

The logo for Viva! Health features the word "Viva!" in a white, cursive script font with two red dots above the 'i'. Below it, the word "HEALTH" is written in a white, uppercase, sans-serif font with wide letter spacing.

Viva!
H E A L T H

Break Free
Campaign

Building bones for life

By Veronika Powell MSc and Jane Easton, Viva! Health

A practical guide offering:

- Nutritional guidance for building strong bones and teeth in adults and kids
- Advice on how to prevent and treat osteoporosis
- Easy, gorgeous one week menu for children and adults

£1.90

About Viva! Health

Viva! Health is the nutrition and health section of the charity, Viva!. We monitor and interpret the latest scientific research on diet and health. We advise the public, health professionals and the food industry on healthy eating. Viva! Health runs education campaigns, gives talks and cookery demonstrations and answers your nutritional queries. AND – you'll never be stuck for a brilliant recipe with our online Vegan Recipe Club.

Veronika Powell MSc is a biologist and health campaigner who has spent years uncovering the links between nutrition and good health and is an expert on plant-based diets.

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www.veganrecipeclub.org.uk.

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This guide is based on the fully referenced *Break Free* report, see www.viva.org.uk/health/bones or see page 31 for more information.

Your skeleton is – alive!

How many bones are in your body? More than 200 and they're all held together with ligaments, tendons and cartilage. It's the scaffolding that houses and protects your organs, gives your muscles something to cling to and stores minerals such as calcium and phosphorus. In the centre of some of your bones is red bone marrow, responsible for producing blood cells. So, far from being just a collection of bones, your skeleton is a living network of cells, fibres, minerals and blood vessels.

Bone mass itself is made of two basics:

- 1 Flexible but tough protein (collagen).
- 2 Around 65 per cent is a hard but fragile compound of calcium (calcium phosphate).

The long bones in your arms and legs are quite complicated. The long part itself, between the round ends, has a thick outer layer which acts as a wall to protect the cavity inside. The cavity is filled with bone marrow whilst the round ends are made of spongy bone.

For bone to grow and be healthy it needs a good supply of energy, protein, bone-forming minerals such as calcium, phosphorus, magnesium, zinc, copper and boron, as well as vitamins (eg C, D, K).

The bones you had 10 years ago aren't the ones you have now as they are constantly shedding bits and renewing themselves. It's all part of their clever architecture that adapts to the strains you put on them every day of your life.

All change

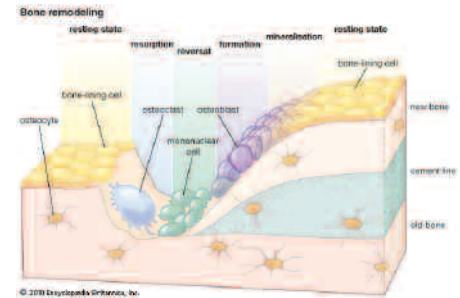
During the first years of life and in early childhood, long bones in your arms and legs grow faster than your trunk – and it stays that way until puberty. When sex hormones start to rear their head, the trunk accelerates its growth while the long bones slow down.

In girls, the greatest increases in bone mass occur between the ages of 12–15 years. In boys, it's a bit later – 14–17 years. This rapid bone growth then slows dramatically by the age of 16–18 in women and 17–20 in men.

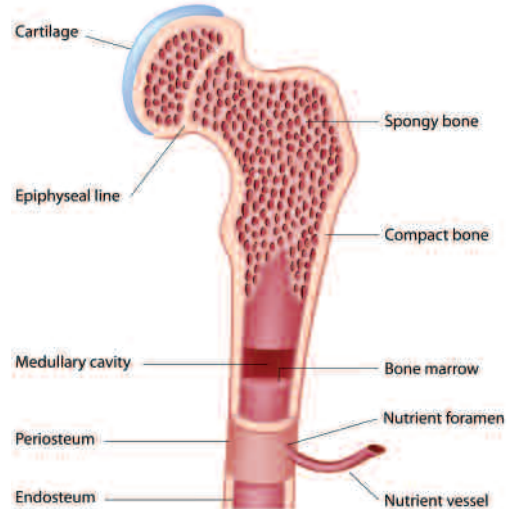
As bones grow, become worn or suffer minor damage from physical activity, they are constantly repaired. Damaged and worn bits are cleared away and new bone is built in the gaps. Two lots of cells are involved – osteoclasts, which break down and carry away damaged bone, and osteoblasts, which form new bone.

There is a bit of hitch in that your body's ability to produce these bone-building osteoblasts is limited. So as you age, their number and their ability to build new bone gradually decreases. The trick is not to use

Bone remodeling



Bone anatomy





them unnecessarily and the only way you can do that is through diet.

The whole process of bone growth and maintenance goes like this: a framework for the bone is made out of collagen fibre – something like a sponge. The spaces inside the ‘sponge’ are then filled with hard minerals. It’s called mineralisation.

Bone mineralisation continues until peak bone mass is achieved in early adulthood – usually around the age of 30. The body then attempts to keep the skeleton’s minerals at a stable level.

In children and adolescents, new bone mass is deposited in specific places in bones, which is how they grow wider and longer.

There is then another mechanism that goes on throughout your life and ensures that damaged, worn bone is replaced by new bone. It consists of two processes: resorption and formation.

Bone resorption is mostly done by osteoclasts which break down and carry away damaged or redundant bone and has three functions:

- maintain normal bone mass
- repair minor damage to the bones
- maintain optimum calcium levels in the body

The empty cavities it leaves after breaking down old bone are filled by osteoblasts, which form new bone. This process is called **bone formation**.

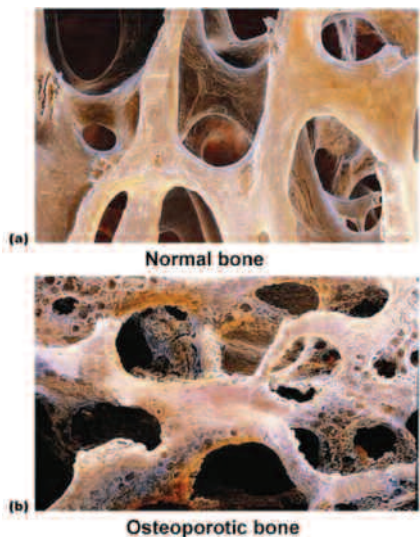
Bone mineral is mostly made up of calcium and phosphorus. The calcium content is closely linked to how much calcium is in your blood and there are constant exchanges between the two systems – blood and bone. It’s a very fine balance, maintained by many organs including the skeleton, intestines, kidneys and parathyroid glands.

Some 99 per cent of your body’s calcium and 80 per cent of its phosphorus is in your skeleton and so anything that affects calcium levels in the body – food, lifestyle, medication – has an impact on your bones. If the effect is negative it can result in bone loss leading to osteopenia (the forerunner to osteoporosis) and it can happen at any age.

Hormone cascade

Calcium balance in the body is regulated by a group of hormones – parathyroid hormone, calcitonin, growth hormone, insulin-like growth factor 1 and sex hormones.

Later in life, when sex hormone levels start to drop (more so in women than men) a decrease of oestrogen in women and testosterone in men causes a higher rate of bone loss. Unfortunately, this isn’t entirely counteracted by new bone formation and can lead to osteoporosis (from the Greek ‘porous



Image©2012 Midlands Technical College

bones'). It is often referred to as 'widow's stoop' or 'dowager's hump,' reflecting the bent posture that often results and the fact that it affects women more than men. It is caused by a drop in bone mass, a deterioration of the bone structure and leads to an increased risk of fractures. Women have a higher risk because of the dramatic drop in oestrogen at menopause – much greater than the corresponding decline of testosterone in men. Life's just not fair!

