

What Causes Osteoporosis

The older you get, the higher your risk of osteoporosis. Obviously, osteoporosis is about aging. The majority of osteoporosis patients had very strong bones to start off with, like everybody else.

Osteoporosis is not about the inability to build strong bones, but about premature degeneration of the bones.

What makes the bones degenerate prematurely?

Somehow, bones that have osteoporosis degenerated more than healthy bones of the same age. In osteoporosis patients, the bones have obviously aged faster. Osteoporosis is about prematurely aged bones.

So, the key question is:

What accelerates aging of the bones?

We realize that all our organs age. That all of our organs cells constantly reproduce themselves; they wear out and they are replaced by new cells. That the number of times cells can multiply is fixed, organs eventually age. Like the skin eventually becomes wrinkled when there are less cells available to replace the dehydrated old skin-cells.

We know that if we expose our skin to the sun too much, that we will look older sooner. Excessive sun-exposure accelerates the aging of our skin. It does so because the sun burns the outer skin cells, which must be replaced by new cells sooner. And the sooner cells must be replaced, the sooner the moment will come that these cells cannot multiply again. Accelerated aging of cells is about a higher turnover of cells; new cells replacing old cells more frequently.

What causes old bone-cells to be replaced by new bone-cells sooner?

We know that estrogens are protective. (and androgens to a lesser extent) All bone-scientists acknowledge that if the female body has sufficient estrogens at it's disposal all the time, the osteoporosis risk is far lower.

That is why osteoporosis risk is 3-fold higher in women: In women the estrogens level is far lower every 4th week, and the bones are less protected at that time. And in post-menopausal women, estrogens level is permanently decreased.

If we knew exactly how estrogens protected against premature aging of the bones, we would also know how the opposite process enhances osteoporosis.

So, how exactly is bone-metabolism influenced by estrogens?

Estrogens inhibit both the uptake of calcium into the bones (1) and deportation of calcium from the bones.

But how exactly can processing more calcium cause osteoporosis?

The absorption of calcium requires the activity of specialized cells: osteoblasts. These osteoblasts also compose pre-calcified bone-matrix, upon which the calcium can precipitate. Deportation of calcium from the bones requires the activity of osteoclasts.

If more calcium is absorbed into the bones, due to a lack of estrogens (2), the production and activity of both osteoblasts and osteoclasts is increased (3) (as in hyperparathyroidism). If much calcium is absorbed, much calcium is deported. But 50 to 70% of the composing osteoblasts die in the composition of new matrix. (4)

The more their activity is stimulated, the more osteoblasts die (5) And since estrogens inhibits uptake of calcium, estrogens prevents the death of osteoblasts (6) If you consume too much calcium all your life, the reproduction of osteoblasts increased also; many people succeed in increasing bone-mineral density (BMD) by consuming more calcium. (7) That is why the average BMD is higher in people that live in countries where a larger quantity of milk is consumed.

Since the number of times a cell can reproduce is fixed, the reproduction capacity will be exhausted sooner if much calcium is absorbed on a regular basis. And if reproduction capacity is exhausted, there will be a lack of new osteoblasts. And since only these osteoblasts can compose bone-matrix, too little new bone-matrix can be composed. But without the matrix, the calcium cannot precipitate, and new bone cannot be composed, while the old bones are constantly being decomposed, to be replaced by new bone. Since there is a lack of pre-calcified bone matrix upon which to build, replacement cannot occur, and porous holes will begin to appear.

And this is exactly what happens in osteoporosis: in

osteoporotic bones the osteoblasts cannot reproduce adequately anymore, and thus less osteoblasts are available (8) and/or the activity of osteoblasts is at least impaired, (9) like 'exaggeratedly aged' bones. (10) In osteoporotic bones there is less matrix available that can yet be calcified than in healthy bones. (11) In osteoporosis dead cells cannot be replaced and microfractures cannot be repaired. (12)

Does that mean that dietary calcium causes osteoporosis?

Only if too much calcium is actually absorbed into the bones. As with all minerals, **the body normally absorbs just as much calcium from our food as it needs.** Only about 200 mg is absorbed into the blood, on the average, whether we consume 300 mg or 700 mg calcium daily, or sometimes even when we consume up to 1200 mg supplementary calcium daily. (13)

In order to absorb the right amount of calcium, absorption rates decrease when we consume more calcium. But if we consume too much calcium, the absorption rate cannot be sufficiently decreased; about 5% of dietary calcium on top of 1500 mg a day is yet absorbed into the blood. For example: Consuming 5-fold more calcium than before. (14)

But why is this extra calcium absorbed in the bones?

