



[Clin Cases Miner Bone Metab.](#) 2015 May-Aug; 12(2): 111–115.

Published online 2015 Oct 26. doi: [10.11138/ccmbm/2015.12.2.111](https://doi.org/10.11138/ccmbm/2015.12.2.111)

PMCID: PMC4625766

The natural approach to osteoporosis

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Summary

Osteoporosis, as every degenerative disease, should be assessed considering the complexity and multifactorial causals and the therapeutic approach should therefore take into account the many factors involved.

The pathogenesis of osteoporosis is in fact the result of complex interactions between genetic predisposition and environmental risk factors ([Table 1](#)).

Table 1
The pathogenesis of osteoporosis.
OSTEOPOROSIS
Class: Multifactorial Disease
• Genetics (not modifiable)
• Epigenetics (modifiable)

[Table 1](#)

The pathogenesis of osteoporosis.

The characterization of genetic markers linked to inheritance of low bone mineral density may allow early identification of individuals susceptible to developing osteoporosis. This could enable targeted prevention with specific natural therapies and lifestyle changes, in order to minimize the environmental risk in individuals genetically predisposed in developing the disease.

Since 1995 there have been several studies designed to identify and characterize different polymorphisms of genes encoding: the vitamin D receptor (VDR), collagen IA1 (COLIA1), calcitonin receptor (CTR) and estrogen receptor (ESR) ([1–4](#)).

If we can not change genetics, we can influence epigenetics, which means the expression of genes through favorable environmental stimuli represented by conscious choices in daily life.

Since the discovery of the DNA molecule in the 50s, for a long time it was believed that the mechanism that leads to the expression of a gene was unidirectional, that means from DNA to protein. This dogma has been surpassed in recent years by epigenetics, through studies that demonstrate the mechanisms by which the environment is able to stimulate, or keep silent, the expression of various genes.

Today there is large evidence that the substances we ingest – such as food, medicines or supplements – drink, breathe, we produce as hormones and neurotransmitters based on the emotions and moods, they go directly to influence the expression of our genes, enhancing or reducing a possible genetic vulnerability to some disease.

These findings make us responsible towards our health because the expression of a chronic and degenerative disease depends largely on our daily choices related to lifestyle.

It is now accepted that cigarette smoking, sedentary lifestyle, lack of exposure to sunlight, nutritional deficiencies, excessive alcohol or coffee, or protein rich diet or sodium chloride, drugs that interfere with the phospho-calcic metabolism, are all harmful factors for a correct bone turnover, and promote osteoporosis (5, 6) ([Table 2](#)).

Table 2
Negative habits and epigenetics.
EPIGENETICS
Negatively related habits:
<ul style="list-style-type: none"> • Smoking • Physical inactivity • Little exposure to sunlight • Nutritional factors • excess of animal proteins; • refined salt, coffee, alcohol, drinks, nutritional deficiencies

[Table 2](#)

Negative habits and epigenetics.

Cigarette smoking increases the risk of bone fractures by 15% through indirect mechanisms, as favoring early menopause and reducing the bone tropism for reduced mitochondrial oxygenation.

The excess of refined salt, especially sodium, increases urinary calcium, as well as the Coffee favors the negative balance of Ca: The Framingham study showed that women who drink more than 2 cups of coffee a day have a higher risk of fractures of the femoral neck (7). The habit of drinking more than two glasses of alcohol per day or drinks rich in Phosphoric Acid (such as some carbonated soft drinks), increases the risk of fractures from 20 to 70% depending upon the location of the fracture.

Just as it is now accepted that a chronic inflammation, in any area of the body, has an effect also on bone activating osteoclasts and accelerating bone resorption.

Osteoclasts are in fact specialized macrophages and so are highly sensitive and responsive to both local and systemic inflammatory cytokines. If these cells are too much activated they causes excessive bone resorption which, if it lasts long-time as in the case of a chronic inflammatory disease, is itself cause of osteoporosis ([Table 3](#)).

Table 3
Increase of bone resorption for osteoclasts activation possible causes.
CHRONIC INFLAMMATION
Increase of bone resorption for osteoclasts activation
<ul style="list-style-type: none"> • Chronic infections • Chronic inflammation • Pro-inflammatory diet • Acidifying diet • High glycemic load diet with AGEs production • Food intolerances • Intestinal dysbiosis • Dental problems • Overweight and obesity • Chronic stress and neurologic dysregulation • Environmental toxicity

[Table 3](#)

Increase of bone resorption for osteoclasts activation: possible causes.

