

## MARKET KEY INGREDIENTS

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## K2VITAL<sup>®</sup> VITAMIN K2 : BALANCE FOR A HEALTHY HEART

Genetics play an influential role in cardiovascular health, but behavioral and environmental factors have equally important roles. Exercise, lifestyle and the avoidance of known risk factors all affect cardiovascular health. Securing the right balance of heart-healthy nutrients, including vitamin K2, is another proven way to reduce cardiovascular risk.

### VITAMIN K2 AND CALCIUM

The essential mineral calcium is vital to bone-building, muscle function and other biological processes. Though for all its benefits, calcium is also at the center of two of the leading causes of cardiovascular disease (CVD). Too much calcium in the body can lead to a hardening of the arteries and vessels of the cardiovascular system,

making them less flexible. Calcium plaque can also build within arteries and vessels. These conditions make the heart work harder, increasing the risk of cardiovascular incident. Fortunately, there is an essential vitamin which keeps calcium in balance. Daily supplementation of K2VITAL<sup>®</sup> vitamin K2 MK-7 is a positive behavior that can improve

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cardiovascular health. Vitamin K2 regulates calcium in the body. It does this by activating matrix Gla proteins (MGP) which, when activated, bind excess calcium in the bloodstream. This prevents calcium from being deposited in the soft tissues of the circulatory system. K2 also regulates calcium by ensuring that it goes to where it is needed by activating the proteins responsible for integrating calcium into the bone matrix.



### CALCIUM AND CDV RISK

When calcium begins to build-up in the circulatory system, arteries and vessels can begin to stiffen. This reduces their elasticity and flexibility and in the worst cases it results in a condition called atherosclerosis. As this condition progresses, the heart must work harder to push blood through vessels partly blocked calcium plaques. Hardened vessels also lose their ability

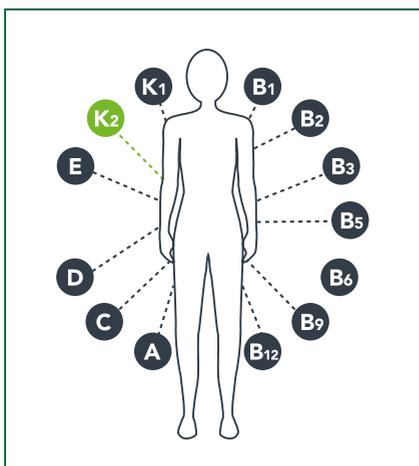
to expand outward. The result is that the heart must work harder to pump blood through the circulatory system. Calcification is a predictor of cardiovascular disease [1], is progressive, and develops over decades. Some degree of calcification may exist in as many as 30% of people over the age of 45 [2]. Arterial stiffening generally increases with age, and increases CDV risk regardless of age [3]. Calcium is vital for bone health, but the body needs to regulate how calcium is utilized to prevent unhealthy consequences for the heart.

### K2VITAL<sup>®</sup> PUTS CALCIUM IN BALANCE

Vitamin K2 is the body's answer to calcium regulation. K2 activates osteocalcin proteins which integrate calcium into the bone matrix, supporting calcium's bone-health role. Strong, resilient bones require adequate dietary calcium. Bone-building uses most of the calcium taken in by diet. However, to balance against the effects of too much calcium, vitamin K2 also activates the calcium-binding protein MGP [4]. Activated MGP binds excess calcium in the blood and

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prevents it from being deposited in arteries [5]. K2VITAL<sup>®</sup> vitamin K2 MK-7 is a pure all-trans K2 that is identical to the MK-7 found in nature. It works with the body to put calcium in balance. Microencapsulated K2VITAL<sup>®</sup> DELTA allows K2 to be formulated with calcium or magnesium in heart health and multivitamin products which can meet K2 potency claims for full shelf-life.



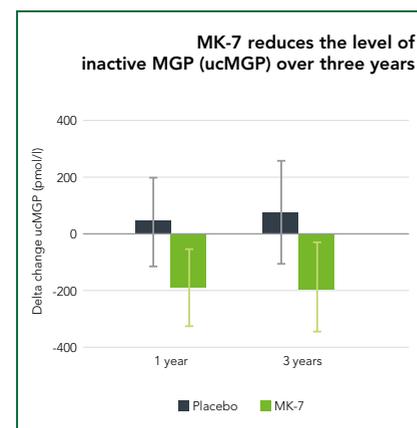
### TOP STUDIES

The relationship between vitamin K2 and arterial calcification is strong. High levels of non-activated MGP are correlated with lower vitamin K intake and lower survival rates among cardiovascular pa-

tients [6]. K2 supplementation at 90 µg doses has also been shown to decrease levels of non-activated MGP [7-9] and increase activated MGP levels [10]. The strongest evidence for the preventative role of K2 in cardiovascular health comes from the Rotterdam study. Nearly 5,000 Dutch men and women, age 55 and higher, took part in the study for between 8 and 11 years. Diets high in vitamin K2 were shown to dramatically reduce CVD risk and mortality [11]. Another study followed 16,000 women aged 40-79. This study demonstrated an inverse correlation between dietary K2 and heart disease, and specifically a 9% reduction in CVD mortality risk for each additional 10 µg/day of K2 intake [12].