This is to prevent blood-calcium level from rising too much. Muscles can only function if calcium from inside the muscle cells can be deported outside the cells. If blood-calcium level were too high, this wouldn't be possible; it would be lethal since breathing requires muscle-action. To save your life excessive dietary calcium is temporarily stored in the bones, prior to excretion. Normally the blood contains a total of 500 mg calcium. The difference between highest and lowest blood-calcium level is only 26%, thanks to the three different hormones that prevent our blood from containing too much (or too little) calcium. After the calcium has been absorbed into the bones two of these hormones stimulate deportation of calcium from the bones, and the third one stimulates excretion of calcium into urine.

But why don't the bones hold on to that extra calcium?

According to the old doctrine, we can prevent osteoporosis by stacking more calcium in the bones. "The more calcium your bones contain, the longer it will take before they are empty."

This would be a simple solution if the bones did indeed hold on to that extra calcium, but our bones are built according to a plan - just like a house, and the amount of calcium in the bones has to be according to that plan. Just as piling up bricks in your living room does not make your house better or stronger, stacking extra calcium in the bones is not an improvement either. To be able to watch TV and clean your house properly, you throw the bricks out.

The redundant calcium in your bones is always deported eventually. To preserve redundant calcium in your bones, you have to keep on consuming lots of calcium daily. But no matter how much milk you drink, or supplementary calcium you take (or not at all), your bones always contain less calcium at the age of 70 than at the age of 30.

The problem is that all this extra calcium is processed by osteoblasts and osteoclasts. If you have been absorbing 400 mg instead of 200 mg dietary calcium into the blood daily, these cells have had to process 2.9 million mg more calcium during these 40 years.

Since all this extra calcium is absorbed due to the action of osteoblasts, these osteoblasts die sooner, leaving you with too little new bone-matrix and too many porous holes once you are old. Like administration of corticosteroids can also cause osteoporosis by killing osteoblasts (15); both prematurely exhaust the reproduction capacity. If less calcium is consumed, the bone-cells age slower, a low calcium intake throughout adolescence has been shown to both retard and prolong longitudinal bone growth in rats. (16)

So, yes, you can increase your bone mineral density (BMD) by consuming more calcium than you need, but that will exhaust your bones sooner. **That is why in those countries where the average BMD are the highest, hip fractures in older people are the highest also.**

Does this mean that a low BMD is preventive?

If you consume just the normal amount of calcium all your life; yes. If calcium intake is very low, there will still not be a lack of calcium for the calcification of bone-matrix. (17) The only difference will be that the bones will not age prematurely, and that they will not contain redundant calcium.

But if the BMD is low as the result of exhausted osteoblasts; no. BMD is decreased in osteoporosis due to the lack of new bone-matrix. Holes do not contain calcium. So BMD can be low in very strong bones and in weakened bones, which is what makes it so confusing for so many scientists.

Let's reason together to see if there is some form of Proof here?

Supplementary calcium / milk has short term 'beneficial' effects on bone-mineral density (BMD) and adverse long-term (lifetime-) effects. One can increase BMD by a high-calcium intake (7) or not. (18) The average short term effect of extra calcium is the increase in bone-mineral density, and thus strength. That is why average BMD is highest in those countries where more milk is consumed.

If you investigate this correlation, extra calcium will have 'beneficial' effects on bone-strength (19) or not. (20) But this does not say anything about the lifetime effects; it just confirms what initially happens if you consume more calcium; this is just the first effects, not the eventual result.

But is there no other way to find proof?

Yes there is. Compared to other foods, only dairy products (or supplements of course) can be consumed in such large quantities on a daily basis that their consumption strongly increases calcium intake, which is proven by the fact that average BMD is highest in those countries where the more milk is consumed. There is, in fact, a tradition of consuming more milk in these countries. And there are also many scientific studies about hip-fracture incidence per country. If extra calcium eventually has adverse effects, osteoporosis / hip-fracture incidence should be clearly higher in those countries where the most milk is consumed.