But nothing is inevitable and the build-up of bone in young people and the loss in older

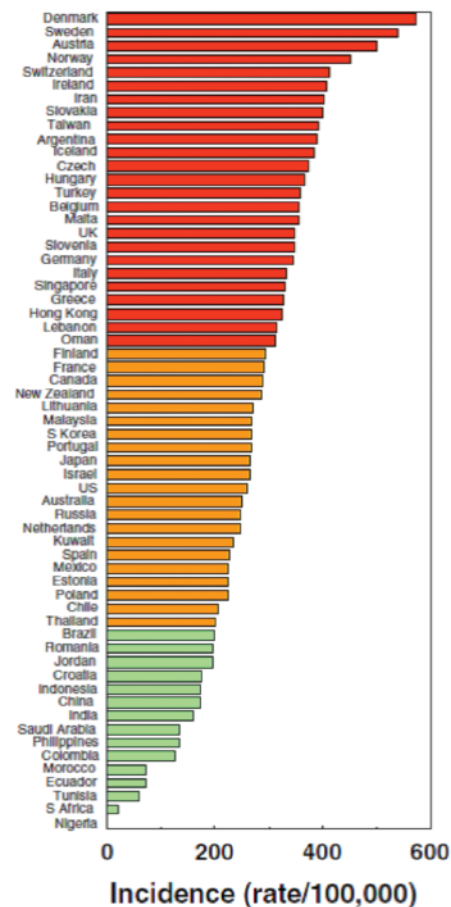
adults are both influenced by a combination of genetics, hormones, nutrition and exercise – and there's a lot you can influence with the latter two!

Osteoporosis and osteopenia

Osteoporosis affects millions of people around the world – three million in the UK alone and increasing.

It takes the form of serious bone loss, making bones more fragile and putting people at high risk of fractures. These so called 'fragility' fractures can be caused by something as simple as falling from a standing position. It is the wrist, spine and hip that are commonly broken but 'osteoporotic' fractures can happen anywhere – even in children, where it is usually the lower forearm. It's a big problem, with 300,000 fragility fractures every year in the UK.

Osteopenia is a condition where bone density has reduced but not enough to be classified as osteoporosis.



Kanis *et al.*, 2012

A fractured world

Osteoporosis starts decades before any symptoms appear and often the first signs can be seen even before the age of 30. For general good health it's the old story that the earlier healthy habits are developed the better – and it's no different with bone health.

In the UK, a half of all women and one in five men over the age of 50 will suffer a fracture and this level of risk is fairly common in many Western countries. This simple fact destroys the old myth that osteoporosis is caused by calcium deficiency because the people who consume the most cow's milk and other dairy products have the highest rates of osteoporosis and hip fracture when they get older. The average weekly consumption of dairy products in the UK is 1.5 litres of milk, 200 grams of yoghurt, 120 grams of cheese, 65 grams of cream and butter – and that's not including desserts and ice-cream.

How can it be that people who consume more than 270 grams of dairy products every day, containing plenty of calcium, have one of the highest rates of osteoporosis and hip fracture in the world?

The latest figures from 63 countries show there is huge variation in fracture rates, with some countries having 10 times as many

fractures than others (see graph on page 5). Interestingly, in countries where meat and dairy consumption is low, rates of osteoporosis and fractures are also low; where it is high, so is osteoporosis.

Osteoporosis – who is at risk?

White people tend to be at greater risk than people of Latin American or African heritage but there are many risk factors involved. The following are among the most common:

- **Age** – quite simply, fracture risk increases with age.
- **Female gender** – osteoporosis is more common in women than in men and tends to occur earlier and be more severe.
- **Weight** – low body weight or being underweight can contribute to lower bone mineral density.
- **Sedentary lifestyle** – due to a lack of stimulation for the bones.
- **Genetic factors** – having a relative with osteoporosis might mean an increased risk but lifestyle choices can determine whether the disease will develop or not.
- **Previous fracture.**
- **Smoking** – smokers tend to have lower bone density.

The US is usually seen as a country which devours huge amounts of meat and dairy yet is way down the table. The authors of this research explained the reason. If US citizens were divided by ethnicity, white Americans would be in the high risk group while Hispanic, Asian and black people would have a much lower risk. It's because these latter groups of people have much higher levels of lactose intolerance and many can't consume dairy products.

- **Glucocorticoid, cyclosporine and methotrexate treatment** – these medications are known to have a negative effect on bone density.
- **High alcohol consumption** – however, a low to moderate alcohol intake could be protective.
- **Elevated blood homocysteine** – high levels are associated with an increased risk – but it can be easily avoided with regular vitamin B12 intake.
- **Having no children** – women who never had children tend to have a higher risk.
- **Early onset of menopause** – lack of oestrogen causes higher bone loss.
- **Calcium or vitamin D deficiency.**
- **Low peak bone density** – which would have happened in young adulthood.
- **Ovarian hormone deficiency** (lack of oestrogen).

Building strong bones

To keep your bones strong and healthy, it's as important to know what weakens them as well as what strengthens them. Calcium intake is important but it's obviously not the only factor because there's something else at work.

Fragile balance

Your body is a finely-tuned organism that needs specific conditions to be at its best and is highly sensitive to any internal changes. One of the most important factors is the blood's acid-alkali balance. It's measured by a 'pH' scale from zero to 14. A pH below seven means the solution is acidic – and the lower the number the more acidic it is – while anything above seven means it's alkaline – and the higher the number the more alkaline it is. A neutral pH is bang in the middle at seven.

Blood needs to be kept at between 7.35 and 7.45 – slightly alkaline. If there's any change in this balance, the body will immediately do all it can to correct it because maintaining this level is critical to health and even survival.

Diet is one of the main factors that influence the acid-alkali balance because whatever we

eat or drink forms acids or alkalis. If there's too much acid and calcium from the diet isn't enough to neutralise it, the body needs to draw on its calcium reserves in the skeleton. Some of the calcium is then returned back to the bones but most of it is excreted in the urine together with the acids.

Protein matters

Some foods produce acid more than others and protein is a prime culprit. Protein contains the body's building blocks – amino acids – some of which contain sulphur and the body turns this sulphur into sulphuric acid. Animal protein (from dairy products, eggs, red and white meats and fish) contains higher levels of sulphur amino acids than vegetable protein and is responsible for producing large amounts of acid in the body.

Sugar is another acid-producing culprit and therefore sugary foods, processed cereal products and sweet drinks are not bone-friendly foods.

Phosphorus also plays a part and again it largely comes from meat and dairy products. Potassium and magnesium come mainly from plant foods whilst calcium is found in both plant foods and dairy and these increase the alkali level but... dairy products also contain animal protein and this dominates, making the overall effect of dairy acidic.

Animal products make our blood acidic. We neutralise this impact by leaching calcium out of our bones. That's why high dairy-eaters have more osteoporosis.



Traditional Inuit people had very high calcium intake from fish bones but studies found that after the age of 40, they had lost between 10 and 15 per cent of their bone mass compared to the average American. This extremely early onset of osteoporosis was attributed to a diet very high in animal protein and phosphorus from fish and low in alkaline foods.

The importance of acid-alkali balance is now widely accepted, particularly where bones and kidneys are concerned.

Scientists have studied the effect that animal protein and fruits and vegetables can have on the amount of acid produced in the body and the result is clear – the more animal protein (meat, fish, dairy and eggs) is eaten, the greater the rise in acid levels. It's reached a point now where the average Western diet produces a permanent acid overload in your blood. The answer, they say, is to increase your intake of alkaline foods such as fruit and vegetables and cut back on meat and dairy.

A huge analysis of 34 surveys from 16 countries found that 70 per cent of all fractures resulted from eating animal protein. Not satisfied with that, another scientific team tested the same theory in a seven-year study of 1,035 women. They found that those with diets high in animal protein had almost four times more bone loss – and a 3.7 times higher risk of hip fracture – than women who ate the least amount of animal protein. Yet another analysis of data from 33 countries came to a similar conclusion – the higher the animal protein



intake, the higher the rate of hip fractures.

A study of more than 120,000 women lasting 12 years showed that eating more than 95g of protein a day significantly increased the risk of forearm fracture. When animal and vegetable protein was looked at separately, the result was again a very high risk for animal protein but none for vegetable protein. Refining it even more, women who ate five or more servings of red meat each week had a significantly higher risk of forearm fracture compared with women who ate red meat less than once a week.

