be thinning at the very critical time of life when they need to be adding mineral density. When these menstrual changes occur in a young woman, it is cause for concern. A full hormonal, bone loss and nutritional workup should be done.

### **Bone is far more than calcium!**

Bone is made up of tiny crystals of calcium and phosphorus deposited onto a tough mesh framework of protein fibers, mostly collagen. While the calcium phosphate crystals provide strength, weight, and hardness to bone, this collagen protein matrix allows some capacity for flexibility, allowing bone to be less brittle and less likely to fracture.

If you completely dissolved away all the minerals in bone with an acid, the collagen framework would still be there and the shape of the bone would be intact and flexible, like the tip of your nose.

Bone is a living tissue that replaces itself every seven years or so. Like a railroad crew, there are bone cells that destroy old bone, and other bone cells that form new bone in its place. The whole process takes months to complete. Bone loss occurs when bone-dissolving cells predominate over bone-building cells. Nutritional, hormonal, genetics and lifestyle factors affect this bone remodeling process.

### **Nutrients play important role in prevention**

Calcium makes up 37% of bone minerals. Calcium needs are greatest during adolescence when bones are growing longer and denser. In the years around menopause, calcium needs again are very high. Calcium foods should be a part of the diet for a lifetime.

### **Calcium Intake Recommendations**

Adolescence	1200 -1500 mg
Adults	800 -1000 mg.
Pregnant/lactating	1200 mg.
Postmenopausal	1200-1500 mg.

### **Calcium absorption declines with age.**

Food sources of calcium are absorbed and utilized better by the body than inorganic or "rock" forms of calcium found in most calcium supplements. For example, calcium carbonate is the same as sidewalk chalk, not a normal food for humans. Neither is coral calcium. Calcium citrate-malate may be better absorbed than other supplement forms of calcium. Calcium

is best absorbed if taken in small quantities of around 250 to 350 mg. at one time, taken with meals. Ask for a list of calcium foods when you are next at TDC.

### **Fiber diminishes calcium absorption**

Fiber foods are in the spotlight now since the new USDA Food Pyramid features fiber. Food companies have responded with a host of whole grain crackers, cereals, breads, pastas. While there is no question these whole grains are good for us, they can adversely affect calcium absorption.

Constituents in fiber bind calcium so it is not absorbed well. Most notable of these are the phytates found in cereal grains (whole wheat, oats, rye). High intake of whole grains containing phytates can actually lead to a negative calcium balance, with more calcium lost than is retained. Other minerals may be lost as well. It is best NOT to eat whole grains with every meal, and to be sure to include extra calcium with those meals where you do eat whole grains.

Oxalates bind calcium in the digestive tract so it cannot be absorbed. They are found in some dark green leafy vegetables, tea, rhubarb and many other foods. Green, leafy vegetables also contain calcium. The calcium in broccoli, turnip and mustard greens, collards, and kale is well absorbed. Calcium in spinach and chard, however, is poorly absorbed due to their high oxalate content.

Calcium and iron interact when taken together. Adding a calcium supplement with a meal can increase calcium absorption, but it reduces iron absorption from both foods and supplements. However, calcium taken in orange juice, which is commercially available, does not interfere with iron absorption.

Calcium supplements reduce magnesium absorption. Often, magnesium needs to be added separately to ensure an adequate magnesium supply. Magnesium, important part of bone, also has many other roles in the body.

Stomach acid is necessary for minerals to be absorbed. Loss of stomach



acid usually begins gradually around age 50. Many patients benefit from taking betaine HCl with meals to enhance production of stomach acid. Drinking a small glass of water with lemon juice or a little apple cider vinegar, or taking bitters before a meal may help to stimulate gastric juices.

When patients take frequent doses of antacids or take drugs which stop the production of stomach acid (available without a prescription), calcium and other minerals are not absorbed.

Bowel pathology of any kind can sharply reduce calcium and mineral absorption. Such things as rapid bowel transit, chronic diarrhea, colitis, inflammation, Candida intestinalis, atrophy of lining of the gut all play a role.

Certain drugs, especially prednisone or similar drugs, lead to bone loss. Diuretics like Lasix or Bumex lead to calcium loss in the urine, while hydrochlorothiazide (HCTZ) does not.

### **High Phosphorus intake reduces bone strength**

Phosphorus provides 17% of bone minerals, bound to calcium. Ideally, the diet ratio of calcium to phosphorus should be in a 2:1 or higher.

Human milk is the perfect food in this regard with a 2.4:1 ratio. The higher the calcium content of the diet compared to phosphorus, the better for the bones.

The typical U.S. diet is just the opposite: phosphorus to calcium is 2:1. Dietary phosphorus intake has increased in the last 50 years, paralleling the rise in hip fractures from osteoporosis. Phosphorus has been increasingly added to our food supply since the 1950's. Expect to get a phosphorus load from processed convenience food, cold cuts, fast food, and especially soda pop.

