

Osteoporosis Protocol

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What I will do in this paper is talk about some of the factors involved in maintaining and improving bone density. I always like to go back to the physiology texts, because often the very basic information found there gives some good clues on how to approach a problem.

Guyton's *Textbook of Medical Physiology* says this about osteoporosis:

“Osteoporosis is the most common of all bone diseases in adults, especially in old age. It is different from osteomalacia and rickets because it results from diminished organic bone matrix rather than from poor bone calcification.”

Protein and Protein Digestion

The usual approach to bone density issues is to see it as a lack of calcium or a lack of vitamin D. These may be factors, but prior to being able to build up bone calcium, there needs to be the *organic bone matrix* mentioned above. When calcium accumulates in bone, it calcifies a collagen protein scaffold. The protein scaffold requires, well, protein. Adequate protein to make this scaffold requires enough protein to do this *and* the ability to digest it. One researcher went so far as to say that osteoporosis is a protein malnutrition disease.

One of the problems that increases with age is that it can become more difficult to digest protein. What can happen is that there is a decrease in the stomach's production of pepsin (an enzyme that helps break down protein) and the acid that activates the pepsin. The typical signs and symptoms that I see with this is that a larger protein meal feels heavy in the stomach, sometimes sitting there for many hours. Red meat can become especially problematic when this is an issue.

Another common symptom is excessive production of gas. The acid and pepsin that should be produced will trigger the release of enzymes from the pancreas and bile from the gall bladder. If there is a lack of acid, enzyme and bile release will be inhibited, resulting in increased gas and problems digesting your food.

So, one key piece to building that organic bone matrix is to get enough protein and to be able to digest it. If you have problems with protein digestion, that is another conversation that needs to be had.

How Much Protein Is Enough?

This is a very significant question without an easy answer. The back-story here is that we have two main fuels for our body - carbohydrates (starches and sugars) and fat. When we need carbohydrates, our body may take protein and convert it into sugar for fuel.

The problem comes when we become what I like to term “carbohydrate-dependent,” which is a situation where it is very difficult to burn fat for fuel because the insulin/blood sugar system is out of whack. Typically, after we eat, the body will burn the starches and sugars first or put them into storage for later use as either fat or glycogen.

What should happen is that when we start to run out of sugar for fuel, we should just automatically start to mobilize fat to burn. If you are carbohydrate dependent, access to fat is more or less cut off, and you will want to eat again. You will especially want to eat sugars and starches, because this is what your body can metabolize for fuel. The other thing that happens in this situation, which is pertinent for this discussion of osteoporosis, is that the body will sometimes get very good at using protein as a base for conversion into sugar.

If you are in this situation, you will need to eat protein, not just for body remodeling and structural bone building (repair and maintenance), but also to provide fuel. If you are robbing out your protein to support your need for energy, you will need a lot more protein to be adequate to provide both fuel and a source to make the organic bone matrix. If this is an issue for you, you might want to look at my *Macronutrients and Health* paper where I discuss blood sugar issues and fat burning.

Nutritional Support

Whenever you see an article on osteoporosis, various nutrients will be mentioned. These are important *once you have adequate organic bone matrix present*.

Vitamins Include

- Vitamin D, which is essential to help calcium absorption
- Vitamin A
- Vitamin K2
- Folate and B12

Vitamins D, A, and K2 are synergistic with each other in helping bone building and bone remodeling. When each of them is adequate, they will also prevent any one of them from becoming toxic. When any one of them is missing, any of the others becomes more likely to become excessive. For instance, if you take high doses of vitamin A without adequate vitamins K2 and D, the A will become a problem. With adequate D and K2, you can take relatively large amounts of A with no problem at all.

Vitamin K2 is synthesized in the gut by bacteria. If you have gut issues, then you may have a problem in this area. To the best of my knowledge, no testing exists for K2.

Folate and B12 are critical for new bone formation and are not uncommon deficiencies as we age. Folate as 5MTHF or 5 methyltetrahydrofolate (rather than as folic acid, a synthetic folate variant), and B12 as methylcobalamin or hydroxycobalamin are the best forms.

Minerals and Other Nutrients

- Calcium is needed for healthy bone formation, though excessive calcium may actually be problematic in that it may crowd out other important minerals by competing for absorption.
- Magnesium deficiency is a very significant contributor to problems with poor bone density and poor bone quality. Magnesium appears to contribute to the flexibility of bones when they are formed. Excess magnesium, however, can cause problems with bone density. It may be advisable to test red blood cell magnesium – the best marker of magnesium sufficiency. Make sure that it is *red blood cell*, not *serum* magnesium.

- Silicon is very helpful in the formation of organic bone matrix.
- Zinc, copper, and manganese are essential cofactors in the production of bone matrix.
- Sometimes you will hear about strontium being used. I would not recommend it. Strontium is very similar to calcium. If you flood your system with strontium, you will have some increase in bone density, but the body will rid itself of the strontium as fast as possible once there is adequate calcium to take its place.
- Vitamin C is critical in helping the organic bone matrix to form. It helps form collagen.
- Collagen peptides are protein breakdown products a bit like gelatin that helps make the collagen backbone of the organic bone matrix.