A study of children and adolescents from six to 18 years old confirmed that it really is the type and amount of protein that matters. A normal intake of protein led to healthy bone growth. However, children who ate high amounts of animal protein (producing more acid) had significantly lower bone mass. Apart from recommending an increase in fruit and vegetables, it also showed that high long-term calcium intake had no significant effect on bone health.

And there's more! A recent study looked at children and the growth of their bones and it concluded that animal foods, particularly meat, had a significant negative effect on bone mass increase.

In another large study of women, the division was stark – a high intake of animal protein caused bone loss while a high intake of vegetable protein did not – and even increased bone density.

Although plant protein does produce acid,

there is less of it and alkaline salts (carbonates and citrates) in fruits and vegetables neutralise it during digestion. So, the consumption of fruits and vegetables removes the need for bones to provide calcium to neutralise the acid.

People on the once highly-publicised Atkins diet, which relies on high animal protein and low carbohydrates, were examined and showed that after six months they were losing 50 per cent more calcium in their urine than when they started the diet – something you really don't want. Although high-protein diets seem to slightly increase calcium absorption from the diet, high amounts of acid-producing food can lead to calcium losses. It wasn't long before experts started warning against these kinds of diet because they can lead to bone loss and a bunch of other serious health problems.

This was confirmed by other scientists who added another warning – a high protein diet increases the kidney's acid load, which can lead to kidney stones. Just as important, the kidneys become less efficient at coping with acid as you age and so consuming fewer acid-producing foods becomes progressively more important the older you get. If you don't, the body's buffer system goes into action and whenever it can't get enough calcium from the diet to neutralise the acid and the effect can be a gradual development of osteoporosis and kidney stones, loss of muscle mass and failing kidneys.

Adding all the data together, it's clear that high protein intake, essentially animal protein,



has a damaging effect on bone that is only partly corrected by increasing your calcium intake. A good comparison is giving someone a blood transfusion while they're still haemorrhaging heavily. Simply telling someone to increase their calcium intake whilst ignoring their calcium loss is never going to solve the problem.

In short, continually eating foods that may leach calcium from the bones will exhaust the supply of osteoblasts, whose job it is to try and

repair that loss by returning calcium to the bones. On the other hand, eating a diet that is mostly alkaline doesn't cause calcium loss and allows the body to hold on to its supplies, even though the diet might be lower in calcium than a meat and dairy diet. In children, this effect can be dramatic as they have twice the ability of adults to absorb calcium. On a diet with no or low in animal protein, with low calcium losses, they can absorb all the calcium they need for growing bones.



Balancing act

The high alkaline content of many fruits and vegetables can counteract the effects of acid-generating foods such as meat, dairy and cereals (see chart on pages 19-22). The science is now absolutely clear; fruits and vegetables improve bone mass and bone metabolism in both children and adults.

To examine this further, one study focused specifically on the diets of children and adolescents and found that some food groups – fruits, vegetables and potatoes – had an alkalising effect whilst dairy products, cereals and bread, meat, fish and eggs – were acidifying. This was backed up by another study of adolescents which went into even more detail – adolescent girls consuming more than three servings of fruit and vegetables a day had healthier and better bones and were losing less calcium than girls who ate less than three servings.

In a large study of 994 women, those with the lowest intakes of potassium, magnesium, fibre, vitamin C and beta-carotene (all found in plant foods) had significantly decreased bone density in their lower back and hips. The same scientific team confirmed these results in another study and added that a high intake of fruit and vegetables in childhood is important to bone health.

Another big study examined the association between diet and bone mineral density in a group of 668 post-menopausal women. Results showed that higher intakes of fruit

were linked to higher bone density.

A project based at the Medical Research Council's Human Nutrition Research laboratory in Cambridge analysed studies examining the association between fruit and vegetable consumption and bone health. Strong associations were seen between bone health and carotenoids (plant pigments) and vitamin E which led the scientists to the conclusion that fruits and vegetables have a very positive effect on bone health.

There is no doubt that high fruit and vegetable consumption is essential for strong bones. The high potassium and magnesium content of fruits and vegetables, with their alkaline salts, makes these foods not only healthy but also extremely efficient at preventing bone loss.

Calcium and phosphorus

The two main minerals in the skeleton are calcium and phosphorus so it's obviously important that both these are present in your diet. Phosphorus is plentiful in most diets and deficiencies are unlikely.

Over 99 per cent of the calcium in your body is in your teeth and bones so as well as keeping you upright, your skeleton is also your calcium reservoir.

How well you absorb calcium is highly dependent on your age. It's highest in infancy (50 – 60 per cent), especially from human milk, but by adulthood it has dropped to about 30 per cent.

A full-term baby gets all the calcium he or

she needs from mothers' milk for the first six months. Infant formulas tend to contain more calcium than human milk because calcium in this form may not be so well absorbed.

How much calcium you actually need at different ages is shown in the table on the right.

There's a big question mark over whether taking in more calcium than your body's minimum needs does any good at all. In a study of young women, where their intake ranged from 486 mg a day to 1,958 mg, there appeared to be little, if any, difference in the effect on bones. It was backed up by another team who studied the bone mass of children and women in Gambia. They found that calcium intakes of just 300–500 mg a day had no obvious negative effects on bone health. The main difference in lifestyle between Gambian and British subjects was the amount of daily exercise they had, such as carrying loads, walking and chores. A Harvard study found something similar – in countries such as India, Japan and Peru, the average daily calcium intake was as low as 300 milligrams yet the number of fractures was quite low. Apart from calcium intake, these countries differ from the UK and USA in other important ways, such as levels of physical activity and amount of sunlight—both of which could influence the low rates of fracture.

And the science just keeps on coming! A review of 15 separate studies on calcium came to the conclusion that neither high calcium intake nor calcium supplements protects

bones from breaking. In fact, the research showed that taking calcium supplements might actually increase the risk of fractures!

Dramatic as this was, an earlier study of more than 120,000 women had already come to a similar conclusion when trying to establish whether eating calcium-rich dairy foods lowered the risk of fractures or not. The results were pretty profound – not only did dairy not reduce the risk but it could increase it! Women who drank two or more glasses of milk a day had a 1.5 times greater risk of fractures than women who drank less than this. The very latest study on the subject has produced similar results. Over 60,000 women were followed for up to 19 years and it was found that calcium intake above 750mg offered no additional protection from fractures but actually increased the risk of hip fractures.

It's much the same with children. Another big analysis, this time of 19 studies, looked at calcium supplementation and how it influenced fracture rates in children. It found that supplements are unlikely to lower the risk in childhood or even later in life. An even bigger analysis of 58 studies, which looked at calcium and high dairy intake in children, found that there wasn't even a modest improvement in bone health either for children or young adults.

Too much calcium can, in fact, be bad for bones and can be one of the two main causes of osteoporosis, the other being acid-

Age

Recommended calcium intake (mg/day)

0 to 12 months	525
1-3 years	350
4-6 years	450
7-10 years	550

Males

11-18 years	1,000
Over 19 years	700

Females

11-18 years	800
Over 19 years	700
During lactation	+550

Source: Department of Health, 1991

generating foods such as animal protein, as we've already described.

The only foods excessively high in calcium are dairy products and they, of course, always contain animal protein. This generates acid which has to be neutralised with calcium from your bones. Even though dairy products contain high amounts of calcium, the fact that it's absorbed slowly means it can't ride to the rescue, neutralise high acid levels and replace calcium back in the bones.

However, later on, when calcium from the dairy product is absorbed in the blood, the

levels rise too high and the body needs to get rid of some. This needs to happen quickly so the body excretes the excess calcium in urine and only a fraction is returned to the bones.

The process of replacing bone calcium is entirely down to osteoblasts and the body's ability to produce them decreases with age. The more you use them, the more they die and so constantly calling on them to remedy the results of your poor diet will eventually exhaust them. Once that starts to happen, porous holes begin to appear in your bones and you're on the road to osteoporosis.