Statistics

Example:

In Greece the average milk consumption doubled from 1961 to 1977 (21) (and was even higher in 1985), and during the period 1977 - 1985 the age adjusted osteoporosis incidence almost doubled too. (22)

In Hong Kong in 1989 twice as much dairy products were consumed as in 1966 (21) and osteoporosis incidence tripled in the same period. (23) Now their milk consumption level is almost "European", and so is osteoporosis incidence. (24)

It is very simple: where the most milk is consumed, the osteoporosis incidence is highest. Compared to other countries, the most milk is consumed in Sweden, Finland, Switzerland and The Netherlands (300 to 400 kg / cap / year), and osteoporosis incidence in these countries has sky rocketed. (25)

Like Australians and New Zealanders, (26) Americans consume three fold more milk than the Japanese, and hip-fracture incidence in Americans is therefore 2½ fold higher. (27) In racial groups within America that consume less milk, like the Mexican-Americans and Black Americans, osteoporosis incidence is two-fold lower than in white Americans, (28) which is not due to genetic differences. (29)

Chinese consume very little milk (8 kg / year), and hip-fracture incidence, therefore, is among the lowest in the world; hip-fracture incidence in Chinese women is six fold lower than in the US. (30) (The average American consumes 254 kg milk / year) **The less milk consumed, the lower is the osteoporosis rate. (31)**

In other countries where very little milk is consumed, on the average, as in Congo (32), Guinea (33) and Togo (34) (6 kg / year) osteoporosis is extremely rare. In the Dem. Rep. Congo, Liberia, Ghana, Laos and Cambodia even less milk is consumed (average person: 1 to 3 kg a year !!), and they've never even heard of age-related hip fracture.

Of course, 'the milk industry' will say : "that's because blacks and Asians are genetically different from whites", but that is rubbish ; Osteoporosis incidence in female Asians is much lower than in Asian females living in the USA (35) just like osteoporosis incidence (and calcium consumption) in African Bantu women (36) is much lower than in Bantu women living in the USA. (37) And both calcium intake and hip-fracture rate is far lower in South African Blacks than in African Americans. (38)

The Milk Industry has sold us on what they call a fact that we can be smarter than Nature by consuming more milk.

They say: "Nature has made a mistake but fortunately we are smarter than nature, and know how to correct this; Mother's milk, by mistake, contains far too little

calcium, which has to be corrected by giving to humans cow's milk which contains 4 times as much calcium."

Of course this is nonsense and a ploy on their part.

If calcium requirements really were four fold higher, pre-historic infants would never have been able to grow up, and ultimately, to have children. If we really need cows' milk, man could never have existed.

Babies' Food

Of all humans, babies need the most calcium because their bones are still weak and need to be calcified much more. And mothers' milk does, of course, contain all the calcium (and other nutrients) babies need in their first two years. Babies fed on mother's milk are perfectly able to increase bone-mineral density (BMD).

So, exactly how much calcium does mothers' milk contain ?

Not much:

<u>Calcium in mg / 100 g</u>	
226	Hazelnuts
140	Egg yolk
132	Brazil nuts
96	Olives, green
87	Walnuts
54	Figs
44	Black berries
42	Orange
40	Raspberries
38	Kiwi
33	Mandarin
32	Human milk
20	Coconut
18	Grapes
16	Apricot
16	Pineapple
14	Plum
13	Salmon
12	Mackerel
12	Mango
11	Watermelon
10	Avocado
9	Banana
6	Muskmelon

What does this mean?

Adults and infants always need less calcium than babies (per kg bodyweight). Food for adults there-

fore does not need to contain as much calcium (in %) as mother's milk.

And because our natural foods, on the average, contain about as much calcium as mother's milk, it is absolutely impossible that these natural foods contain too little calcium. If they did, mother's milk would contain too little calcium too, and babies would not be able to increase BMD on mother's milk.

And because many foods contain more calcium than mother's milk, the average calcium absorption rate is low, to prevent the uptake of excessive calcium.

Confusing? That is what the milk industry is counting on, and the main reason why they have been able to tell their lie.

Vitamin D

The body needs broad daylight to transform cholesterol into vitamin D. The hormone that increases dietary calcium absorption (calcitriol), is composed of vitamin D. Some say osteoporosis incidence is, therefore, higher in countries with little sunlight.

Is osteoporosis incidence really lower in countries with more sunlight?

No. Italy is much sunnier than Poland, hip-fracture incidence in Italy is much higher (40) than in Poland (and Spain) (41), simply because in Italy 25% more dairy products are consumed. (21) Kuwait is extremely sunny, but, nevertheless, osteoporosis in Kuwait is about as high as in Great Britain and France (35), because in Kuwait, also, drinks a lot of milk. (21)

Furthermore, the effects of this vitamin D hormone can be very different.

This hormone increases calcium absorption from food and absorption of calcium into the bones, (42) and therefore induces death of osteoblasts (43). Calcitriol also stimulates deportation of calcium from the bones into the blood.

