

# Education News

ISSUE 4



## PREVENTING OSTEOPOROSIS / STRENGTHENING BONE DENSITY AND WHY CALCIUM SUPPLEMENTS MAY NOT BE THE KEY

### DID YOU KNOW?

- 60,000 people a year are treated for hip fracture in the UK.<sup>1</sup>
- The incidence of osteoporosis trebles in women around the age of menopause, and can double again as women get older.<sup>2</sup>
- The number of both men and women being diagnosed with osteoporosis before the age of 40 is steadily increasing.<sup>3</sup>

It is never too early to start supporting our bone density, both through diet and weight bearing exercise. Our bone density tends to peak in our 20s, and then we all need to be more proactive in strengthening our skeletal structure. So what can we all do to improve the health and density of our bones? And why is it that menopausal and post-menopausal women are at greater risk for osteoporosis?



### CALCIUM

Deficiency is often cited as the major cause of low bone density. Frequently advice is given to add more calcium to the diet, or where osteoporosis or osteopaenia (low bone density) is already diagnosed, calcium supplements are usually prescribed. We appear to have plenty of calcium in our diets (see Calcium intake from foods), so perhaps we need to dig a little deeper into this controversial subject. In addition, recent research and media coverage has highlighted the possible connection between calcium supplements and the potential increased rate of heart attacks, a very negative finding considering most people take a food supplement to support longevity. We feel that this could be partially due to the wide spread use of food supplements that focus on delivering large amounts of calcium in the poorly absorbed form of calcium carbonate<sup>4</sup>, an inorganic compound that our bodies may not utilise very well. This could possibly explain the researchers' conclusion that excess calcium from supplements may leave deposits on the arteries that "increase vascular calcification and thereby cardiovascular events"<sup>5</sup>. They had not noticed this effect with increased dietary calcium. More on calcium later.

#### CALCIUM INTAKE FROM FOODS:

RDA (recommended daily amount): 800mg  
Average British daily intake 2000: 960mg  
Average British daily intake 1990: 918mg

Source: National Food Survey 1990 & DEFRA 2000

### VITAMIN D

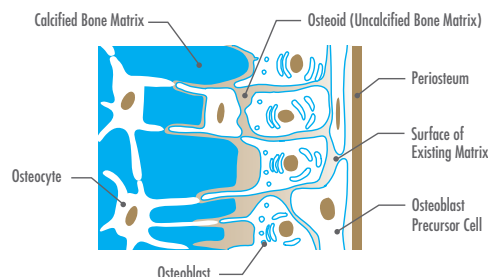
Is usually the next port of call. We have long known of its importance for avoiding rickets, softening of the bone in children and teenagers, as vitamin D helps the body to absorb calcium and phosphorous in the gut, both of which are needed for a strong bone matrix. Vitamin D is known as the sunshine vitamin, as we use sunlight to help manufacture it in the skin; we can also get vitamin D from oily fish.



### LAZY BONES

Inactivity is another major factor. Our bones are continually adapting their density and structure to meet our current needs. So regular weight bearing exercise, such as walking, will send messages to the bone cells to increase density in the areas feeling the impact most, i.e. the legs, hips and spine, which together with the wrists are the main target areas for osteoporosis. Spending your days sitting at the computer/ on the sofa/ in the car, bus, train or taxi, on the other hand, sends signals that you don't need strong bones in those areas<sup>6</sup>. Postmenopausal women who walk for at least 6 hours per week have a 55% reduction in risk of hip fracture (41% in women who walk for 4 hours a week) compared to those who walk for less than 1 hour a week<sup>7</sup>. And one study noted that professional tennis players can have up to 25% greater bone density in their serving arm than in their other arm.<sup>8</sup>

**A typical bone structure showing the osteocytes (bone cells) and the bone matrix.**



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## BONES ARE LIVING TISSUE

**That's the beauty of our bones: they are not fixed, solid objects, but living tissue, constantly changing and renewing.**



In a live body they are much softer and more pliable than you would imagine. Minerals, fluids and other nutrients are continually and dynamically moving in and out of them – in fact, one of the main functions listed for bones in anatomy books is storage of mineral reserves, which can be released when needed elsewhere. As we have seen, bone tissue is also continually being laid down or destroyed to reshape your structure as you place varying demands on it. So the good news is that you can feed, nurture and strengthen your bones just as you can the rest of your body.