Calcium from plant foods doesn't flood the system with excessive amounts but provides a steady supply throughout the day, which is used for your body's immediate needs and keeps blood levels steady. When only small amounts of calcium are being absorbed into the blood, hormone regulation is more precise and efficient. On the other hand, with excess calcium in the blood, more hormones are being produced than is necessary which leads to overstimulation of both bone loss and bone replacement with the two processes working against each other.

If you fill your diet with plenty of vegetables, fruit, nuts and seeds and pulses, you'll get all the calcium you need. Good sources are sesame and other seeds, tofu (calcium-set), pulses, almonds and Brazil nuts, green leafy vegetables (including broccoli), figs, cinnamon, oregano and parsley.

This avoids the problems of too much

Food	Mg calcium/ 100g food				
		Cabbage – raw	52	Olives	61
		Celery – raw	41	Oranges	47
Oats (oat flakes)	52	Kale – boiled	150	Pineapple	18
Wheatgerm	55	Okra – boiled	120	Raisins	46
Wholemeal bread	106-186	Peppers – raw	30	Raspberries	25
Granary bread	209	Spinach – boiled	160	Satsumas	31
Bran flakes	40	Sweet potatoes – boiled	23	Almonds	240
Muesli	110	Watercress	170	Brazil nuts	170
Broad beans	56	Beanburger	69	Hazelnuts	140
Chickpeas – boiled	46	Nutroast	77	Pecans	61
Green beans – boiled	56	Vegetable kiev	105	Sesame seeds	670
Lentils – boiled	22	Cinnamon	1230	Tahini (sesame seed paste)	680
Kidney beans – canned	71	Mixed herbs (dried)	1653	Sunflower seeds	110
Soya beans – boiled	83	Rosemary	1280	Tortilla chips	150
Tofu (calcium-set)	510 (if not, the value is 150)	Thyme	1890		
Peas	35	Dried apricots	73		
Broccoli – raw	56	Currants	93		
	(boiled – 40)	Figs – dried	250		
		Cantaloupe melon	20		

Source: FSA, 2002

calcium from dairy and supplemented foods, which affects not just bones but can also lead to kidney stones and calcification of tissues. Calcification in this context means that calcium is deposited in the wrong places such as in the soft tissues of muscles and blood vessels, which causes pain, interferes with the tissue's normal functioning and, if it's in the arteries, can increase the risk of heart attack.

When your daily calcium intake is higher than 2,000 milligrams the risk of harm increases.

Cows' and soya milk calcium content:

Type of milk	Mg calcium/ 100ml drink
Whole milk	118
Semi-skimmed milk	120
Soya milk – Provamel, calcium enriched	120
Soya milk – Alpro original	120

Source: FSA, 2002; Provamel, 2012; Alpro, 2012

Give your bones all they need

Apart from the nutrients already mentioned, your body needs many more to work properly and to build and maintain strong bones. Here are the most important vitamins and minerals.

Vitamins:

Vitamin D

Why we need it:

Vitamin D helps to keep calcium levels normal. It increases the efficiency of calcium absorption and helps to transport it around the body. When you take in too little calcium, vitamin D calls on the osteoclasts to start decomposing your bones to release calcium and return levels to normal.

Almost all your vitamin D comes from exposure to sunlight (UVB spectrum), which triggers your skin to produce it. Sunscreens with a sun protection factor (SPF) of only 8 reduce UVB penetration by over 95 per cent and vitamin D production falls by a similar amount. An SPF of 15 cuts vitamin D by 99 per cent. To ensure you get sufficient vitamin D, leave sunscreen off for your first ten or 15 minutes in the sun.

It's also recommended that you spend a similar amount of time outside every day with your face and hands exposed and preferably

arms, too. Your skin does its job even when skies are cloudy.

Again, age plays a part and a 70-year-old's ability to produce vitamin D is one quarter that of a 20-year-old. Fortunately, even this deterioration still enables sufficient vitamin D to be generated.

Good food sources:

Vitamin D is not found naturally in many plant-based foods however, there are vitamin D (D2) enriched foods like margarine, breakfast cereals or soya milk.

You should be able to get your vitamin D from the sun so be very careful about reaching for vitamin D supplements. Taking too much can be damaging (the official figure is over 4,000 IUs per day). Very high levels of vitamin D (above 10,000 IUs per day) are toxic and can cause kidney and tissue damage. And remember, there is no evidence that calcium and vitamin D supplementation alone can prevent fractures.

Vitamin K

Why we need it:

Important but often overlooked, vitamin K helps to form bone proteins and a lack of it has been linked with low bone density.

Good food sources:

Parsley, kale, spinach, Brussels sprouts, Swiss chard, green beans, asparagus, broccoli, spring greens, thyme, romaine



lettuce, sage, oregano, cabbage, celery, sea vegetables, cucumber, leeks, cauliflower, tomatoes and blueberries.

A daily portion of broccoli, sprouts, lettuce or spring greens is enough to meet your needs.

Vitamin C

Why we need it:

Vitamin C helps to form bone protein collagen – collagen fibres are the framework of the bone and is therefore essential for bone health. The old sailor's disease of scurvy is caused by vitamin C deficiency, which makes the body unable to manufacture collagen and bones cannot be repaired and maintained.

Good food sources:

Fresh fruit, particularly citrus fruit and berries, and vegetables such as green leafy ones, peppers, potatoes and sweet potatoes.

Vitamin A

Why we need it:

Vitamin A isn't a single vitamin but a family of compounds and they play an important role in many bodily processes, including bone growth. Nevertheless, too much vitamin A can contribute to bone loss and an increased fracture risk as well as

interfere with vitamin D production.

Retinol is the form of vitamin A that causes particular concern and is found only in foods of animal origin. It is extremely high in liver and it's relatively easy to get too much on a diet rich in animal products but also from supplements.

Beta-carotene is the plant form of vitamin A and hasn't been linked to any adverse effects on bone – or anything else for that matter.

Good food sources:

Quality sources of beta-carotene are brightly coloured fruits and vegetables such as carrots, sweet potatoes, apricots, green vegetables, pumpkins, tomatoes, apples, peaches etc.

B vitamins

Why we need it:

The B group vitamins are important for bones and lack of vitamin B12 in particular has been linked with increased bone loss.

Good food sources:

Best sources of B vitamins are wholegrains, such as oats, brown rice, wholegrain bread, and nuts and seeds, green leafy vegetables, avocado, mushrooms, beans and lentils.

Vitamin B12 is best taken as a supplement as there are no good plant sources. However, many foods are now fortified with B12 including margarine, breakfast cereals, soya milk, yeast extract and veggie burger and sausage mixes. As the body's ability to absorb it declines with age, the official recommendation is that everyone over 50, meat eater or not, should take a B12 supplement.



Minerals:

Magnesium and potassium

Why we need it:

These two minerals maintain an alkaline environment in the body and are essential for many vital reactions.

Magnesium is as important as calcium for bone health – it helps maintain and repair bone.

Good food sources:

Dark green leafy vegetables, apples, nuts and seeds, wholegrains, avocado, figs, bananas, apricots and lemons.

Iron

Why we need it:

Iron is involved in a chain of reactions leading to the manufacture of bone protein – collagen.

Good food sources:

Beans, lentils, peas, broccoli, cabbage, wholegrains, seeds, dried apricots, prunes and figs.

Boron

Why we need it:

Boron is essential for the conversion of vitamin D into its active form (vitamin D is necessary for calcium absorption).

Good food sources:

Green leafy vegetables, fruit, nuts and pulses (peas, beans and lentils).

Copper

Why we need it:

Copper is vital for bone and cartilage protein (collagen and elastin) formation.

Good food sources:

Pulses, nuts and seeds.

Zinc

Why we need it:

Zinc stimulates bone growth and repair and is also necessary for hundreds of vital reactions in the body and the production of enzymes and hormones.

Good food sources:

Wholegrains, nuts and seeds (especially pumpkin seeds), pulses and green leafy vegetables.

Silicon

Why we need it:

Silicon is an integral component of bone and cartilage proteins and bone building cells.