A 2015 study by Knapen et al. concludes that beyond prevention, vitamin K2 can reverse existing levels of calcification and restore arterial flexibility. Knapen showed that high intake of vitamin K2 MK-7 was linked to reduced arterial calcification [13]. Further, it demonstrated that arterial stiffness significantly decreased in the MK-7 test group after three years (180 µg/day), compared to a slight increase for the control group.

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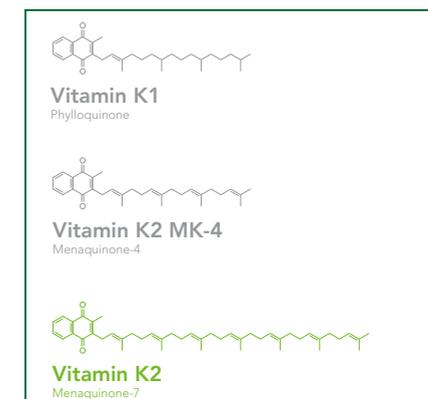


### DIET OR SUPPLEMENTATION?

Western diets are likely K2 deficient [14], creating opportunity in a wide range of supplement market categories. Vitamin K2 (menaquinone) is actually a family of molecules with side chains of different lengths. EFSA approval, however, is limited to the MK-7 form. Studies demonstrate that MK-7 is best for supplementation because it is absorbed best and is most bioactive [8, 14, 15-17].

The MK-7 molecule exists in nature, but in some respects is uncommon. Most dietary K2 consists of less efficient MK forms in meat and dairy products, but in levels too low to meet requirements. This dietary

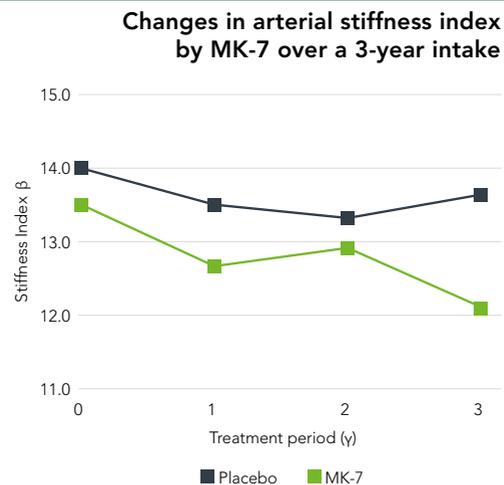
deficiency may be a relatively recent development brought about by changes in food preservation and livestock management. Regardless, vitamin K2 is an essential fat-soluble vitamin like vitamins A, D and E and it is vital at all stages of life. Supplementation is an effective solution, and MK-7 is the best, most bioactive K2 form.



### K2VITAL<sup>®</sup> HEART HEALTH FORMULATIONS

Vitamin K2 balances calcium, but the body requires several other important nutrients for cardiovascular health. Multi-ingredient heart health products can leverage the synergistic benefits of several nutrients to reduce the risk of cardiovascular disease. Magnesium,

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for example, is an essential mineral that regulates cardiac function, rhythm and vascular muscle tone. B-complex vitamins also contribute to normal heart function. The K2VITAL<sup>®</sup> Bone Cardio<sup>™</sup> white-label product is an example of a multi-ingredient formulation that leverages K2, D3, magnesium and B vitamins for both bone and heart health. L-Arginine is an amino acid that relaxes blood vessels and lowers blood pressure. Omega-3 fatty acids are also important. The body needs both omega-3 and omega-6 fatty acids for optimal heart health. Western diets are high in omega-6 (from vegetable and soybeans oils) and low in omega-3 (from fish). Formulations like OMEKA-3, designed by Kappa Bioscience

and CAPSUGEL, provide K2 and omega-3 in an innovative dosage form. These formulations are just two of 150 licence-free, ready-to-launch product formulations developed by Kappa Bioscience. Both of these white-label formulations are included in the K2 Formulation LookBook, now in its fourth edition, published by Kappa and distributed at industry events. The vitamin K2 market is growing rapidly, and K2VITAL<sup>®</sup> K2 offers commercial opportunity in up to 11 distinct market categories.

### References

For more information  
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