Maintaining healthy bones with soya

Key propositions

- Bone is a living tissue which is continuously being broken down and replaced with new bone throughout life.
- After the age of 30, as part of the ageing process, bone is broken down at a faster rate than new bone is formed resulting in a loss of bone mass as we get older.
- Osteoporosis is a condition where bones become weak and brittle and more likely to fracture.
- Osteoporosis is a huge, worldwide problem and especially in Western countries with an ageing population.
- The risk of a fracture due to osteoporosis is greater in Caucasians than people of Japanese ethnicity.
- Diet plays an important role in maintaining healthy bones and emerging evidence is suggesting that soya and soya isoflavones may be beneficial to bones.
- The inclusion of soya foods into a well balanced diet should be considered as a way of helping to maintain healthy bones.

Introduction

Bone is a living tissue which is constantly being renewed – old bone is broken down (bone loss) and new bone is created (bone formation). Bone formation and bone loss takes place throughout life, although at different rates at different times. Up to the age of 30, new bone is made faster than old bone is broken down resulting in an increase in bone mass. At around the age of 25-30, bone mass is at its peak and so bones are at their strongest. After this, as part of the ageing process, bone loss occurs at a faster rate than bone formation resulting in a loss of bone mass as we get older. In women, bone loss is accelerated following the menopause due to a drop in the hormone oestrogen (which is no longer produced by the ovaries). Oestrogen slows down the rate of bone loss so keeping bones strong.

Osteoporosis is a gradual loss of bone mass, leaving bones less dense, more brittle and more prone to fracture. All bones can be affected but fractures are most common in the wrist, spine and hip. As bone loss occurs without symptoms, people may not know they have osteoporosis until their bones become so weak that a sudden strain, bump or fall causes a fracture. It's a huge problem and in the UK 1 in 2 women and 1 in 5 men over the age of 50 will fracture a bone, mainly as a result of osteoporosis.[i]

Many factors, including lifestyle, can influence the risk of osteoporosis. Physical inactivity, smoking, drinking too much alcohol, being underweight and not having enough exposure to sunlight, can all increase the risk.[ii] Whereas making sure you have the right type of diet will help to maintain healthy bones and protect against osteoporosis.

The Role of Diet in Maintaining Healthy Bones

Healthy bones need a well balanced diet incorporating a wide range of nutrients. Two major nutrients that are essential in maintaining healthy bones are Calcium and Vitamin D.

Calcium

Calcium is vital for strong bones as it gives them their strength and firmness. Good dietary sources include dairy products and soya foods fortified with calcium. Some plant foods also contain high amounts of calcium such as soya beans, tofu, almonds, sesame seeds and green leafy vegetables (especially Kale, Pak-Choi and watercress). However, generally, most vegetables contain very little.

As well as making sure enough calcium is in the diet, another important factor for healthy bones is the amount of calcium that is lost in the urine (calcium excretion). A diet high in salt, alcohol and caffeine increases the amount of calcium lost in the urine. Whereas increasing fruit and vegetable intake has the opposite effect i.e. reduces calcium excretion. Protein is also thought to influence the amount of calcium lost in the urine, although the effect of different types of protein (animal versus plant) is still a matter of debate.

Vitamin D

Vitamin D plays an important role in bone health as it

This fact sheet has been funded by an educational grant from the Soya Protein Association.

controls the formation of bone and the absorption of calcium. We get most of our vitamin D from sunlight as Vitamin D forms under the skin in reaction to sunlight. Food is a second source of Vitamin D, however only a few foods such as oily fish and eggs are naturally high in this vitamin. Some foods are fortified with Vitamin D such as margarines, breakfast cereals and soya products.

The Effect of Soya and Soya Isoflavones in Maintaining Healthy Bones

The beneficial effect of soya and soya isoflavones on bone health is currently receiving a great deal of attention. It has been suggested that isoflavones, natural compounds present in soya, may have favourable effects on bones by increasing bone formation as well as reducing bone loss.[iii, iv] This may account for the lower fracture rates seen in traditional soya consuming countries, although other factors may also play a role.

The evidence...

A study of over 24,000 postmenopausal women found that those who were eating more than 13.2g of soya protein a day had a 37% reduced risk of fracture compared to those who were eating less than 4.9g a day.[v]

Soya also appears to improve Bone Mineral Density (BMD). BMD is a measure of the amount of calcium contained in bones and is thought to be a good marker of fracture risk.[vi] Studies looking at East Asian populations have found that pre and postmenopausal women who eat more soya or soya isoflavones have higher BMD of the spine, and some cases the hip, than those women eating smaller amounts.[vii, viii, ix]

In clinical studies where menopausal women have been given soya protein or soya isoflavones as supplements for 3 months or more, isoflavones appear to significantly slow down the rate of bone loss.[x, xi, xii] However results from clinical studies lasting more than one year have found no significant effect of soya or soya isoflavones on BMD.[xiii] A possible explanation for this difference could be that some of these studies involve only small numbers of subjects and are run for short periods of time. Ideally bone trials should be 18 to 24 months in length.

In one study, drinking 500ml of soya milk a day for 2 years reduced bone loss in the spine of postmenopausal Danish women.[xiv] In another large study, Italian postmenopausal women who had a low BMD and took 54mg genistein (the main isoflavones found in soya) a day for 2 years increased their BMD in the spine and hip compared to a control group.[xv] Half of these women agreed to continue for a third year and the results were even more impressive.[xvi] Nevertheless, in another 2 year study no differences in BMD were seen in women taking a supplement of 25g soya protein (containing 90mg of isoflavones) when compared to women drinking a supplement of either 25g of soya protein (without isoflavones) or women drinking 25g of milk protein.[xvii] However after the 2 years, the group that took soya protein with isoflavones did slow down their rate of bone loss in the thigh compared to the beginning of the study. Despite this, results from more recent long term clinical studies have also been inconclusive.[xviii, xix, xx, xxi]

Differences in the design and duration of studies, as well as factors such as differences in physical activity of the subjects, age, years since menopause, types of isoflavones (including the format – supplements versus soya foods) and the type of bone studied may account for the different results. Further long term studies need to be done.

Conclusions

- Osteoporosis increases the risk of fractures, especially of the hip, spine and wrist.
- A well-balanced diet, providing a wide variety of nutrients including Calcium and Vitamin D, play an important role in maintaining healthy bones to help reduce the risk of osteoporosis.
- Studies is East Asian populations suggest that those people who eat more soya have lower rates of fractures and higher Bone Mineral Densities than those who eat relatively little.
- Soya foods are good sources of plant protein which may protect against bone loss by reducing the amount of calcium lost in the urine.
- Many soya foods are fortified with Calcium, helping to ensure an adequate dietary intake of calcium.
- Soya foods naturally contain isoflavones which may help to increase bone formation as well as decrease bone loss.
- Eating 2 to 3 servings of traditional soya foods a day, as part of an overall well-balanced diet, can help to maintain healthy bones.

This fact sheet has been funded by an educational grant from the Soya Protein Association.

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This fact sheet has been funded by an educational grant from the Soya Protein Association.