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## MINERAL METABOLISM AND OSTEOPOROSIS

Osteoporosis is a condition that affects the bones, causing them to become weak and fragile and more likely to break (fracture). These fractures most commonly occur in the spine, wrist and hips but can affect other bones such as the arm or pelvis. Hip and vertebral fractures are associated with increased morbidity (catastrophic injury) and mortality (contribute to a cause of death).

Osteoporosis is the most common bone disease in humans.

- For instance, over two million osteoporosis fractures occurred in the United States in the year 2005.
- Over 10,000,000 people in the United States have osteoporosis.
- An additional 34 million people in the United States have low bone density of the hip.
- Although commonly associated with post-menopausal women, osteoporosis can also affect men, younger women and children.
- One in 3 women older than 50 years will eventually experience osteoporotic fractures, as will 1 in 5 men.
- By 2050, the worldwide incidence of hip fracture is projected to increase by 240% in women and 310% in men.

Bone is made of a hard outer shell with a mesh of collagen (tough elastic fibers), minerals (including calcium), blood vessels and bone marrow inside.

- Healthy bones are very dense, and the spaces inside the bones are small.
- In bone affected by osteoporosis, the spaces are larger, and this makes the bones weaker, less elastic and more likely to break.

Bone is a living tissue that is constantly repairing itself. This process is called “bone turnover.”

- Osteoclasts are cells which break down old bone and prepare the way for new bone building, much like a demolition crew on a remodeling project in a house.

- Osteoblasts are cells which build new bone in areas that osteoclasts have prepared, much like the carpenters, masons and other contractors who install all the improvements in a remodeling project.
- This process requires a range of proteins and minerals, which are absorbed from the bloodstream, as well as “load-bearing” exercise to stimulate the process.

In childhood, bones grow and repair very quickly, but this process slows down as you grow older. Bones stop growing in length between the ages of 16 and 18, but continue to increase in density until you are in your late 20s. From about the age of 35, you gradually lose bone density. This is a normal part of aging, but for some people it can lead to osteoporosis and an increased risk of fractures.

Risk factors for bone loss include and are not limited to:

- Sedentary lifestyle
- Smoking or other nicotine use
- Taking corticosteroids like prednisone
- Renal dialysis
- Anti-seizure medications

We recommend a baseline bone density scan (DEXA) and lab work to determine your risk of bone loss and catastrophic fragility fracture.

## TREATMENT OF OSTEOPOROSIS:

### TIER 1 TREATMENT - THE NUTRITIONAL BUILDING BLOCKS

There are three vital nutrients that are needed every day for building healthy bone, and they all need to be there in sufficient amounts to do the job; much like a bricklayer needs good quality bricks and mortar to build a strong brick wall. Baseline blood testing is recommended to help guide effective treatment.

#### **CALCIUM:**

- Calcium is the main mineral, among others, that give bones their structure.
- The form of calcium that is most easily absorbed is “Calcium Citrate.”
- Calcium IS NOT EASILY ABSORBED when Vitamin D levels are low, a problem for virtually anyone living in the Pacific Northwest. Typically, only about 10% of the calcium you get from food and supplements is absorbed from your gut in low Vitamin D states.

Recommended Daily Calcium (supplements should be divided into 2-3 doses)

- Birth to 6 months - 210 mg
- 6 months to 1 year - 270 mg
- 1-3 years – 500 mg
- 4-8 years - 800 mg
- 9-13 years - 1300 mg
- 14-18 years - 1300 mg
- 19-50 years - 1000 mg
- 51-70 years 1200 mg
- 71 or older 1200 mg
- Pregnant or lactating 14-18 years 1300 mg
- Pregnant or lactating 19-50 years 1000 mg

\*\*Don't forget to count the amount of calcium in your diet

### Vitamin D3:

- Blood levels routinely accepted are a reference range between 30 - 100.
- For bone building, we suggest a Vitamin D level between 75 – 100, with a minimum of 60.
- This optimum level of Vitamin D will drive up to 40 – 50% of your calcium intake from the gut into your bloodstream, help battle fatigue, and will support your immune system.
- Daily doses of Vitamin D3 are highly individual and are guided by blood level testing.

### Vitamin K2:

- This important nutrient acts like a “traffic cop” and is necessary anytime you are increasing the amount of calcium in your bloodstream.
- It works with two proteins that put the calcium where it belongs, and it keeps it from going where it doesn’t belong.
  - One these proteins binds to the calcium and deposits it in the “bone bank,” right where we need it to go.
  - The other protein prevents the calcium from being deposited where it doesn’t belong, in blood vessels or kidneys, and will scavenge the calcium from these structures.
- Daily Vitamin K2 dose is 100-180 mcg/day. MK-7 is the form that was used in studies.
- People on blood thinners (coumadin or warfarin) should consult with their primary provider before beginning Vitamin K2; they may have to adjust the dose of your blood thinning medication.
- Many people have difficulty converting Vitamin B12 and Folate into their methylated form that the body can use. This is vital for all metabolism, including building bone, and a supplement may be recommended.

### RECOMMENDED TIER 1 TREATMENT

	<b>NUTRIENT</b>	<b>DOSE</b>
	Calcium Citrate	600 mg two times per day (OTC)
	Vitamin D3	I.U. Daily (OTC)
	Vitamin K2	100 – 180 µg Daily (OTC)
	Multivitamin [Over the counter]	One Capsule Twice Daily