

# Maintaining Mobility and Stability: Vitamins and Minerals for Bone Formation

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Bone substance consists of two thirds of calcium phosphate and one third of organic proteins. Substances which have an influence on bone metabolism are micronutrients such as calcium, magnesium, fluoride, zinc, copper, manganese, as well as vitamins D and K.

Risk factors for the development of osteoporosis are genetic and hormonal factors, poor nutrition, lack of exercise, insufficient UV exposure, as well as nicotine and alcohol abuse. In the case of diet, low-calcium and phosphate-rich foods, as well as an insufficient supply of vitamins D and K are important risk factors.

Only through the continuous intake of sufficient quantities of minerals in the diet is it possible to prevent the body accessing the bones as a mineral reservoir, with the result that osteoporosis forms.

The three pillars of **prevention and treatment** are diet plus a supply of micronutrients (based on calcium and vitamin D), exercise and an individual drug therapy.

**Calcium:** people with a low calcium intake (e.g. 400 mg a day) with a simultaneous vitamin D deficiency suffer more bone fractures than those with a sufficient supply. According to the VERA study, there are huge differences between the calcium requirement as determined by the DGE and the actual supply of calcium. Some population groups are therefore recommended to take additional calcium. A deficiency can be avoided if between 1000 and 1500 mg of calcium a day is taken in (in the diet, drinks and/or tablets) overall.

**Vitamin D:** vitamin D deficiency is particularly common in elderly sick individuals. A study has shown that the combination of calcium and vitamin D can influence bone density and the frequency of fractures.

**Magnesium:** study results show that an increase in the intake of magnesium correlates with higher bone density and lowers the risk of fracture.

**Vitamin K:** here too, studies have shown that a higher intake of vitamin K correlates with greater bone density and lowers the risk of fracture.

A sufficient supply of vitamin K is an important basis for the efficacy of calcium: the vitamin regulates bone mineralisation by activating the osteocalcin, thereby creating binding sites for calcium in the bone matrix. Furthermore, it increases the absorption and retention of calcium and suppresses osteoclastic activity.

According to surveys, half of elderly people in Germany have vitamin K deficiency. Clinical studies with vitamin K have shown a rise in osteocalcin, a fall in the

biochemical markers for bone loss and an increase in bone density (in combination with calcium and vitamin D). The increased supply of vitamin K lowered the prospective risk of a hip fracture.

The common lack of calcium, vitamin D and vitamin K among individuals over the age of 50 should be compensated for, if necessary by a preparation, thereby reducing the prospective risk of a fracture.