Good food sources:

Wholegrain cereals, some fruits and vegetables.

Note on sodium

A high salt intake increases calcium loss whilst a low intake is recommended for a number of reasons, the main one being to reduce the risk of high blood pressure.



Lifestyle

Exercise

Exercise is important for healthy bones throughout your entire life. It is vital to attain peak bone mass in children and adolescents – in fact, the research is crystal clear that this is the most important environmental factor of all for bone development. It's the old adage of use it or lose it as bone adapts to the loads put on it and therefore weight-bearing exercise such as walking, running, dancing, yoga, ball games and so on, leads to an increase in bone density.

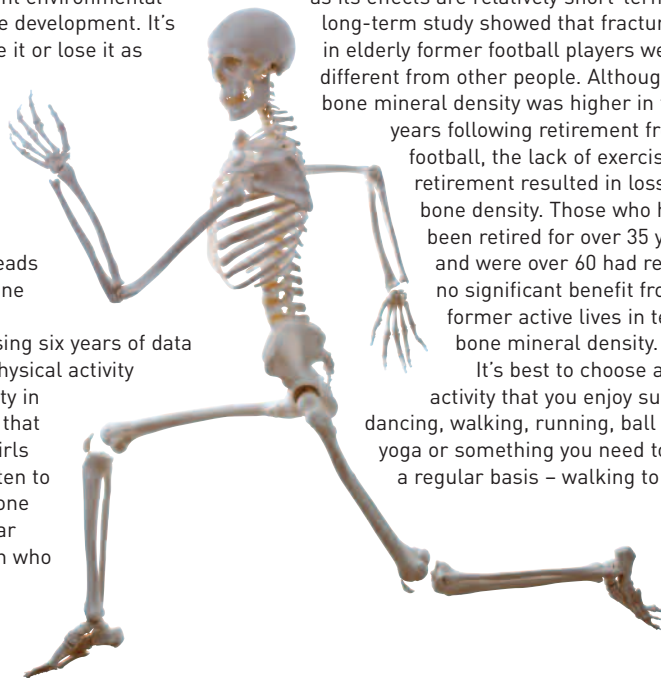
One study, analysing six years of data investigating how physical activity affected bone density in adolescence, found that teenage boys and girls who exercised had ten to 20 per cent more bone mass over a two year period than children who weren't active.

Findings from another study, following Dutch

children and young adults from 13 to 28 years old, found that regular weight-bearing exercise was more effective in building bone mass than calcium intake. Even premature babies have been found to benefit from a daily physical therapy programme for bone growth.

It's important to have regular, weight-bearing physical activity throughout your life as its effects are relatively short-term. One long-term study showed that fracture rates in elderly former football players were no different from other people. Although their bone mineral density was higher in the years following retirement from football, the lack of exercise after retirement resulted in loss of bone density. Those who had been retired for over 35 years and were over 60 had retained no significant benefit from their former active lives in terms of bone mineral density.

It's best to choose an activity that you enjoy such as dancing, walking, running, ball games, yoga or something you need to do on a regular basis – walking to



How to build bone-healthy habits into your daily life:

Daily life

- Use stairs rather than lift.
- Carry your shopping bags.
- Walk to the shops, café, restaurant, pub etc.
- If you use public transport, get off a stop before your usual stop and walk the rest.
- Even if it's just for a couple of minutes, dance to your favourite song at home.
- Try to incorporate at least 30 minutes of walking, running or other exercising into your daily routine.
- When watching TV, get up during ad breaks and walk around or do a few squats.
- Gardening helps your bones too!

Weekends/free time

- Go for long walks, hike and jog.
- Ball games, tennis, etc. are great for your bones but also a good family activity.
- Volunteer in a local shelter – walking dogs helps them as much as it helps you!
- Try yoga – everyone can do it, there are styles and classes to suit everyone's abilities.

work/school, using stairs instead of a lift, doing housework, gardening, shopping, carrying bags etc.

Lack of physical activity contributes to bone loss, especially in older people whose bone health is already deteriorating. On the other hand, the health benefits of exercise have been confirmed in both sexes up to the age of 90 years old.

So, there are many studies that show physical activity aids bone growth in children and young people and helps you to avoid osteoporosis later in life. But don't go mad on it – too much exercising can lead to women's periods ceasing (amenorrhea) which can affect hormone balance and lead to irreversible bone damage in the long run.

Eating disorders

Not surprisingly, eating disorders that lead to serious weight loss and undernourishment are extremely dangerous for bones. If amenorrhea occurs (periods ceasing) because of a drop in oestrogen production (which depends on a certain minimum amount of fat in the body), the damage to bones can be irreversible. Oestrogen deficiency during puberty can cause bone loss and reduce peak bone mass. It can usually be increased again with recovery, but it is very unlikely ever to reach its peak.

Osteoporosis resulting from oestrogen deficiency caused by anorexia is the most severe. One study found that anorexics faced a

seven-fold increase in fracture risk compared with non-anorexics of the same age.

Smoking

Smoking is a risk factor for poor bone health because it accelerates bone loss and reduces calcium absorption. For example, in one study, women who smoked about one pack of cigarettes a day had, in the long term, lower bone mineral density than non-smokers.

The effect is strongest in women, with a twofold risk of fracture for current smokers compared with those who don't smoke.

Alcohol

'Moderate' alcohol consumption (one drink a day) seems to benefit bones. A study looking at bone health and alcohol consumption looked at different types of alcohol and how they influenced bones. Bone mineral density



was six to eight per cent higher amongst postmenopausal women who had around two glasses of wine a day compared to people who had none. For men, bone density was six per cent greater in those who drank two beers a day compared to those who drank none. In contrast, men who drank more than two shots of spirits a day had the lowest bone density.

Break Free – a dietary approach

Some nutrients are vital for healthy bones but it is your diet as a whole that matters most. It's perfectly possible to eat all the important nutrients but still have poor bone health if the good nutrients are outweighed by the bad.

There are genuine concerns that the poor diets of many children and adolescents in the UK are seriously affecting their health. They are eating the wrong foods, not hitting the five-a-day target for fruits and vegetables and as a result, their diets are 'nutritionally inadequate' – in other words, many of our kids are suffering from malnutrition.

Despite the constant promotion of milk and dairy products as 'foods for healthy bones', we have very high rates of osteoporosis and hip fractures. There is a wealth of scientific evidence to show that dairy products are not the bone-builders they claim to be but can, in fact, be harmful. A large number of studies agree that the best diet for bones is one based on plant foods and which steers away from animal protein.

Bones love Alkalis

There are obviously big problems with acid-producing diets but the science also shows a

strong connection between them and obesity, heart (cardiovascular) disease and overall health and well-being.

In most studies, high acid load comes from eating animal protein whilst alkalis are the result of eating good sources of calcium, phosphorus, potassium, magnesium and vitamins C and K – in other words, plant foods. It's important to say that whilst high intakes of protein can damage bones, so can low levels. Follow the advice below and you won't go far wrong.

The most effective alkalisating substances are potassium and bicarbonate – and fruits and vegetables are suppliers of both, which makes them ideal foods.

The ratio of alkali-forming foods to acid-forming should be 70:30 for healthy bones. The table on pages 19-22 shows you the effects different foods have. Although some foods may be acid outside the body, such as lemons, they may become alkaline once you've eaten them.

“Vegetarian and vegan diets are not only healthy for babies and children but preferable to modern meat- and dairy-based diets, which are a major cause of chronic ill-health and premature death.”