On the other hand, this hormone also inhibits secretion of PTH (excessive PTH strongly accelerates ageing of the bones). Thus, indirectly, this hormone can be protective, by decreasing both uptake of calcium into the bones and deportation of calcium from the bones. (44)

However, since supplementary vitamin D/ calcitriol increases the blood-calcium level (45), this extra calcium can precipitate in arteries and on the outside of

the bones, causing arteriosclerosis and bone-deformities (46). It can also settle in joints and ligaments, and can cause muscle-cramps because the blood-calcium level needs to be low enough to deport calcium from muscle cells. **It can even kill muscle cells (if the calcium cannot be deported), eventually causing fibromyalgia.**

Osteoporosis is often accompanied with a very low vitamin D level. (47)

This can have multiple causes:

Osteoporosis is caused by consuming too much calcium year after year.

The body tries to counteract this by taking up as little calcium as possible. Vitamin D increases the calcium absorption rate. So to prevent the uptake of excessive calcium, the body composes as little vitamin D as possible.

Hyperparathyroidism strongly increases both uptake of calcium into the bones and deportation from the bones, eventually causing osteoporosis. If too little calcitriol is available, the secretion of PTH is not sufficiently inhibited.

If you consume very little calcium (less than 300 mg / day which is a very hard to achieve), a lack of vitamin D / calcitriol can cause osteoporosis by making it impossible to increase calcium absorption.

In general, it is not a problem at all to have little vitamin D / calcitriol at our disposal. This even protects us against absorbing too much calcium.

In 52% of examined Saudi Arabian females for example, vitamin D level was extremely low (because of clothes that block almost all sunlight), but their bones were not affected. (48)

In alcoholics the levels of the vitamin D-hormones were decreased by 3 to 48%, but BMD was not affected. (49) ***In general, we do not need much vitamin D to either inhibit PTH secretion or to increase calcium absorption.***

Exercise

If osteoporosis was about a lack of exercise, all healthy but physical inactive people would have osteoporosis, which is not the case. That is why bone-loss with age cannot be explained by declining physical activity levels. (50) Loading determines the maintenance of bone-

strength. If the bones are not loaded at all (like in space), they rapidly lose calcium. If we are normally active, our bones contain sufficient calcium to cope with incidental falls. Furthermore, a lack of exercise does not accelerate the aging of osteoblasts, so it cannot possibly be the cause of osteoporosis.

Exercise causes microfractures which stimulates the osteoblasts to increase their activity. Logically, then exercise also increases the death rate of osteoblasts. (51) (excessive exercise is detrimental (52))

But exercise can increase bone-strength in elderly, can't it?

Yes, but only as long as osteoblast reproductively is not almost totally exhausted.

Exercise increases activity and reproduction of the remaining osteoblasts, temporarily increasing bone-strength (exercise does not guarantee future bone-strength (53)), but also accelerating aging of the bones.

If osteoblast reproductively is almost totally exhausted, one cannot increase BMD through exercise (or extra calcium) anymore, which is often the case in osteoporotic patients. (54) That is why the possible exercise-induced bone mass gain is far less than the disuse-induced bone loss. (55) This is why in osteoporosis exercise only partially (20 – 40%) decreases hip-fracture risk - even in the short term. (56) The later in life, the smaller the effects of exercise will be. (57)

Normal activities are all the exercise you need to maintain bone health. Increased physical activity accelerates aging of the bones. On the other hand, exercising specific muscles can be effective since strong muscles can absorb the shock when falling. (58).

Overweight & Osteoporosis

That menopause favours osteoporosis and obesity protects from it are well-known clinical observations.

In menopause the estrogens level is lower, and estrogens is protective because it inhibits uptake of calcium in the bones and bone-formation by osteoblasts.

In obesity the leptin level is elevated (59) and leptin also inhibits bone-formation by the osteoblasts. (60)

Some think that obesity is protective because there is more loading on the bones, increasing it's strength, but

if that would be the case, osteoporosis could easily be stopped and even reversed by increasing physical activity / loading of the bones. Osteoporosis however is irreversible. ***Osteoporosis is not caused by a decreased in bone mass, but is due to the exhaustion of osteoblasts, which is irreversible since it is about aging. The low bone mass is the result of the lack of new matrix, not the cause.***

The answer is to watch what you eat all your life and no matter what age you are, you are never to old to start changing your eating habits. All diseases are caused mainly by what you put in your mouth. You have control over that!

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