

# VITAMIN K

The discovery of Vitamin K followed the observation that certain experimental diets produced fatal hemorrhages of chicks. The symptoms looked like those of scurvy, but they did not respond to the administration of lemon juice, a rich source of the antiscorbutic vitamin. Feeding alfalfa or other greens to the sick birds brought dramatic relief from those symptoms.

Of the many green leaves studied those of alfalfa proved to be exceptionally rich in the new factor. A Danish investigator, Carl Peter Henrik Dam, isolated a fat-soluble substance from dried alfalfa leaves. Because it corrected the clotting or coagulation time of the blood, he called it the Koagulations vitamin. This was shortened to vitamin K for convenience.

Occurring in nature are vitamin K1, which is present in most edible vegetables and notably in green leaves, and vitamin K2 which is produced by intestinal bacteria in the lower large intestine and is only partly available for absorption.

Excessive doses of synthetic vitamin K have produced hemolytic anemia in the rat and kernicterus in the baby; consequently ingestion in excess of 5 mg daily should be avoided. The toxicity of synthetic vitamin K is attributed to the increased breakdown of red blood cells and inhibition of glucuronide formation, although other possible mechanisms have been suggested.

A daily allowance for vitamin k cannot be established because of the wide but inconsistent distribution of the vitamin in the diet and the variability of intestinal flora and absorption activity from person to person.

## FUNCTION:

Vitamin K is essential for normal function of the liver and for the formation of prothrombin by the liver. Prothrombin is a normal constituent of blood. It is one of the several components that react together to form the blood clot. When vitamin K is deficient, the prothrombin content of the blood falls and clotting time is prolonged. The capillaries must also become fragile since extensive hemorrhage accompanies the reduction of prothrombin.

The administration of vitamin K causes a prompt response of the body with the formation of prothrombin, and the blood returns to its normal composition and physical properties.

Fibrin is one of the chief constituents of a blood clot. Prothrombin is required for its formation.

## ABSORPTION:

The natural vitamins K are fat-soluble and require bile in order to be absorbed. Consequently absorption occurs in the upper parts of the small intestines where bile salts are present. A vitamin K deficiency is very likely to occur wherever bile is prevented from entering the intestinal tract. This is true of most of the fat-soluble vitamins, but is

particularly important in the case of K because of its bearing on blood clotting. Thus, when there is an obstruction of the bile channels and jaundice ensues there is delayed clotting. This is not due to the occurrence of the bile in the blood, but to a deficiency of vitamin K. As in the case of fatty acids, it is probably the bile acids to which may be ascribed the specific function of absorption of fat-soluble vitamins.

#### ANTAGONISTS:

Heparin and Dicumarol act as antagonists to vitamin K since their action is to diminish the amount of available prothrombin. The salicylates also are antagonistic to vitamin K. Consequently, when any of these are administered over a long period of time, supplements of the vitamin may be required to enable the liver to restore the prothrombin level to normal.

In a case of coronary thrombosis with or without myocardial infarction, keeping the prothrombin level at what may be considered a low safe by the use of anticoagulants, is not the answer to the problem of hemorrhage. Vitamin K should be given at the time of the initial attack to restore the prothrombin level to normal thereby reducing the further danger of hemorrhage and thrombosis.

Mineral oil may lead to prothrombin deficiency due to interference with absorption.

It is probable that the normal, healthy person derives much of his vitamin K from synthesis by intestinal flora. The only times when the human intestinal tract does not produce enough for human needs appear to be immediately after birth (before intestinal flora is established) and possibly during or following prolonged treatment with sulfa drugs or antibiotics.