Exercise

Exercise is a critical component of bone building. You might think of it this way. The body is pretty smart. It won't spend its money making strong bones if there is no particular reason to. Exercise stresses the bones. When bones are put under stress, the body responds by laying down more bone to handle the stress. The more the stress, the more the bone builds up, assuming that there are enough raw materials to do so.

Exercise can and should take many forms. Strength training, stretching, yoga, walking, dancing, bouncing on a mini trampoline, jumping rope, even isometrics - anything that requires you to put stress on your body will tell the body that strength in the bones is needed.

Hormones

Both estrogen and testosterone play a role in bone building and maintenance. A significant amount of bone is lost in women at menopause because of the lack of adequate estrogen. Estrogens tend to keep the cells in the body that break down bone for remodeling under tighter control.

It is especially important at peri-menopause and menopause to get adequate exercise and to have good nutrition. It may be appropriate to supplement with some bio-identical hormones if you and your doctor feel that this is appropriate for you. By and large if you are some years into menopause, adding in hormones will not be of as much help.

In men, adequate testosterone has a similar role as estrogens do in women.

Inflammation and Stress

This, along with the protein issue, is another sleeper issue not much thought about. Chronic, low-grade inflammation will increase levels of a chemical in the blood called interleukin 6, or IL6. IL6 has a very powerful effect on bone, causing it to break down much more rapidly than it ordinarily would. The problem is that if you break down bone rapidly, but there are inadequate resources to rebuild bone, there will be a net loss of bone.

Sources of chronic inflammation are many. This is something to discuss with your physician. Incidentally, one of the most common sources of chronic, low-grade inflammation is a problem with blood sugar.

Emotional stress tends to cause bone breakdown if it is excessive or prolonged.

Medications

The bulk of the medications that are used for osteopenia and osteoporosis tend to stop the body from breaking down and remodeling bone. What should happen in a healthy situation is that the cells in the body that are responsible for initiating the remodeling of bone, the *osteoclasts*, begin the process by dissolving bone, literally making tiny tunnels in the bone matrix. New matrix is then laid down in these little tunnels and bone is rebuilt by *osteoblasts*. These drugs block the osteoclasts from working. If the osteoclasts don't work, then osteoblasts can't create new, strong and healthy bone.

What most of the medications do is to prevent the osteoclasts from breaking down bone. Fewer tunnels and less remodeling are the result. You will see some increase in bone density with this approach, or at least a stabilization of bone density. The problem is that you end up with large quantities of poor quality bone. After some years of this, if the bone breaks it doesn't tend to break normally at all. It tends to shatter. I cannot recommend these medications.

What To Do

The basics here are straightforward. If you have a blood sugar related problem - hypoglycemia, pre-diabetes, or diabetes itself, this needs to be attended to. Attending to this will decrease inflammation and decrease the need for protein, because protein is not being taken for fuel.

If you are having a blood sugar problem, then you will need much more protein because at least some of it is being taken to support the energy of your body. In this situation, you may need up to 25-30 grams of protein three times a day.

If you are not having a blood sugar problem, then 20-30 grams of protein two times a day may be quite adequate. If you are doing a lot of exercise, then you will need more.

Deal with any sources of inflammation. If you have a chronic disease that is inflammatory, you might want to take some natural anti-inflammatories such as curcumin and fish oil, for example. Dental problems, especially gum disease and problems with old root canals are especially problematic.

Get good exercise. The more variety the better. Mix up strength, stretching, walking, dancing, etc. Pick things that you will do, that are at least tolerable, if not fun. *The best form of exercise is the one that you will do.*

Take vitamin D 2000-5000iu per day, vitamin A 10,000iu per day (making sure that it is actual vitamin A, not "vitamin A from carotene"), and vitamin K2. For the latter, there are many brands available.

Calcium as a citrate or a microcrystalline hydroxyapatite are the easiest to absorb. I typically don't recommend any more than about 300-600mg of calcium per day. Avoid calcium carbonate as it is very hard to absorb. Coral calcium is a type of calcium carbonate. Always take calcium at a separate time from any other minerals. Calcium will be preferentially absorbed, crowding out the other minerals when taken at the same time.

Take Biosil, a type of bioavailable silicon, 6-12mg per day. This must be taken away from both calcium and magnesium. Make sure that you are sufficient in zinc. Plasma (not serum) zinc is the preferred test. It is commonly low.

Many of us are deficient in magnesium because of soil depletion. Here I would recommend 400-600mg per day taken at a separate time from the calcium. For instance, take the calcium or the magnesium at bedtime, and the other one in the a.m. See if one way or the other helps your sleep. Too much magnesium at once will cause loose stools or general gut unease. If you have trouble with any magnesium, you might try the liquid magnesium chloride, mixing it with water and sipping it through the day. Another option is to dissolve 2-6 capsules of magnesium citrate/malate in 16 ounces of water and drinking it in sips through the day.

Take 5MTHF and hydroxy or methylcobalamin. These come in a combo pill, and are found in high quality multi vitamins or B complex vitamins.

Take several scoops of collagen peptides daily. You can put this in soups or stews, shakes, etc., or just mix it with some water and take with a meal. Take vitamin C 500mg daily.

In closing

When thinking about bone density, it is helpful to remember that issues here have typically developed over a very long period of time. It is something to be concerned about, but not something that developed overnight. It is not something that will get better overnight either. Take your time and make a plan. The suggestions made here will serve your overall health.