Dr Anne Griffiths MB ChB, Diploma from the Royal College of Obstetrics and Gynaecology, Member of the Royal College of General Practitioners, MSc in Community Paediatrics



Effect of foods on the body's pH

(data compiled from a combination of resources)

vegetables		
highly acidic pickled vegetables	moderately acidic sauerkraut corn	mildly acidic overcooked vegetables (all kinds) mushrooms
mildly alkaline asparagus artichokes aubergine carrot courgette mustard greens new potatoes olives parsnip pumpkin rhubarb seaweed squash sundried tomato swede sweet potatoes turnip	moderately alkaline avocado Brussels sprouts cabbage cauliflower endive ginger horseradish leeks lettuce okra onion peas peppers potatoes savoy cabbage radishes spinach tomato watercress	highly alkaline alfaalfa grass barley grass beetroot broccoli celery cucumber green beans garlic kale sorrel sprouts wheatgrass

fruit		
highly acidic -	moderately acidic preserved/ canned fruit	mildly acidic blackcurrants blackberries clementines gooseberries plums prunes
mildly alkaline apple apricot (fresh or dried) banana blueberries cantaloupe melon cherries dates (fresh or dried) figs (fresh or unsweetened dried) grapes grapefruit kiwi mango		moderately alkaline lemon lime
		highly alkaline -

pulses		
highly acidic -	moderately acidic dairy-free cheese	mildly acidic hummus tempeh chickpeas kidney beans black beans
mildly alkaline lentils tofu dried soya protein products mung beans	moderately alkaline butter beans soya beans peas	highly alkaline sprouted beans and lentils

nuts and seeds		
highly acidic -	moderately acidic peanuts peanut butter pistachios walnuts	mildly acidic cashews hazelnuts macadamia nuts pecans pumpkin seeds sunflower seeds
mildly alkaline Brazil nuts pine nuts (raw)	moderately alkaline almonds almond butter flax seeds fresh coconut pumpkin seeds sesame seeds	highly alkaline -

cereals		
highly acidic biscuits and cookies cakes	moderately acidic corn tortillas crackers pasta processed morning cereal (eg cornflakes, processed chocolate cereal) sourdough bread white bread	mildly acidic amaranth barley basmati rice brown rice buckwheat pasta (soba noodles) bulghur/bulgar wheat couscous oats popcorn rye bread seitan (wheat protein) wheat wholemeal bread
mildly alkaline buckwheat kamut millet spelt wild rice	moderately alkaline quinoa	highly alkaline sprouted grains

beverages		
highly acidic beer coffee spirits sweetened fruit juice tea (black) Coca-Cola lemonade	moderately acidic wine	mildly acidic coffee substitutes (barley, rye, etc.) fresh fruit juice rice milk
mildly alkaline almond milk green tea soya milk	moderately alkaline coconut milk ginger tea herbal tea	highly alkaline coconut water

spices and herbs		
highly acidic -	moderately acidic -	mildly acidic -
mildly alkaline basil caraway seeds comfrey cumin seeds fennel seeds thyme	moderately alkaline cinnamon coriander curry leaves oregano parsley	highly alkaline cayenne pepper chives

oils and fats		
highly acidic -	moderately acidic butter	mildly acidic margarine rapeseed oil sunflower oil
mildly alkaline avocado oil coconut oil flaxseed oil olive oil sesame oil	moderately alkaline -	highly alkaline -

condiments		
highly acidic vinegar yeast	moderately acidic ketchup mayonnaise mustard soya sauce	mildly acidic miso
mildly alkaline -	moderately alkaline -	highly alkaline Himalayan salt sea salt wasabi

sweets		
highly acidic artificial sweeteners cane sugar fructose honey jam white sugar	moderately acidic barley malt syrup brown rice syrup chocolate halva molasses	mildly acidic agave syrup maple syrup
mildly alkaline -	moderately alkaline -	highly alkaline -

dairy and eggs		
highly acidic eggs goat cheese hard cheese ice-cream	moderately acidic butter cheese egg whites cows' milk yoghurt (sweetened)	mildly acidic cream yoghurt
mildly alkaline buttermilk	moderately alkaline -	highly alkaline -

meat and fish		
highly acidic beef chicken lobster ocean fish pork sardines (canned) tuna (canned) veal wild salmon	moderately acidic chicken duck freshwater fish liver organ meats oysters	mildly acidic -
mildly alkaline -	moderately alkaline -	highly alkaline -



Combination is the key

Don't think in terms of individual foods but what the combined effect of foods will be. Those in the mildly acidic or moderately acidic group can be combined with alkaline foods to arrive at a balance. Or you can simply change the proportions of ingredients, for example, use less pasta and more tomato sauce, vegetables, lentils or tofu.

All nutrients necessary for healthy bones are found in the plant foods listed as mildly acidic to highly alkaline. Animal foods, remember, are always acid-forming and lack essential nutrients such as magnesium, potassium, beta-carotene, vitamin C etc. They are not only bad for bone health but are completely unnecessary.

To ensure you get enough essential omega-3 fats, include flaxseed (linseed), hempseed or walnuts and their oils in your daily diet but don't heat them as they'll lose their qualities. For cooking, use rapeseed or olive oil.

An alkaline diet based on these foods will give you all the essential nutrients you need but you will need one addition – vitamin B12. There are many foods to which it's added – soya or almond milk, margarines and cereals – or you can take a supplement.

Healthy bones, healthy teeth

Tooth decay is caused by bacteria such as *Streptococcus mutans* and *Lactobacillus* that live within dental plaque. These bacteria produce acids when sugars are eaten. When enough acid is produced to reduce the pH below 5.5, it starts to dissolve your tooth enamel which can eventually lead to tooth decay. When the pH rises again, the damage and mineral loss can be reversed from the minerals dissolved in your saliva.

Just like bones, if the speed of tooth damage exceeds the speed of repair, small cavities can occur and develop over months or even years, opening the door to tooth decay.

Sugary foods are really not that great but that doesn't mean you should avoid fruits – they are healthy and highly desirable. The

sugar in fruit produces a small amount of acid in the mouth but if you drink water, herbal or green tea afterwards, you don't need to worry. An alkaline diet together with twice-daily tooth brushing is the key to healthy teeth.

All the studies mentioned are described more in detail and referenced in the scientific report *Break Free* available at www.viva.org.uk/health/bones or order by calling 0117 944 1000 (Mon-Fri, 9-5).



What to eat each day to boost your bones

No. of Servings	Foods	Healthy Portion Size	To Provide
At least 8	<p>Fruits: Apples, pears, peaches, oranges, kiwi fruit, bananas, raisins, berries etc. – eaten whole or in smoothies [juices are more acidifying because they don't contain fibre and provide fruit sugar more readily than whole fruit]</p> <p>And vegetables: Broccoli, cauliflower, spinach, kale, leeks, carrots, peppers, tomatoes, squash, green beans, sweet potatoes, celery, lettuce, cabbage, Brussels sprouts, etc.</p>	<p>Fresh fruit: 1 medium piece (the size of a tennis ball)</p> <p>Dried fruit: 1-1 ½ tablespoons or 1 golf ball</p> <p>Green or root vegetables: 2-3 tablespoons or ½ tennis ball</p> <p>Salad vegetables: 1 large cereal bowl or 80g</p>	<ul style="list-style-type: none"> ■ Beta-carotene (makes vitamin A), vitamins B2, B3, B5, B6, B9 (folate), vitamin C, vitamin E, vitamin K ■ Minerals/trace elements such as calcium, iodine, iron, magnesium, manganese, phosphorus, potassium ■ Fibre, antioxidants
3-4	Wholegrains: Millet, quinoa, brown and wild rice, spelt, buckwheat, wholegrain bread, muesli, wholegrain pasta etc.	<p>Cooked grains: 2-3 heaped tbsp or ½ cup</p> <p>Breakfast cereal: 25g or 1 regular cereal bowl</p> <p>Muesli: 45g or a small bowl</p> <p>Cooked pasta: 1 cup as side or 2 cups as main dish</p> <p>Wholemeal or rye bread: 2 slices</p>	<ul style="list-style-type: none"> ■ Vitamins such as B1, B2, B3, B5, B6 ■ Minerals/trace elements such as calcium, copper, iron, magnesium, manganese, phosphorus, potassium, zinc ■ Protein, energy, fibre
3-4	<p>Pulses: Beans (pinto, white, butter, black-eyed, soya), lentils, peas, chickpeas, tofu and soya and bean products (burgers, sausages, mock meat etc.)</p> <p>Nuts or seeds: Almonds, Brazil nuts, pumpkin seeds, sesame seeds, flaxseed etc.</p>	<p>½ cup (cooked)</p> <p>2 tablespoons</p>	<ul style="list-style-type: none"> ■ Vitamins such as B1, B2, B3, B5, B6, B9 ■ Minerals/trace elements such as calcium, copper, iron, magnesium, manganese, phosphorus, potassium, selenium, zinc ■ Protein, energy, fibre
Small amounts	<p>Vegetable oil: Flaxseed, hemp seed oil, used cold; olive oil or rape seed oil for cooking</p> <p>Margarine</p>		<ul style="list-style-type: none"> ■ Essential omega-3 and omega-6 fats (flaxseed, soya, walnut, hemp oils) ■ Energy
At least 1	B12 supplement or B12 fortified foods: eg fortified soya milk, some breakfast cereals or yeast extract		■ Vitamin B12

1-2 litres of water per day (at least eight glasses) should also be consumed as part of a healthy, balanced diet. Tea, especially herbal teas, can be counted as water.