A chronic inflammation can be clinical or subclinical, not showing signs nor symptoms, and can be supported by:

- - Chronic infections: viral (herpes, CMV, EBV, ...), bacterial (streptococci, Sfilococchi, Chlamydia, Clostridia, Borrelia, Ureaplasma, EC, ...), fungal (Candida), or by intestinal parasites (pinworms, tapeworms, giardia, ...);
- - Chronic inflammatory diseases: arthritis, osteoarthritis, psoriasis, colitis, diabetes, hepatitis;
- - Pro-inflammatory food: trans-hydrogenated fats, fried food, cooked oils, peanut, egg yolk, red meat, cold cuts and sausages, fatty cheeses, etc.;
- - Acidifying diet: aging, alkaline bicarbonate reserves are reduced and, especially if one has respiratory or metabolic –liver or kidney – diseases, the food becomes a key strategy to maintain the acid-base balance in tissues and inside cells. Since the blood pH should remain confined within the physiological range compatible with life, the body dabs pH

fluctuations using bicarbonate, phosphate, plasma proteins, hemoglobin and oxyhemoglobin, and compensating mechanisms through the respiratory and renal function

One of the causes of increased synthesis of acid metabolites is protein degradation that produces strong acids – such as Phosphoric or sulphuric, nitric acid – which must be eliminated by the kidney, after being daded by a basic mineral (Ca, Mg, K, Mn, ...), to form a neutral salt.

The doubling of animal protein intake from 35 to 78 gr/day causes a 50% increase in urinary calcium. The effect occurs well below of protein quantities that most Western people consume – that is, between 70 and 100 g per day (8). The other favoring acidosis condition of extracellular matrix is represented by the bacterial fermentation of simple sugars with the formation of D-Lactic Acid.

In case of reduced availability of bicarbonates, the organism must make use of salts which usually have other functions, especially to calcium and phosphates present in bones. Moreover, calcium phosphate, a key component of the skeleton, is more soluble in acid pH.

Therefore, a diet too rich in proteins and sugars, and low in vegetables or minerals, over time will cause a latent acidosis of the extracellular matrix with depletion of buffering capacity of the body that will try to compensate through the release of calcium from the bones and will create the ground for the development of degenerative and inflammatory diseases (9, 10).

- High glycemic index (and load) diet with production of AGEs (Advanced Glycosilation End-products), that means denatured proteins because of stable bond with a molecule of glucose, when it remains at high levels in the circulation. Normally the degree of protein glycation is investigated by measurement of HbA1c.

Whereas collagen is the most abundant protein in the body and forms, between the many support tissues, even the bone, a high degree of glycation may also interfere with proper formation of the bone matrix.

In addition to this, AGEs trigger pro-oxidant and pro-inflammatory reactions.

- - Food intolerances or allergies as celiac disease or as “Gluten-sensitivity” (still little known and recognized), Nickel allergy, lactose intolerance, etc.
- -Intestinal dysbiosis: in addition to supporting a silent inflammation, it participates in the pathogenesis of osteoporosis by reducing the synthesis of Vitamin K and impaired absorption of micronutrients.

The entire population of bacteria and viruses that lives in our intestines in a symbiotic relationship, is called microbiota and represents our second liver and our second brain. On average, the bacteria that are part of this organism inside us, are 10 or 100 times the number of cells that make our body and are equipped with a number of genes 10 times more than ours (300,000 against our approximately 28,000) disposing of greater metabolic capabilities.

An altered composition of the flora allows the growth of bacterial, viral or fungal pathogen populations and activates a local inflammatory response with alteration of intestinal permeability that will cause the LEAKY GUT SYNDROME. The passage into the circulation of molecules not properly filtered by the bowel causes a systemic inflammatory reaction that can be expressed in various target tissues including the osteo-articular apparatus. This syndrome participates heavily the etiology of osteoporosis also for the mechanism of malabsorption of nutrients.

- - DENTAL PROBLEMS as granulomas, periodontal disease, immunologic reactions to materials or facilities. Titanium, for example, is not inert and is not always tolerated: it

could cause inflammation and type 1 (IgE-mediated) or Type 4 (cell-mediated) allergy. In most cases, more than allergenic, it appears to be pro-inflammatory: particles of titanium oxide can disperse into the surrounding environment and be phagocytized by macrophages that react triggering a systemic reaction, reactivation of sub-clinical inflammation foci.

