

Vitamin K2 and Bone Health

Vitamin K2 could be the key to maintain healthy bones



Concerns about bone health are often discussed in the media, and osteoporosis is a very real threat for many of us as we age. At present, we assume the quality and strength of our bones significantly deteriorates with age and we will become increasingly frail and prone to bone breakages. But what if such degeneration were not a certainty? Recent research is revealing a key relationship between the levels of certain vitamins in our diet and the health of our bones that may reverse the trend with which we currently battle.

Bones are built out of a flexible collagen framework coated with strong calcium. They have a solid, sturdy outer layer and a spongy middle. This is the living part of the bones. Our entire skeleton is replaced every seven years through a process called remodelling. This consists of cells called osteoclasts breaking down old skeletal material in a process called resorption, and cells called osteoblasts building new skeletal material (ossification). The products of the breakdown are released in to the blood system; some utilised and others excreted. The materials required for creation of new skeletal material must come from our diets. Optimally, the bone-building of the osteoblasts will exceed the breakdown processes of the osteoclasts to ensure we are at least maintaining our bone mass (and therefore strength). If the levels of breakdown are greater than the levels of bone creation, you can see the overall amount of bone tissue will gradually drop. This leads to a loss of bone density and, eventually, a much weaker skeleton, fragile and prone to breakages.

So, it is clear that we must do what we can to ensure the osteoblasts can work effectively and have all the nutrients they need to continue making new bone tissue for us. We are all aware that we need calcium and vitamin D in our diets, as these are building blocks of our bones.¹ It has been shown recently that vitamin K, particularly K2, is also vital for bone-building², as it facilitates the action of the osteoblasts.

Osteoblasts produce a protein called osteocalcin. This is the protein that binds to the calcium in our systems and makes it in to bone tissue. Osteocalcin is released around the soft, growing bones where it binds with calcium to add to the layers of bone tissue being made. Osteocalcin only works if it is first 'turned on,' or activated, by vitamin K. Therefore, to build new bones we need sufficient levels of vitamin K in our bodies. This primarily comes from our diets.

The vital importance of vitamin K has been shown in many recent studies³⁻⁵, though the idea that it plays a role in bone strength is not new. Hart showed in 1984⁶ that patients with neck fractures had extremely low concentrations of vitamin K in their blood. Later studies showed that levels of vitamin K2 were low in patients with osteoporotic fractures.⁷



Scientists have built on these findings and are now showing the direct link of vitamin K2 on improving bone health.⁸ Vitamin K2, as opposed to vitamin K1, is emerging as the more effective as it has much higher bioavailability.

Many studies have taken place in postmenopausal women, as this is a population subject to significant bone loss over time.⁹ In 2013 Knapen *et al* studied 244 post-menopausal women over three years.¹⁰ They received either a placebo or 180 µg of vitamin K2 (as MenaQ7) each day. The health of their spine, at the neck and base of their back, was measured at the start of the study and each year. Typically in postmenopausal women there is significant degradation of bones, resulting in vertebrae being compacted as they become less dense. The group receiving daily vitamin K2 showed significantly healthier bones and their vertebrae had not compacted as much as the control group. It was also found that the supplementation group had approximately 50% less markers of unhealthy bones than the control group. These improvements only became obvious after at least 2 years of treatment, suggesting supplementation with vitamin K2 might be most beneficial as a long term therapy. However, improvements within a year have been reported in others studies.^{2,4}

It is not just the ageing population that are potentially in need of vitamin K2 supplementation. Changes in diets and food-processing techniques over recent decades have reduced the levels of vitamin K that we ingest; meaning the majority of the population is already getting lower levels, even those with a balanced 'healthy' diet. Combine this with the realisation as research progresses that the RDAs for vitamin K are likely underestimates, and it seems probable that the majority of the Western population is currently vitamin K deficient.¹¹

This is a relatively new area of research, and the mechanisms involved are not yet fully known. What is clear is that calcium and vitamin D are not enough to maintain healthy, strong bones. Vitamin K, and particularly vitamin K2, needs further research as a vital component in the prevention and treatment of unhealthy bones and conditions such as osteoporosis and osteoarthritis.

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