Bone building in practice

Eating a healthy, alkaline diet really isn't difficult. The key is to incorporate lots of fruit and vegetables into your meals and snacks and as it might require a bit of invention, the following section will equip you with plenty of ideas and recipes.

Little tricks for little people

If you have children, here are a few tips to encourage them to eat bone-friendly foods – or any new foods!

- Involve your child in meal preparation or cooking, depending on their age; try to get them interested in what they eat.
- Let your child choose some fruit and veg in a shop.
- Lead by example – if your children see you eating the same foods, it'll encourage them.
- Don't get discouraged: young children may need as many 20+ exposures to a new food before they take to it. Keep each exposure to a new food low-key and relaxed.
- Keep meal times happy and drama-free – that way kids trying to assert their independence won't see food as a power battle!
- Discourage unhealthy snacking between meals: if they fill up on crisps and chocolate they won't be hungry enough to

eat a proper meal – also, their taste buds will be blunted by fat and sugar!

- Make fruit and veg visually attractive – arrange cut pieces in a fun shape and play with colours.
- Chop fruit and vegetables in small, bite-size pieces.
- Keep freshly cut vegetable sticks in the fridge.
- Add dried fruit (unsweetened) and berries to your child's cereal.
- Always pack a small box of nuts and dried fruit in the lunchbox.
- Always add vegetables to main dishes (aim for at least two types of veg per dish).
- Serve some fresh cut vegetables on the side of the plate.
- When making sauces, add tahini (sesame paste).
- Make or buy smoothies rather than juice.
- Try to switch from peanut to almond butter – it's healthier and a good calcium source (you can spread it on bread but also on thinly sliced apples or pears).
- Add beans and lentils to stews, soups (blend them if your child prefers that) and salads and use them pureed as sauce bases.
- Serve pancakes with fresh fruit (bananas, strawberries) or savoury vegetable filling (eg spinach and tofu).
- Soya yoghurt with chopped dried and fresh fruit is a great snack.
- Avocados are a great source of energy – slice them in a sandwich or blend with beans or chickpeas into a spread.



Yolanda Soryl

“My four vegan babies were all born with beautiful skin, calm natures and above-average birth weights. Starting solids at around six months old, their early favourite foods included avocado, nut butters, banana and toast. Two of my children can be picky about what they eat, but with the amount of fruit, baked beans, hummus, marmite, soya yogurt and wholemeal bread that disappears on a daily basis in my house, I have no worries about their nutritional needs.

“They are active and busy children, and their sporting efforts include representing their schools in athletics, swimming and netball. Other physical interests include ballet, climbing, badminton, rugby and hockey.”



On the wall from left to right: Te Koha, 3 years, Neve, 7, Asher, 9 and Ella, 12

Grown-up tricks

Many of the tips on page 25 are suitable for everyone – not just for kids – but here’s a few more for adults:

- If you eat cereal in the morning, add a handful of berries (fresh or frozen).
- Dried fruit, nuts and seeds are an ideal snack, wherever you are (try almonds & raisins, pumpkin seeds & apricots, Brazil nuts & pears).
- Aim to have at least three pieces of fresh fruit and veg as snacks throughout the day.
- Tofu stir-fries and lentil and bean dishes are ideal.
- Experiment with fresh fruit in desserts – eg dip pieces of fruit in melted dark chocolate and serve with soya cream.
- Casseroles and stews are very versatile – make sure you don’t cook vegetables longer than necessary though.



- Always eat a big salad with a pasta dish – that’ll help you tip the balance towards alkaline side.
- Although hummus and veg sticks are an easily available option, you might get bored. Make your own dip – just blend a can of beans or chickpeas with two spoons of tahini or pumpkin seeds, your favourite veg (peppers or steamed broccoli work well) and some salt and pepper (and any other spices you like).
 - Making biscuits? Try adding buckwheat flour, raisins and sesame seeds or ground almonds.
 - Eating out:
 - Indian veggie options are a good choice, just ask for your dish to be cooked in oil and not ghee. An extra serving of saag (spinach) is also a good addition.
 - Italian pasta with tomato sauce and fresh herbs and fresh salads are great. You can also go for a pizza without cheese and ask for extra grilled vegetables on top.
 - Jacket potatoes with chilli beans and salad is a good quick lunch.

Break Free: One week's recipes

You can find all the recipes in bold online:
www.veganrecipeclub.org.uk/bones and we'll be adding more!

Getting ready

- **Make a shopping list and buy food items you don't already have.**
- **Make soup(s) if you have time OR buy in ready-made fresh soups – or a mixture of the two. Freeze in portions if necessary.**
- **If you are time-strapped in the week, make some of the recipes suitable for freezing and freeze in individual portions.**
- **Make a jar of omega-3 rich vinaigrette and store in an airtight container in the fridge. Go to the link above for recipe.**
- **Most of these recipes are for two or four people so reduce quantities and your shopping list if cooking for one. Alternatively, freeze leftovers if appropriate.**
- **Wholegrains and pulses also freeze well when cooked.**

Monday

Breakfast: Muesli with soya milk and blueberries or other berries. Choose natural, unsweetened muesli.

Snack: Rye bread – Biona or other flat rye bread with a dab of almond or cashew butter (Meridian or other brand).

Lunch: Tomato & Quinoa Soup OR a supermarket fresh soup, eg Asda Roasted Red Pepper & Haricot Bean Soup or Waitrose Spiced Chickpea & Lentil. Whichever soup you choose, add two handfuls of shredded broccoli or spinach and cook in for a minute or two. Serve with a large mixed salad: celery, sprouts and cucumber with chives and home-made vinaigrette plus a slice of wholemeal bread.

Snack: Raw vegetable sticks with reduced-fat hummus and a small handful of dried apricots.

Dinner: Quick Pad Thai with Sesame Kale – use noodles such as wholewheat soba, buckwheat udon or wholemeal rice. Serve with a watercress and tomato salad and omega-rich vinaigrette, as above.

Tuesday

Breakfast: Quinoa & Apple Porridge – can be made the night before.

Snack: 4 Brazil nuts, a piece of fruit.

Lunch: Innocent Veg Pot with a handful of Taifun (or other flavoured tofu) chunks stirred in. Serve with a green salad on the side.

Snack: Half a ripe papaya or mango plus a small handful of whole almonds.

Dinner: Middle-Eastern Nutty Millet Pilaf with Peas and Mint. Add two handfuls of baby spinach a minute or two before the end and cook in. Serve with plain vegan yoghurt and a salad of alfalfa sprouts, mangetout and rocket.



Wednesday

Breakfast: Wholemeal toast with tahini and yeast extract. A small handful of grapes.

Snack: A small handful of dried figs or apricots and 1 tbsp raw cashews.

Lunch: Avocado, tomato and alfalfa sprout sandwich with a light smear of vegan mayo on wholemeal bread. Use pea shoots*, rocket or watercress if you can't get alfalfa.

*Available from Co-op and Sainsbury's. See useful product list below for mayo alternatives.