- - **OBSIDITY** and **OVERWEIGHT**: the fat is not just a mere deposit of calories and toxins, but an endocrine and immune organ, capable, among other functions, to synthesize many inflammatory cytokines (IL1-IL6, TNFalpha ...). An excess of this tissue, as in overweight or obesity, involves a chronic inflammation, although silent.

Moreover, overweight and obesity are almost always related to Metabolic Syndrome (when not to Diabetes) with high glucose values (and so AGEs) and Insulin: high levels of this hormone stimulates itself a systemic inflammatory reaction.

- - **CHRONIC STRESS** and neuro-vegetative dystonia. A chronic stress causes, especially in more vulnerable persons, an increase in inflammatory markers supporting a chronic inflammation in the brain that can be expressed also with aggressive behavior or depression. Excessive stimulation of the sympathetic autonomic nervous system leads to activate an inflammatory response while the activation of the vagus, and the parasympathetic system, stimulates the release of anti-inflammatory cytokines “pacifying” the immune system. An experiment of the Icahn School of Medicine, Mount Sinai, showed that mice subjected to chronic stress show higher levels of both IL-6 and leukocytes, confirming the same result in an equivalent experiment on humans and so demonstrating that the immune system can become hypersensitive to a stressor up to the dysregulation of chronic inflammatory processes. This immune dysregulation favors the development of many diseases including cancer, heart attacks and osteoporosis.

Another mechanism by which chronic stress promotes bone resorption is excessive stimulus to the secretion of cortisol by the adrenal.

A stressed person, which secretes a lot of adrenaline and cortisol, generally has also difficulty falling asleep and rest. Lack of sleep or alteration of physiological biorhythms affect the nocturnal secretion of GH, losing an important stimulus to the formation of new bone.

- - **ENVIRONMENTAL POISONING** from heavy metals, such as aluminum, lead and mercury, mold, soot, pesticides, dioxins or plastic. Many of these substances, as well as stimulate a chronic inflammatory reaction, act as **ENDOCRIN** disruptors, which interfere with the neuroendocrine axis causing, among other diseases, even early menopause (favoring osteoporosis). Heavy metals, in addition to supporting a sub-clinical inflammation, inhibit osteoclast activity and bone formation and replace calcium in bone mineralization, making bones more brittle.

Cigarette smoke, smog, cans, jars, dishes or aluminum sheets, deodorants, contaminated water, dental amalgams, paints, drugs or vaccines containing aluminum, mercury or lead, are all sources of continuous poisoning of these toxic substances which, once ingested, remain in the body for decades, supporting a chronic inflammation in the endothelium, but also in neurological and osteo-articular tissues.

- **DRUGS** taken over long periods – such as gastroprotection, the proton pump inhibitors, the psychotropic drugs, the statins – support a chronic inflammation, both in direct and indirect ways.

There are other possible causes of osteoporosis ([Table 4](#)).

Table 4
Other causes of osteoporosis.
OSTEOPOROSIS: other causes
<ul style="list-style-type: none">• Nutrients' deficiency• Nutrients' excesses• Endocrine disorders• Autoimmunity• Hepatic and renal diseases• Diabetes and other chronic degenerative diseases

[Table 4](#)

Other causes of osteoporosis.

Among them there is nutritional deficit. If we consider the composition of the bone, all the nutrients that participate must be available and can be taken from food, so that the bone turnover can take place in a correct and physiological way. Therefore it occurs:

- - An adequate supply of amino acids for the protein scaffold;
- - Minerals: Calcium, Magnesium, Boron, Potassium, Zinc, Manganese, Copper, Strontium, Silicon, etc. The latter stimulates bone mineralization in case of Calcium deficiency and counteracts the aluminum which tends to substitute the calcium and inhibits osteoblasts while Zinc stimulates the proliferation of osteoblasts and is necessary for the synthesis of collagen and sex hormones (estrogen and testosterone);
- - Vitamins:
 - Vit C for the synthesis of collagen;
 - Vit D, for the absorption of calcium and many other functions. Its deficiency is very widespread in our latitudes for the excessive use of sunscreens;
 - Vit K to activate osteocalcin – protein on which calcium salts are fixed: without the carboxylation of glutamic residues induced by Vit K, calcium can not be fixed. If vitamin K is not enough, there is an increase of hematic not carboxylated osteocalcin, a phenomenon typically observed in postmenopausal women and in those who make use of anti-Vit K drugs; administering low doses of Vit K this index of bone loss is reduced;
 - Vit B6 for the synthesis of Collagen.

These nutritional deficiencies can be caused by malnutrition – as it happens in Western countries where we eat foods high in calories but low in nutrients – or malabsorption.