Most of our phosphorus, however, comes from meat, fish, poultry, and dairy. These foods contain far more phosphorus than calcium, leading to loss of calcium in the urine. This raises the question of whether dairy is really a good source of calcium for the bones or not. A prolonged

high phosphorus diet leads to bone loss. The higher the phosphorus, the more calcium is lost in the urine.

Leafy greens, on the other hand, have a very high calcium to phosphorus ratio making them the most desirable sources of calcium. Turnip and mustard greens, kale, and collards can be added to soups, sautéed with olive oil and garlic, or simply steamed with a little butter or ghee.

**Soda pop is extremely harmful to the bones. With no calcium at all and a high phosphorus load and high acid content, bone is dissolved when pop is consumed.** This is especially worrisome for children, adolescents, and young adults who drink pop on a daily basis. They may be losing bone mass at the very time of life when they need to be increasing bone mineral deposits.

### **Magnesium aids calcium usage**

Magnesium is deposited in bone on the collagen protein matrix right along with calcium and phosphorus as part of bone crystals. Magnesium is necessary for proper calcium usage by bone. Usual recommendations are to get calcium and magnesium in a 2:1 or a 1:1 ratio. Magnesium is found in green beans, celery, green leafy vegetables, fish, whole grains, seeds, nuts, soy, dried beans, molasses, dairy, meat, and some water.

### **Vitamin D for more bone density**

Vitamin D intake correlates with bone density. The more Vitamin D<sub>3</sub> you get, the denser your bones. Vitamin D<sub>3</sub> stimulates bone to lay down more matrix protein, and it increases calcium availability. Vitamin D<sub>3</sub> helps bones incorporate minerals for strength.

Vitamin D is made by the body when the sun's UVB rays act upon cholesterol in the skin. Only a few foods contain Vitamin D: fish liver oils, fatty fish, and egg yolks.

Vitamin D is not efficiently made in dark-skinned persons or when sunscreen is used. Cloudy days and polluted air also reduce Vitamin D synthesis. In Michigan,



Vitamin D production is highest in mid-May to Mid-September and lowest in January.

Doses of Vitamin D based on research done on both Vitamin D and osteoporosis are now 3,000 IU per day or more. These levels are not toxic for humans, and in fact, humans make that much under some circumstances. At TDC, we frequently run Vitamin D blood tests and dose accordingly.

#### **Other nutrients for sound bones**

**Boron** is a trace mineral that aids calcium metabolism. Without enough boron, bone becomes brittle, and calcium and magnesium are lost. Boron activates estrogen which promotes bone health. Boron is rich in nuts and seeds, non-citrus fruit, legumes, soy, vegetables, honey.

**Copper** slows bone breakdown and aids repairs and formation of bone matrix. Zinc depletes copper, so be sure to add copper if you take zinc supplements.

**Folate and B12** play a role in bone health by keeping homocysteine levels low. Homocysteine comes from breakdown of protein and builds up if B vitamin levels are too low. High homocysteine is a risk factor for osteoporosis because it interferes with formation of bone matrix. TDC routinely checks homocysteine levels and treats accordingly.

**Manganese** deficiency leads to faster bone loss. It plays several roles in bone health. It is found in pineapple, nuts and seeds, whole grains, beans, green leafy vegetables, meat and tea.

**Silicon** is needed for good connective tissue, bones, cartilage, and tendons. Silicon levels decrease with age in blood and skin, so supplements may be necessary in later years. Horsetail is a good source of silicon, as are brown rice, barley, cucumbers, walnuts, string beans, turnips, parsley, nettles.

**Strontium** is very similar to calcium, and helps make bones stronger and plays a role in bone remodeling.

**Pyridoxine (B6)** supports protein structures in bone, and promotes progesterone production. With B6 deficiency, fractures heal more slowly.

**Vitamin C** is needed by bone for formation of its collagen and cartilage protein structure, and it increases calcium absorption.

**Vitamin K** is necessary for calcium to deposit on the protein matrix of bone. Vitamin K is normally made in the intestines. If normal bacteria have been disrupted, it interferes with Vitamin K synthesis.

**Zinc** is important for bone formation and repair. It is frequently deficient, especially in the elderly. Stress depletes zinc.

#### **Causes of Bone Loss**

**Reduced levels of Progesterone and Estrogen** hormones increases bone loss. Estrogens slow down bone breakdown, while progesterone supports the cells that make bone. At TDC, we see many postmenopausal patients gain bone on bone mineral density studies with use of bio-identical hormones, bone nutrients, and exercise. Natural progesterone is not to be confused with synthetic progestin drugs.

For those who can't take hormones, taking the herbs black cohosh or dong quai, and eating soy foods regularly have a positive effect on bones.

