

## Vitamin K deficiency may trigger age-related diseases

A recent study published by McCann and Ames from the Children's Hospital Oakland Research Institute (Am J Clin Nutr 2009<sup>1</sup>) confirms the vital role of Vitamin K in the prevention of age-related diseases, including bone impairment and cardiovascular disorders. The outcome of the study underlines that current recommendations for dietary vitamin K intake are not being met - which may result in early development of age-related diseases.

### **Vitamin K daily intake still too low**

Current RDA is based on the body's requirements for adequate blood coagulation. However, the analysis of data from hundreds of previously published articles led McCann and Ames to conclude that current recommendations for vitamin K intake are too low and need to be increased in order to ensure optimal health for the whole body. Bone loss will otherwise accelerate, as well as the calcification of soft tissues will increase - surprisingly, even among the young population.

### **Dr Ames' triage theory**

The findings strongly support Dr Ames' triage theory, already mentioned back in 2006. Dr Ames suggests that age-related diseases may be a consequence of evolution-triggered mechanisms aiming to protect against shortages in vitamins and minerals. Simplified, micronutrient deficiencies trigger responses of the body, which contribute to acceleration of osteoporosis and cardiovascular diseases.

### **From the vitamin K perspective**

Applying the theory to vitamin K, the researchers reported on mice-studies with inactivated versions of the 16 known vitamin K-dependent proteins. While five of these proteins had critical functions (all related to blood clotting), five were less critical (all functioning outside the clotting system), and these animals survived weaning. However, genetic loss of these extra-hepatic proteins and/or vitamin K deficiency were associated with age-related conditions, including weaker bones, hardening of the arteries (predictive of cardiovascular disease), and increased incidence of spontaneous cancer. Dr Ames found out that the experimental animals were in similar condition to warfarin (vitamin K- antagonist) treated patients (drug induced vitamin K-deficiency and thus no optimal function of vital vitamin K-dependent proteins).

### **A closer look at the triage theory**

McCann and Ames' study offers new strategy for combating age-related diseases, which are a major health issue in our aging population. By getting to know early biomarkers of diseases, we would be able to suppress them more efficiently. Dr Leon Schurgers, senior scientist from VitaK, at Maastricht University, explains:

Although still awaiting verification, the article definitely shows intriguing possibilities for early detection of risk and better prognosis for treatment of osteoporosis and atherosclerosis. And once again gives us a warning - current vitamin K RDA, based just on hepatic requirements and not considering the need for bone and cardiovascular health, is being underestimated."

### **K vitamins and their health implications**

There are two naturally-occurring forms of vitamin K; vitamins K1 and K2, both have in common a naphthoquinone-ring structure. Due to the differences in their structure (aliphatic side-chain), they have different bioactivity, efficacy and bioavailability; this difference makes them responsible for different transport routes within the body. Vitamin K1, found in green leafy vegetables, is mainly guided to the liver to activate proteins involved in blood clotting (thus its supplementation fulfils mainly hepatic requirements). In fact, this is the most commonly known role of K vitamins. However, dietary vitamin K1 is poorly absorbed, and has therefore little influence on excessive calcium accumulation and cardiovascular health, even when taken in large quantities. Vitamin K2 on the contrary acts beneficially for also bones and vasculature. Natural vitamin K2 is the source of vitamin K preferred by tissues other than the liver, including bone, cartilage and soft tissues. High consumption of vitamin K2 was found to correlate with more bone mass, strength and density. It also prevents arterial calcium accumulation which triggers various cardiovascular disorders. Beneficial effects of vitamin K2 -but not K1 - on the cardiovascular system were shown by 'The Rotterdam Study' (2004) which discovered that increased intake of vitamin K2 significantly reduced the incidence of arterial calcification and the risk of CHD mortality by 50% compared to low dietary vitamin K2 intake.

<sup>1</sup> Source: American Journal of Clinical Nutrition  
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"Vitamin K, an example of triage theory: is micronutrient inadequacy linked to diseases of aging?".  
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