

## **CALCIUM, DAIRY and HEALTH**

Despite plenty of evidence to the contrary, people are still convinced, supported by press reports along with the American Dairy Council and even their doctors, that daily consumption of dairy, particularly milk is absolutely vital to human health, especially a child's health. It has been promoted as being necessary for building strong bones and teeth. It was easy for everyone to accept. Milk was chalk-white, like bones, teeth, and seashells. Calcification turned things stony-hard. If you want strong bones, you have to drink milk!

For the longest time, the minimal daily requirement for calcium was set by the National Institutes of Health and the National Academy of Sciences at 800-1200 mg for pregnant or nursing mothers. The new RDA is between 1,000-1,300 mg. Without at least 3 glasses of milk or dairy-product equivalents each day, osteoporosis would be the end result. Calcium is in every multivitamin. To get calcium into your bones, you have to eat calcium and the more you eat, the more you get! This is now known to be ALL WRONG. In fact, the opposite is true. The societies in the world consuming the most dairy have the highest osteoporosis rates.

## **CALCIUM**

Calcium is a compact, powerful mineral that performs essential tasks in the body besides making bones hard. It is important for the regulation of many aspects of metabolism, which it does by activating proteins. When bound to proteins, it causes them to change shape the results of which can be anything from muscles contracting, including heart muscle, to channels opening through the walls of cells. Calcium is so powerful that its concentration in the blood must be kept within a very narrow range. Too much or too little, and your heart will stop. Calcium is also one of the main minerals used to balance the pH of our blood, also kept in check in a very narrow range. This calcium comes from the calcium circulating in the blood, muscle cells as well as our bones. When you eat something acidic like tomato sauce, it doesn't change the pH in your body. The type of proteins you eat does however, specifically proteins coming from animal products which have a much higher concentration of sulfur containing amino acids. These are very acidifying in the blood. In addition to dairy, people who eat a lot of animal products (meat, fish, eggs, dairy) have much higher rates of osteoporosis than people who eat plant-based.

For these reasons, the body controls calcium very carefully. Eating a lot of it doesn't lead to it getting taken up into the bloodstream like salt or sugar. Calcium is pulled from the gut into the body only as needed. That process of absorption is controlled by vitamin D. Insufficient vitamin D leads to insufficient calcium absorption. Once in the blood, about half of the calcium is transported attached to proteins with the rest of it floating free. In the bones, the dual processes of depositing calcium into the matrix or releasing it is controlled by cells called osteoblasts (bone-makers) and osteoclasts (bone-breakers). Stressing the bones during exercise will activate the bone-makers and times of famine, pregnancy, or lactation when there is not enough calcium will activate the bone-breakers to release the precious mineral.

These multiple points of control along with the potential dangers of calcium imbalance are why just eating the RDA of calcium isn't enough to manage bone health and stave off osteoporosis. As mentioned above, where you get it from matters as does proper vitamin D levels.

## **EXERCISE, HORMONES and BONES**

Weight-bearing exercise stresses the skeletal system and triggers the biochemical signals to absorb and pack on more calcium. Eating right and getting enough vitamin D will not substitute for exercise in preventing osteoporosis. The steroid hormones testosterone, estrogen and progesterone play crucial roles regulating bone health as well. Addressing hormonal issues, especially at menopause, is important and requires the help of a trained and certified clinician.

But back to milk... Mammals do not need milk beyond infancy. About 70% of humans have lactose intolerance, meaning, they do not possess the enzyme making them capable of digesting dairy after infancy. About 7000 years ago, a genetic mutation in human evolution gave northern Europeans and people from the Middle East the ability to consume dairy products in adulthood. But for the rest of humanity, milk has never been available, let alone necessary, for bone or any other kind of health. Green vegetables, legumes and fish provide more than

enough. Indeed, tofu, salmon, sardines, almond milk, and chickpeas all offer even more calcium per serving than cow's milk does. In addition, the calcium from these non-dairy sources, especially the plant ones, is better absorbed than the calcium from dairy.

### **Other factors for bone health**

Calcium does not act in a vacuum. It is deposited in the collagen connective tissue matrix of the bone. Other very important compounds which assist in calcium metabolism, all abundant in a whole-foods, plant-based diet, include:

- Copper
- vitamin C
- Phosphorus
- Magnesium

### **Vitamin D**

The “sunshine vitamin” was only discovered in 1928, although the disease its absence caused and the remedy through consumption of cod liver oil was established long before that. Vitamin D deficiency results in rickets, a disease characterized by weak and wobbly bones. We now understand more clearly how vitamin D controls the uptake of calcium from the gut and the optimal amount of vitamin D in the diet was set at 400 i.u. In special cases like pregnancy and lactation, the RDA was 800 i.u.

We were off by about a factor of ten.

Vitamin D does a lot more than just enhance bone density and prevent osteoporosis and rickets. Vitamin D receptors can be found in the blood vessel walls, on brain tissue and on immune cells. It plays an important role in regulating blood pressure, weight and mood. It probably protects against cardiovascular disease, cancer and diabetes. It plays an important role in the immune system, particularly in regulating the so-called “natural killer” or NK cells. These cells are particularly important in fighting cancer.

The levels of vitamin D in the blood that were considered normal and healthy, above 30 ng%, would keep rickets at bay. But some really powerful things happen with the immune system and in the brain when vitamin D levels reach and rise above 50 ng%. Mental and emotional health are noticeably improved. Many of us working in age management now believe that taking enough vitamin D to keep the levels between 50 and 100 ng% is the optimal strategy and supporting those levels may require as much as 5,000 to 10,000 i.u. per day (depending on sunlight exposure.) The previous RDA of 400–800 i.u. may prevent rickets but isn't optimal.

Should we supplement with calcium and vitamin D?

You can get all of the factors necessary for bone health in a plant-based whole foods diet. But would supplementation with extra calcium be beneficial? Because calcium absorption depends upon vitamin D more than calcium content of the food, probably not. At least not if you eat a healthy plant-based diet. Vitamin D supplementation, on the other hand, is something to consider.

Caution is warranted. There is no way to predict blood levels of vitamin D based on how much you ingest. Absorption of vitamin D, a fat-soluble vitamin, is greatly affected by the fat content of the diet. Exposure to sunlight creates vitamin D, so that is also a confounding factor. Taking large doses of vitamin D along with oil-containing foods in a sunny environment could push you over the 100 ng% upper level of safety, resulting in dangerously high levels of calcium, which in addition to threatening heart function can manifest in calcification of tissues, possibly including blood vessels and kidney stones. Vitamin D toxicity is extremely rare, but easily avoided with a simple blood test. And the potential benefits of supplementation are substantial.