Bone tissue, made up of osteocytes, is a form of connective tissue, as is much of your flesh and blood. The bone matrix these cells are suspended in is made up of 65% mineral salts (calcium, phosphorous, magnesium, boron, sulphur and strontium) plus collagen and ground substance.

So as with all connective tissue, bone cells need good levels of oils, amino acids, electrolytes, water and other supporting nutrients to stay vital and strong. They need a healthy flow of blood, lymph and interstitial fluids to carry these nutrients and messages, such as hormones, towards them, and to carry waste and toxins away. Bone matrix needs good levels of calcium and other minerals needed either for bone matrix ingredients or for the process of forming the matrix, such as zinc, copper and manganese. E.M. Carlisle wrote various papers in the 1970s and 80s describing silica's role in placing calcium into the bone matrix, and also in the production of collagen. Silica can be found in wholegrains, root vegetables and beets, alfalfa, nettles and horsetail. Collagen also requires vitamin C, and ground substance likes to be well hydrated.

## THE PROBLEM WITH CALCIUM

Depletion of any of these nutrients can contribute to bone degeneration. So why do we focus so much on calcium? Well, calcium phosphate does make up 70% of the weight of our bones<sup>9</sup>, so for strong healthy bones, we need to make sure this substance is available to them. This can be a problem, however, even when there is plenty of calcium in the diet.

When we eat calcium-rich foods – for example, sesame seeds, almonds, green leafy vegetables and broccoli – the body first of all needs to absorb it in the small intestine, for which it needs good levels of vitamin D.



The parathyroid then regulates how much calcium is kept in the blood – this is important as calcium enables muscles to contract, so it's needed in the blood to keep the heart beating. Blood calcium levels have also been linked with nervous system function and with blood sugar regulation<sup>10</sup>. Any calcium that is surplus to the blood's strict requirements can be released for use elsewhere in the body.

The next most important use we have for blood sugar is to buffer acidity. So if our tissue cells are too acidic, which is increasingly the case for many of us, we will send any surplus calcium there first.

So the bones will only receive calcium if there is enough left over after that. What's more, if we need more calcium to buffer acidity than is surplus to the blood's requirements, the parathyroid will actively pull calcium out of the bones, thus decreasing bone density. This is often why nutritionists with a holistic approach will recommend a regular detox to help the body maintain a healthy alkaline balance at cellular level.

## MENOPAUSE

As we get older, unless we are actively keeping on top of all of this, we have a tendency for resources to dwindle, and for there to be an increasing strain on the endocrine system, which includes the parathyroid glands. In fact our bone density peaks in our 20s, and we tend to start laying down less bone after that. Then as women hit the menopause, they start to produce less oestrogen, which is greatly involved in stimulating bone formation. It's no wonder that post-menopausal women are more affected by loss of bone density than anyone else. Calcium placement both at cellular level and within the bone matrix is much more likely to be impaired.



## MAGNESIUM

In addition, stress of any kind – whether emotional, physical or environmental – seems to cause the cells in the body to become more acidic, and to literally hold onto calcium as it moves in to buffer that acidity. Magnesium is particularly involved in calcium placement at cellular level, and as a nutrient is often very low in the diet due to over processed foods and the general depletion in most minerals noted by McCance & Widdowson over their 50 year survey of the composition of foods. Magnesium is also noted to be depleted by stress, fizzy drinks, red wine and other alcoholic drinks, and some diuretics and antibiotics.

So we can see that osteoporosis and other incidences of low bone density is not usually so much of a calcium deficiency issue as a calcium misplacement issue. In which case the traditional approach of giving calcium supplements isn't really going to help. Magnesium would be a much more logical focus for a programme.

Important note: Magnesium really could be the most significant, often forgotten nutrient that is key to our bone health. However, it would be advisable to avoid inorganic forms of magnesium, such as magnesium oxide, that are poorly absorbed and mainly work as a laxative.

**"So... low bone density is not usually so much of a calcium deficiency issue as a calcium misplacement issue. In which case the traditional approach of giving calcium supplements isn't really going to help. Magnesium would be a much more logical focus..."**

## THE PROBLEM WITH CALCIUM SUPPLEMENTS

In fact, focussing on calcium can bring its own problems. To begin with, most supplements provide calcium in the form of calcium carbonate or dolomite, which contains calcium carbonate.<sup>12</sup> As previously stated, calcium carbonate is an inorganic form of calcium which is poorly absorbed by our bodies when compared to the less commonly available calcium citrate.<sup>13</sup> Furthermore, calcium carbonate can have a detrimental effect on stomach pH, which can affect the absorption of many nutrients, including calcium and the other important cofactors and trace elements like magnesium, boron, manganese to name but a few. It doesn't make sense to me on any level to be taking calcium carbonate, either on its own or as part of a multi.

