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Pleiotropic actions of vitamin K: protector of bone health and beyond?

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Abstract

Vitamin K is a nutrient that was originally identified as an essential factor for blood coagulation. Recently, vitamin K has emerged as a potential protector against osteoporosis, atherosclerosis, and hepatocarcinoma. Accumulated evidence indicates that subclinical non-hemostatic vitamin K deficiency in extrahepatic tissues, particularly in bone and possibly in vasculature, exists widely in the otherwise healthy adult population. Vitamins K1 and K2 have been shown to exert protective effects against osteoporosis, although it is important that the beneficial effects will be further confirmed by large-scale, randomized, clinical trials. Increasing evidence implicates a role for vitamin K in calcification of arteries and atherogenesis. Moreover, the therapeutic potential of vitamin K2 as an antihepatoma drug has recently been highlighted. Most of the new biological functions of vitamin K in bone, vasculature, and hepatoma cells are considered attributable to promotion of gamma-carboxylation of glutamic acid residues in vitamin K-dependent proteins, which is shared by vitamins K1 and K2. In contrast, vitamin K2-specific, gamma-carboxylation-unrelated functions have also been demonstrated. Thus, biological differences between vitamins K1 and K2 and potential involvement of gamma-carboxylation-independent actions in the new roles of vitamin K remain open issues. Molecular bases of coagulation-unrelated pleiotropic actions of vitamin K and its implications in human health deserve further investigations.

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