This last mechanism may be due to stomach problems (gastritis, duodenal ulcer, ...) but very often is caused by LEAKY GUT SYNDROME, that means the loss of a physiological intestinal permeability caused by pro-inflammatory foods, drugs, alcohol, chemical additives, ingestion of environmental toxins, viral, bacterial or fungal infections, psychophysical stress or food intolerances.

The Leaky Gut Syndrome is always present in patients suffering from inflammatory bowel diseases such as ulcerative colitis or Crohn's disease, so that in the years they show an increased risk of bone fractures, because of chronic malabsorption of nutrients and of corticosteroids therapies.

Another cause of osteoporosis is represented by some nutritional excesses as food high in purines, or the supplementation of Fluoride salts.

This mineral, proposed to prevent and treat osteoporosis, may actually increase the fragility mainly in cortical bone. Recent studies have shown that (in the form of Fluoride) is largely ineffective in increasing bone density. The main effects are stimulation of osteoblasts and a positive balance of Calcium. It is embedded in the protein matrix in the form of fluoroapatite, but an excessive administration and for a long time, may cause more brittle bones.

The therapeutic index is, in fact, somewhat narrow and the recommended dosage of 60–75 mg causes side effects in 33–50% of patients.

A myth debunked by many scientific studies, is the correlation between Milk, Cheese and bone density.

It was shown that excessive or regular consumption of these food would cause loss of bone minerals, particularly for the mechanism of tissue acidosis that these foods cause, both for the excess of proteins and for the content of salt (Sodium chloride), both acidifying.

This, and the fact that they contain a certain amount of trans hydrogenated fats, makes them a class of pro-inflammatory foods, causing or contributing to cause subclinic inflammation that, as we have seen, can trigger too much osteoclasts and bone resorption.

American women over 50 have a very high rate of hip fractures, index of osteoporosis, surpassed only by the Europeans and the Australians, or by women who live in countries where the consumption of milk is even higher than in the US (11–13). Hegsted in a publication of 1986 states that “..the hip fractures are more common in people who are habitual consumption of dairy products and who normally take high quantities of calcium” (14).

An epidemiological study carried out on 77.761 women aged between 34 and 59 years, lasted 12 years, showed that women who drank three or more glasses of milk per day, compared with women who drank little or no milk, not only did not show a reduced risk for hip fractures (as expression of osteoporosis), but the opposite effect: women who drank the most milk had a higher incidence of bone fractures (15). Milk and cheese are a class of food more frequently involved in adverse food reactions, both for deficit of lactase (or reduced lactase activity), frequent among Caucasians too, and for casein.

It is estimated that about 40% of the adult western population has difficulty to metabolize lactose.

This means that these foods represent one of the most frequent cause of the LEAKY GUT SYNDROME for altering the microbiota and the developing of intestinal inflammation.

Moreover, with milk proteins, we also ingest the bovine insulin too which, for strong structural similarities, shall function on us, upregulating our blood insulin load. And this could be significant due to the low nutritional quality with which these animals are fed in intensive livestock in order to make them produce the more quantity of fat as quickly as possible. Through milk and cheese we also assume quantities of drugs, hormones and pesticides that for their lipophilic nature are concentrated in fatty parts of animals, so that, after our ingestion, we deposit them in our tissues undermining our health, even of our bones.

Patients with chronic Endocrine (as thyroiditis) or Autoimmune (such as rheumatoid arthritis or scleroderma) or Metabolic (such as diabetes) diseases, show greater ease in developing osteoporosis, both for deficit of hormones useful for correct bone turnover, that through the maintenance of a chronic inflammation and the impediment to the execution of regular physical activity.

Concomitant liver or kidney diseases interfere on bone resorption also for the alteration of the metabolism and absorption of nutrients such as vitamin D, proteins or Calcium.

When preparing a **personalized therapeutic program** in order to prevent or treat osteoporosis, it is therefore necessary to take into account all the variables involved, supporting the patient in the process of detoxification, recovery of physiological functions and proper cell nourishment, allowing his body to find and express, if still possible, his potential for self-healing (Table 5).

Table 5
Goals of a natural therapeutic program
<ul style="list-style-type: none"> • Restore proper digestive and intestinal functionality • Restore eubiosis (Microbiota) • To reach the ideal weight by reducing body fat • Reduce or eliminate any sources of intoxication • Chelating therapies for heavy metals • Liver and extra-cellular matrix detoxification • Anti-inflammatory natural therapies • Natural therapies for endocrine and immunological balance • Integration of any nutritional deficiency • Replace, when possible, synthetic drugs with natural and nutritional therapies • Define a food education which takes into account of <ul style="list-style-type: none"> - any intolerances (gluten, lactose, nickel, etc.);

Table 5

Goals of a natural therapeutic program.