Even if you're taking a more absorbable, organic form, such as calcium citrate, you need to be aware that calcium ideally needs to be supported by a good source of magnesium, so any multi or formula that contains calcium needs to contain additional magnesium. It is also worth noting that to get the balance right, which ideally be twice as much magnesium as calcium, then you need to supplement these nutrients in forms that are more or less equally absorbed. So for example, a formula would ideally need to contain 100mg of calcium (as citrate) and ideally this would deliver 200mg of magnesium (as citrate), if it contained 200mg of magnesium (as oxide) then the quantity of actual magnesium absorbed would usually be too low.

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## A NUTRITIONAL APPROACH

**If we are eating plenty of green leafy vegetables, broccoli, cauliflower, nuts and seeds, then we should be getting sufficient calcium in our diet together with some magnesium to help with calcium placement – although additional magnesium may need to be supplemented (again, in an organic form, such as magnesium citrate<sup>14</sup>).**

Green leafy vegetables are also rich in vitamin K, which is also important for bone density. One study reports that nurses eating their green leafy vegetables, broccoli and other green vegetables every day had almost half the amount of hip fractures compared to nurses eating their greens only once a week or less. Contrary to what we may have been brought up believing, dairy products such as milk and cheese are not ideal sources of calcium due to the low levels of magnesium present.

A good nutritional approach to either preventing or addressing low bone density will need to focus on improving magnesium levels and absorption (and thereby helping to improve calcium

placement), as well as ensuring adequate vitamin D and Vitamin K, together with an alkalisating and hydrating diet and general endocrine support. If calcium appears to be deficient rather than misplaced, then you would need to address how well the gut is absorbing nutrients, and perhaps only then look at further calcium supplementation in citrate form as part of a balanced formula.

Each of us will benefit from a slightly different programme according to our individual make-up. Good nutrition is not just about getting all the right nutrients on our plate, but also ensuring that we are absorbing, transporting and utilising the nutrients within those foods. Then as we lighten the load of our diet, alkalise and rehydrate, and our biochemistry starts to function more efficiently, our detoxification pathways will increase. This will give our liver and other aspects of our routes of elimination (such as lymph, colon, skin, lungs and kidneys) more work to do, so changes need to be gradual and supported. You may well benefit from a programme tailored for you by a nutritional therapist.

Bearing this in mind, here are some general guidelines you may find useful and some practical ideas for how to incorporate dietary changes easily and enjoyably.

### INCLUDE:

- A good variety of vegetables and salads, of varying colours but highlighting greens. Choose organic where possible, and make sure they make up at least 2/3 of your meals. Also get into the habit of regular vegetable juicing.
- Plenty of nuts and seeds.
- At least 2 vegetarian days a week, and at least 1 vegetarian meal a day – ensure you have complete proteins by combining legumes with grains, seeds or nuts.
- A daily walk

### AVOID/REDUCE:

- Dairy, damaged fats, table salt, sugar, aspartame
- Fizzy drinks, caffeine, alcohol

You may also benefit from avoiding wheat, or perhaps gluten (wheat, rye and barley). In any case, grains, pulses, nuts and seeds should be rinsed well and soaked overnight in water. This will reduce phytates and deactivate any enzyme inhibitors, so you can make the most of the nutrients they contain.

<sup>14</sup> See my article "Simply Magnesium" at <http://www.nutrigoldeducation.co.uk/blog/diet/simply-magnesium/>

# MENU SUGGESTIONS

You will each have your own likes, dislikes and requirements, which will change seasonally and as you change.  
You may find the following useful as part of a nourishing, hydrating, alkalisating diet:

## BREAKFAST:



Wheat-free muesli (soaked overnight in water) with homemade almond milk

Superseed smoothie – with nut milk, pumpkin seeds, sunflower seeds, sesame seeds, plus avocado or banana to thicken and raw honey or berries if you need to sweeten it

Quinoa or rice porridge with ground nuts and seeds

Soft poached egg on a bed of rocket and baby spinach with a lemon and flax oil dressing

## LUNCH/DINNER:



Try to have your main meal earlier in the day and a smaller, lighter meal for dinner.

Chicken or tempeh stir fried in coconut oil with mixed vegetables

Broccoli and almond soup

Quinoa salad with watercress, grated carrot, pumpkin seeds and spring onions.