Snack: 1 banana and 1 tbsp sunflower or pumpkin seeds.

Dinner: Quick Tomato & Lentil Dahl (with added kale or cabbage – see the recipe) – serve with brown rice (make extra for the next day) and a cucumber and tomato salad plus a small dollop of plain vegan yoghurt flavoured with a little mint and cumin – you can cheat and add mint sauce! See useful products list on page 30 for an easy brown rice tip.

Thursday

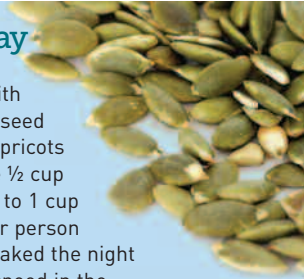
Breakfast: Porridge with ground flaxseed and dried apricots or figs. Use ½ cup jumbo oats to 1 cup of water per person – can be soaked the night before for speed in the morning! Serve with a little fortified soya or rice milk.

Snack: ¼ cantaloupe melon with a handful of pumpkin seeds.

Lunch: Carrot & Two Coriander Soup OR a fresh soup such as Co-op Garden Vegetable Soup with Barley (with extra spinach or shredded greens) or M&S Super Green with added cooked lentils/white beans.

Snack: an apple or pear; plain soya yoghurt, eg Alpro, Provamel or Tesco.

Dinner: Viva!'s Moroccan Chickpea Stew with extra vegetables and wholemeal bulghur or couscous.



Friday

Breakfast: Quinoa & Apple Porridge or natural muesli with plant milk and berries.

Snack: Berry Nice fruit smoothie – home-made or bought, eg Innocent; 4 Brazil nuts.

Lunch: Big fresh vegetable salad with pulses and/or wholegrains – home-made or bought. Eg Asda Cous Cous Harissa Chickpea Salad; M&S Edamame Bean Large Deli Salad or any other with an optional wholemeal bread roll.

Snack: a handful of raisins and whole almonds/cashews.

Dinner: Borlotti Beans in Coconut Milk served with brown rice and steamed broccoli or other greens.





Saturday

Breakfast: Scrambled Tofu on wholemeal toast. Add a handful of baby spinach leaves and a chopped tomato.

Snack: An orange and a banana.

Lunch: Cannelini Bean, Black Olive, Sundried Tomato & Basil Paté with rye bread and raw vegetable sticks (celery, carrot, pepper etc).

Snack: Ryvita with a dab of almond or cashew butter (or a small handful of nuts), apple.

Dinner: Baked Butternut Squash with Saucy Rice.

Sunday

Breakfast: Baked beans on wholemeal toast with a sprinkling of cumin, followed by a small cup of plain soya yoghurt with ½ chopped banana and/or dried fruit.

Snack: Guacamole with rye crackers (eg Ryvita) and raw veg sticks. Sadly, most shop versions contain added cream, but it takes only five or less minutes to make your own.

Lunch: Falafels, hummus, wholemeal pitta bread and a large mixed salad. Falafels are widely available and most are vegan – Cauldron is the most common brand but there are others.

Snack: A handful of mixed nuts and raisins, fruit.

Dinner: Nut Croquettes with roast vegetables and gravy. For a bought version, try Asda Nut Cutlets; Sainsbury's Vegetarian Nut Cutlets or something similar (just ensure no egg or other animal products included). Sainsbury's Ready to Roast Mediterranean Vegetables are also a quick fix! Other supermarkets do something similar but just check that the ingredients are free from animal products. Make our delicious gravy or use a ready-mix, eg Bisto green tub.

Desserts

Desserts are not off the table for the Break Free alkaline diet although they're usually more on the acidic side. Remember, you're allowed to treat yourself, just make sure you eat plenty of alkalising food throughout the day. Here are a few ideas for healthy dairy-free desserts (all recipes can be found on www.vegetarianrecipeclub.org.uk/bones):

- Poached Pears in Red Wine with Cinnamon or Star Anise – serve with a splash of soya or coconut cream.
- Tropical Mango and Pecan 'Cheesecake' – delicious and creamy with lots of mango goodness.
- Luxury Chocolate Mousse with fresh raspberries – or other berries, you choose!
- Banana Fool – quick and simple yet delicious.
- Fruit Kebabs with Chocolate Sauce – easy and an all-time favourite.
- Tropical Jelly with Peach & Raspberry Coulis – if you're after something light, this one's for you.
- Mixed Berry Crumble – add flaked almonds.



Useful products

Rye bread is available from many large supermarkets, eg Tesco, Waitrose, Sainsbury's and Lidl.



Meridian nut and seed butters are widely available. The best choice is almond butter. Tahini (made from sesame seeds) is a great addition in sauces or spreads. Also don't be afraid to try cashew butter. There are plenty of other brands available too.



Quinoa is a very nutritious type of grain, rich in protein and very tasty and healthy! Cooks in 15-20 minutes so you can add it to rice.



Innocent Veg Pots come in several flavours – all vegan bar one.



Cold pressed rapeseed oil is ideal for cooking – a very rich source of healthy omega-3 fats.



Go for a **wholemeal muesli** without added sugar, honey or milk powder (Avoid Swiss type mueslis for this reason). Choose one with almonds and raisins for added benefits.



Firm plain tofu is widely available. Use it in stir-fries, Thai dishes. Cut into cubes and fry in hot oil.



Smoked tofu is firm and chewy. It can be used cold in salads, sandwiches. Or cube it and add to stews etc. Find it in Waitrose or health food shops.



Silken tofu is soft and creamy and is great in smoothies, sour crème, vegan mayo, creamy desserts... This brand or others are available in most large supermarkets.



Marinated tofu pieces are good added to a stir-fry or salad. Available in most large supermarkets.



Nutritional yeast flakes are a fantastic, tasty product. Use them as a condiment or to give a slightly nutty, cheesy taste to sauces.

Available in a blue or brown tub from health food shops or online, eg www.goodnessdirect.co.uk and others.



Sprouted seeds are a wonderful source of nutrients – add them to salads, sandwiches or to any hot dish just before serving. Don't cook. Currently available from health food shops only. Or grow your own easily and cheaply. www.veganrecipeclub.org.uk/super-sprouts



Soba (buckwheat) noodles are excellent with Oriental dishes. Some brands contain ordinary wheat as well but that also means they're cheaper.



There are several alternatives to **mayo** in supermarkets and health food shops. Solesse from Asda, Tiger Tiger from Sainsbury's, Mayola from Tesco, Plamil from health food shops.



Ready-cooked brown rice! Microwaves in two minutes, stir-fries in four.



Brown rice from scratch: 1 cup of rice to 2-2 ½ cups of stock/water. Cook 25-30 minutes, adding a splash of water if it starts to dry out.

Want to know more?

Whether you want to read all about the science behind this guide or are just interested in some aspects, we have it all covered.

Break Free – report £4 (inc p&p)

This fully referenced report explains what really matters when it comes to bone health and how to prevent and treat osteoporosis.



Boning Up on Calcium – fact sheet £0.80 (inc p&p)

An easy to read fact sheet summarising all the important information on calcium.



Nutrition in a Nutshell – guide £1.50 (inc p&p)

Why a plant-based diet is healthy and nutritious.

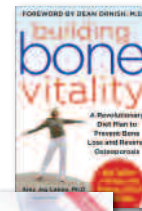
Your questions about protein, iron and calcium answered here! Includes a vitamin chart and where to obtain all the nutrients you need on a vegetarian or vegan diet.



Books:

Building Bone Vitality – £10.99

By A.J. Lanou and M. Castleman



Understanding, Preventing and Overcoming Osteoporosis – £8.99

By J. Plant and G. Tidey



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Building Bones for Life

A guide on how to build and maintain healthy bones and how to prevent and treat osteoporosis.

A practical guide explaining what really matters when it comes to diet and bone health, offering plenty of reliable information and useful diet and lifestyle guidance for all ages.

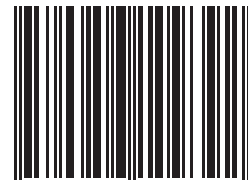
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