To do this it is important to collect a medical history rich of details that consider, as well as family and pathological history, even eating habits, lifestyle, physiological functions such as digestion or evacuation, daily rhythms, stress levels and quality of sleeping, voluptuary habits, kind of work and hobbies (e.g. painting or pottery or other activities that may put the patient in contact with potentially toxic substances), diagnostic tests and intake of drugs or supplements.

The program of treatment will have to be targeted to:

- - restore proper digestion and bowel function, correcting a possible dysbiosis or altered intestinal permeability. This means a diet aimed at these objectives. It may be useful a bowel cleaning, as hydrocolonotherapy, and integration of digestive or laxatives herbs, and/or fibers and/or probiotics;
- - lead the patient to a healthy weight by reducing fat mass, monitoring him with the impedance test (lean mass, muscle, fat mass, body water);
- - assess, with the aid of an osteopath, postural errors that could also cause alterations in the process of local bone remodeling, sending the patient to specialists – physiatrists or osteopaths – able to guide him in the recovery of a correct posture and deambulation;
- - identify possible sources of environmental or food poisoning motivating the patient to avoid them;
- - use a chelating agent for heavy metals where there is evidence, with examinations of the hair, urine or saliva, of intoxication (EDTA, DMPS, DMSA, Zeolite, Chlorella, Alpha-Lipoic Acid, etc.);
- - detoxify the liver and the extracellular matrix with herbal, homeopathic or homotoxicologic medicines;
- - use anti-inflammatory substances, natural or homeopathic, as Turmeric, Ginger, Bromelain, Papain, MSM, Quercetin, Boswellia, Ribes nigrum MG1DH, Arnica, etc.;
- - prescribe natural therapies to rebalance autonomic, endocrine or immunological systems;
- - supply any deficiency of vitamins (D, C, K, group B) or minerals;
- - replace, where possible, synthetic drugs with natural ones (e.g. the Statins with diet and fermented red rice, gastroprotective drugs with diet and bicarbonate salts, etc.) or nutritional therapies;
- - define a personalized diet that takes into account any intolerances (gluten, lactose, nickel, etc.), metabolic diseases (diabetes, dyslipidemia, etc.), index and glycemic load, acid-base balance of extra-cellular matrix, nutritional deficiencies or excesses, adequate intake of phytoestrogens, errors in daily food choices, digestive difficulties or alteration of bowel functions, concomitant diseases (liver, kidney), etc.;
- - advise the patient regular visits by the dentist to maintain proper dental hygiene, remove any amalgam of mercury and prevent periodontal disease;
- - help the patient to find the right biorhythm sleep-wake, helping him with natural substances (passionflower, valerian, etc.) and urging him to undertake a process to acquire techniques of stress management as Meditation, Yoga or Tai Chi. In case the patient seems to be open and ready, advise the patient to take a path of awareness and personal growth;

- - and of course, invite him to do regular physical activity, expose himself to sunlight, not smoking, drink moderate amounts of alcohol and coffee, avoid drinks, sodas and refined salt.

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Conclusions

A Health National System collapsing to the dramatic increase of many chronic and degenerative diseases that are increasing early in age, including osteoporosis, can not continue to chase the latest (expensive) synthetic molecule placed on the market as a hope of therapy.

If we don't face the real causes why diseases occur, no "magic pill" will be decisive; indeed, it will participate to aggravate the clinical picture for the side effects that each drug leads, making other medications necessary in a vicious cycle that leads the patient to worsen his quality of life, reducing his productivity and self-sufficiency, with very high personal and social costs: costs no longer sustainable.

The causes of chronic and degenerative diseases – like Traditional Medicines (TCM or Ayurveda) knew, as Hippocrates taught and how over a century countless scientific studies show – have to be found in lifestyle – diet in the first place –and the environment.

Our food choices are crucial, not only for different metabolisms, but also for the initiation, promotion or regression of a disease, for energy levels, for the emotional and mental well-being and for the environment in which we live.

Environment, that just because of our wicked choices, is becoming a source of a growing number of new and old diseases such as osteoporosis.

Physicians of all specialties should therefore have a solid knowledge of nutrition and environmental medicine, educating and guiding patients to maintain – or to find back – their own mental and physic well-being, and to assume the responsibility of their own health.

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