Green salad with warm lentils and tahini sauce

Fresh, wild, oily fish and salad

Lentil and kale daal with shortgrain brown rice

## TO DRINK:



Water – gradually increase to 1.5-2 litres daily, best at room temperature and between meals, and never more than 1 litre in the space of an hour, so don't gulp it down.

Herbal teas - nettle tea is rich in silica

A glass of fresh vegetable juice – invest in a good masticating juicer if you can

## SUPPLEMENTS:

This will vary from person to person, but you may want to highlight essential fatty acids, especially omega 3, as well as magnesium citrate, vitamin D and other supporting nutrients.

As a general support for those of all ages, you could look at a multi that is rich in magnesium citrate, while also delivering a full range of B

vitamins and trace minerals together with some omega 3 oils, such as a good quality flax, fish or krill oil, and plenty of sunshine.

For those at higher risk, you should consider a formula that supplies a good balance of magnesium citrate (and calcium citrate (an approximate balance of 2-1 in favour of

magnesium). This formula should also deliver a balanced blend of vitamin E, zinc, vitamin C, manganese, boron, copper, chromium, vitamin K, folic acid and vitamin D. I would also suggest that one should consider taking alongside such a formula a well absorbed form of omega 3 such as fish and krill oil.



**Should you need a more detailed approach, or should you have any questions or concerns that are not addressed in this article, you are always welcome to contact our nutritional advice team on 01395 227850 (9.00am – 5.00pm Monday – Friday).**

Alternatively if you would like a more personalised approach, addressing dietary recommendations, lifestyle changes etc., we would suggest you consider consulting a qualified nutrition adviser or therapist, which you can do by either asking us for details of your local

practitioners, or contacting The Federation of Nutritional Therapists on **0870 312 0042** or by emailing them at **admin@fntp.org.uk**

For more information visit the website at: **www.fntp.org.uk**

<sup>1</sup> Guryel, E, Balancing priorities in the management of hip fracture: guidelines vs. resources. *Ann R Coll Surg Engl.* 2004 May; 86(3): 171-173.

<sup>2</sup> Health Statistics Quarterly Winter 2002 – Office for National Statistics

<sup>3</sup> Health Statistics Quarterly Winter 2002 – Office for National Statistics

<sup>4</sup> Heller, H J, Pharmacokinetic and pharmacodynamic comparison of two calcium supplements in postmenopausal women. *J Clin Pharmacol.* 2001 Jan; 41(1): 116; Harvey J A et al, Superior calcium absorption from calcium citrate than calcium carbonate using external forearm counting, *Journal of the American College of Nutrition*, Vol 9, Issue 6 583-587

<sup>5</sup> Bolland M. J. Et al, Effect of calcium supplements on risk of myocardial infarction and cardiovascular events: meta-analysis, *BMJ* 2010; 341:c3691

<sup>6</sup> Bone loss generally occurs at 1-2% per month during prolonged periods of bed rest - Shackelford LC, LeBlanc AD, Driscoll TB, Evans HJ, Rianon NJ, Smith SM, Spector E, Feeback DL and Lai D., (2004) Resistance exercise as a countermeasure to disuse-induced bone loss. *J Appl Physiol* 97: 119-129.

<sup>7</sup> Feskanich D, Willett W and Colditz G., (2002) Walking and leisure-time activity and risk of hip fracture in postmenopausal women. *JAMA* 288: 2300-2306.

<sup>8</sup> Kannus P, Haapasalo H, Sievanen H, Oja P and Vuori I., (1994) The site-specific effects of long-term unilateral activity on bone mineral density and content. *Bone* 15: 279-284.

<sup>9</sup> Branca F, Calcium, micronutrients and physical activity to maximise bone mass during growth, <http://www.fao.org/docrep/w7336t/w7336t07.htm>

<sup>10</sup> Budd, Martin L., *Low Blood Sugar*. Sterling 1983

<sup>11</sup> McCance R A & Widdowson E M, A Study on the mineral depletion of the foods available to us as a nation over the period 1940 to 1991. Summary of 1st to 5th Edition of The Chemical Composition of Foods, RSC/MAFF.

<sup>12</sup> Dolomite has also been found to contain significant levels of mercury, lead and arsenic, (although most food supplements are screened for these contaminants these days Roberts, HJ, Potential toxicity due to dolomite and bonemeal, *South Med J.* 1983 May; 76(5): 556-9.

<sup>13</sup> Heller, Howard J, *J Clin Pharmacol.* 2000; 40: 1237-12

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