Homeopathic estrogen, progesterone, testosterone in a topical cream or drops are useful for symptoms, but have unknown effects on bone.

Testosterone, pregnenolone, and DHEA help retain strong bones. TDC routinely checks these hormone levels and treats accordingly.

**Lack of exercise** leads to bone loss. Pulling on the bones by using your muscles adds density to bone. Impact from weight-bearing exercise creates force that makes bones stronger. The



key here is regular exercise done over a long period of time. Stronger muscles lead to stronger bones. Lifting weights, if done properly, is a good way to gain bone, as is running or jogging. Swimming, biking, and simple walking are less effective. Recently a patient at TDC had gained 17% bone density in her hip, 9% in her wrist, and 1% in her spine after one year of water aerobics with resistance. She also uses bio-identical hormones, takes bone nutrients, eats a diet with vegetable sources of calcium.

**High protein diets** create an acidic internal metabolism. Alkaline bone minerals, such as calcium, magnesium, potassium, are used to buffer the acid if there are not enough other buffers on hand. For each ounce of protein eaten, figure 30 to 40 mg. of calcium will be excreted. Vegetable protein is more alkaline, and less calcium is needed to buffer it.

Vegetarians have a lower rate of osteoporosis than other women in the U.S., yet they average only about 600 mg. of calcium per day. This is likely due to an alkaline diet, more bone minerals from eating more vegetables, and a high calcium to phosphorus ratio in their diets.

**Acidic metabolism** from eating acid forming foods or from stress leads to bone breakdown. Bone is dissolved to provide minerals to buffer the acid. Ask at TDC for a list of foods which are either alkaline or acidic. It is best to include many alkaline foods in your diet to help prevent bone loss from stress.

Alkaline foods include: pumpkin, lentils, yam, onion, nectarines, watermelon, parsnip, kale, mustard greens, citrus, olives,

strawberries, raspberries, almond, collards, cauliflower, broccoli.

Mineral waters are alkaline and many contain high levels of calcium. Drinking mineral water during the day is a good way to help protect the bones. Perrier, San Pelligrino, Gerolsteinersprudle, and Sanfaustino are examples. San Faustino has the most calcium with 80 mg. per glass.

Another form of alkaline water is made in special machines that split ordinary water into its acid and alkaline components. Ask for a brochure at TDC. Also, TriSalts alkaline powder, 1/8 to 1/4 tsp. may be added to one quart of drinking water to provide alkaline minerals and help spare bone.

**Caffeine** in coffee, tea, soda pop or medicine causes calcium to be lost in the urine. For each 6 oz. cup of coffee, 40 mg. calcium is lost in the urine.



**Salt** increases calcium loss in the urine and ultimately lowers bone density. A 3000 mg daily load of sodium, or rounded teaspoonful of salt, leads to a 7.5 to 10% bone loss in postmenopausal women over a 10 year period.

**Sugar** interferes with calcium absorption and causes calcium losses in the urine. High insulin from eating sugar blocks renal reabsorption of calcium.

**Heavy metals**, such as lead and mercury, contribute to bone loss because bone calcium is used to buffer them. Avoiding heavy metals, removing them from the body, and getting plenty of calcium and other bone nutrients is the best way to deal with heavy metals.

### Testing for bone strength and health

TDC does special tests to follow bone health, including:

- Bone Mineral Density
- Urine Bone Loss test
- Calcium and Vitamin D Levels

- Homocysteine levels
- Genetic Risk Factors for Osteoporosis
- Hormones: Estrogens, progesterone, testosterone, DHEA

6. Replace missing hormones, or use herbs after menopause.
7. Avoid soda pop, fast food, processed food, salt or sugar loads.
8. Get enough sleep, learn stress reduction technique

### Supplements for bone health

The Downing Clinic uses many supplements to promote bone health, and has many calcium supplements:

- Cal Guard
- Balanced Minerals with Calcium
- Osteo Mins (Jonathan Wright, M.D. formula)
- Pro Bono (Jonathan Wright, M.D. formula)
- Liqui Cal
- Calci Food
- CalMag Plus
- Vitamin D<sub>3</sub> IU capsules and drops
- Vitamin K2 capsules and drops
- Ostivone (ipraflavone)
- Bone homeopathic
- Tri Salts (potassium, magnesium, calcium bicarbonate)
- Mag Glycinate
- Mag Citrimate
- Citramin II



### Tips for healthy bones

1. Get calcium and other minerals from a wide variety of vegetables.
2. Limit meat, poultry, fish, and dairy and eat some vegetarian meals.
3. Make soup by cooking bones to get the minerals and nutrients for soup stock.
4. Drink mineral water, vegetable juice, and eat alkaline foods.
5. Exercise at least three times weekly; daily if possible.