

## Vitamin K

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In 1929, German scientists discovered this essential vitamin whose deficiency caused a serious bleeding disorder in the chickens they were studying. The blood would not clot or coagulate without this vitamin and so they referred to it as *Koagulationsvitamin* and since then it has become known around the world simply as vitamin K.

### Coagulation

God designed our blood so that it can coagulate into a clot if we are injured so that bleeding will quickly stop preventing loss of this vital liquid we call blood. This coagulation is produced by a complex chain reaction of many proteins in the blood and is further regulated by many more anticoagulation proteins that prevent clotting when it is not needed. Calcium is an essential co-factor in this process. And seven of the proteins in these reaction chains require vitamin K to activate them so they will work properly.

Vitamin K is actually a special tool used by a pair of enzymes whose job is to add a carboxyl group onto a certain amino acid in some of these coagulation and anticoagulation proteins. This changes the shape of these proteins so they can hold a calcium atom and function properly. So we refer to these proteins as vitamin K dependent since vitamin K is the essential tool needed to make them properly so they can work. Without vitamin K these proteins cannot be made into the right shape to function properly and the whole chain reaction of which they are a part fails.

The pair of enzymes that use this vitamin K tool are able to recycle the vitamin K and use it over and over again which means that it should be more difficult to become deficient. The

anticoagulant drug warfarin, also known as Coumadin, is given to prevent blood clots in certain conditions. The way warfarin works is that it blocks this recycling of vitamin K. And without this recycling, one quickly runs out of vitamin K and soon there are not enough of the vitamin K dependent proteins that can work properly so the blood cannot clot.

Actually most people have a very low level of vitamin K – just barely enough to get by as long as the recycling system is working properly. Occasionally infants are born deficient in vitamin K and can develop a serious bleeding disorder that can result in a fatal bleed into the brain. Today it is recommended that all babies be given a shot of vitamin K at birth to prevent this possibility.

### **Bone Density**

But we now know that vitamin K is used to activate many other proteins in the body in addition to the coagulation proteins – many of these proteins also have to do with the protein's ability to hold calcium. There are special proteins made by the osteoblasts in the bones that are involved in the calcification of bones that are activated by vitamin K in this same way. In the famous *Framingham Heart Study*, those with high levels of vitamin K in their diet had 65% less hip fractures than those with low levels. Studies have shown that vitamin K can be as effective as the osteoporosis drugs in preventing fractures.

### **Arterial Calcification**

The buildup of calcified plaque in arterial walls, known as atherosclerosis, is the number one cause of death in this country. There is a special protein (called MGP) whose job is to prevent buildup of calcium in tissues that are not supposed to be calcified like cartilage and artery walls. This protein is one of the vitamin K activated proteins. When we look at the arteries of those who have serious calcified plaque we find that most of the MGP has not been activated by vitamin K and is totally nonfunctional. When we look at the arteries of those who are healthy without this plaque, we find that they have fully activated MGP in their artery walls.

Not enough vitamin K will result in calcium build up in the artery walls. And researchers have now shown that restoring vitamin K can actually reverse this calcification of the arteries.

Besides arteries many other tissues, glands, cartilages, joints, heart valves calcify as we age while the bones lose their calcium. Vitamin K can help to restore the proper calcium balance in the body by building up the calcium deposits in the bones while preventing and even removing the calcium from other tissues.

### **Reducing Arthritis and Cancer**

Vitamin K has prevented the development of rheumatoid arthritis in experiments as well as other inflammatory mediated processes. Men with good vitamin K intake in the diet have 63% less prostate cancer than those with low vitamin K in the diet.

Vitamin K has been shown to cause leukemia cells to self-destruct. Vitamin K has been shown to inhibit myeloma and lymphoma. Some patients in remission from primary liver cancer were divided into 2 groups, after one year 13% of those receiving vitamin K supplements had developed a reoccurrence. But of the group not receiving vitamin K – 55% developed reoccurrences.

Warfarin, which blocks vitamin K recycling, drastically increases melanoma metastases. But pre-treating the patients with vitamin K can prevent this increase in metastases caused by warfarin. Some researchers now believe that vitamin K may be beneficial in treating pancreatic cancer after identifying several mechanisms by which vitamin K damages pancreatic cancer cells.

### **Eat Your Greens!**

So where can you find vitamin K? In all the dark green vegetables: kale, collards, spinach, broccoli, Swiss chard, etc. One serving of dark greens each day would give you excellent

levels of this critical vitamin. But most people do not eat greens – and if they do, it is only occasionally. And so most people in this country are deficient in vitamin K. So you could take a vitamin K supplement. But I would recommend that if you want good blood, good bones, and clean arteries: Eat your greens! God said: “Thou shalt eat the herb of the field.”

Gen3:18