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The Surprising Longevity Benefits of Vitamin K

New research confirms that **vitamin K** can slash the risk of arterial calcification, coronary heart disease, cancer, type II diabetes, and metabolic syndrome. Most compelling is a study showing that those with the *highest* intakes of **vitamin K** are *less* likely to die from *any* cause.

Scientifically reviewed by: [Dr. April Parks](#), MD, on May 2020. Written By Judy Ramirez.

Dr. Bruce Ames is one of the world's leading authorities on aging and nutrition. Four years ago, Dr. Ames published research indicating that optimum intake of **vitamin K** plays an important role in longevity.¹

A new **2014** study on vitamin K confirms that ample vitamin K intake can indeed help you live longer.² In a group of more than 7,000 people at high risk for cardiovascular disease, people with the *highest* intake of **vitamin K** were **36%** less likely to die from *any cause at all*, compared with those having the lowest intake.

WHAT YOU NEED TO KNOW

- Once thought to be exclusively concerned with blood coagulation, vitamin K is now known to affect at least 16 Gla-proteins in the body.
- These include proteins involved in protecting arteries from calcification, those protecting bones from losing calcium, and ones that help prevent against diabetes and cancer.
- A new study demonstrated that people with higher vitamin K intakes are less likely to die from all causes, lending new urgency to the issue of supplementation.
- A multitude of studies now point to the fact that adequate vitamin K intake, including supplementation, can offer prevention against atherosclerosis, osteoporosis, diabetes, and cancer.
- Assure that your vitamin K intake is adequate by adopting a daily vitamin K supplement that provides both K₁ and K₂ for optimum coverage.

This protection even extended to those with initially low vitamin K intake who boosted their consumption during the course of the study—demonstrating that it's never too late to start gaining the benefits of vitamin K supplementation. Increasing intake conferred protection against cardiovascular death as well.²

Vitamin K is capable of opposing many of the leading causes of death in modern-day Americans—including atherosclerosis,³ osteoporosis,⁴ diabetes,^{5,6} and cancer^{2,7}—because it has the unique ability to activate proteins involved in these conditions.

In this article, we will review a host of new studies that detail the impact of vitamin K supplementation on preventing these and other major age-related diseases.

Risk Reduction By Increased Vitamin K Intake

Condition	Vitamin K Form	Risk Reduction
All-Cause Mortality	K ₂	26% (Highest vs. Lowest Intake) ³
All-Cause Mortality	K ₁	36% (Highest vs. Lowest Intake) ²
Cancer	K ₁	46% (Highest vs. Lowest Intake) ²
Cancer, Advanced Prostate	K ₂	63% (Highest vs. Lowest Intake) ⁷
Cancer Death	K ₂	28% (Highest vs. Lowest Intake) ⁵⁴
Coronary Artery Calcification	K ₂	20% (Highest vs. Lowest Intake) ³⁰
Coronary Heart Disease	K ₁	21% (Highest vs. Lowest Intake) ⁶⁶
Coronary Heart Disease	K ₂	9% lower risk for each 10 microgram/d increased intake ⁶⁷
Coronary Heart Disease Mortality	K ₂	57% (Highest vs. Lowest Intake) ³
Metabolic Syndrome	K ₁	27% for having low HDL-cholesterol* 49% for having elevated triglycerides* 82% for having high blood sugar* (All Highest vs. Lowest Intake) ⁶⁸
Type II Diabetes	K ₂	7% lower risk for each 10 microgram/d increased intakes ⁵
Type II Diabetes	K ₁	17% reduction for each 100 microgram/d increased intake ⁶
Type II Diabetes	K ₁	51% with increased K ₁ intake vs. decreased or no change in intake ⁶

*Based off of odds ratios

The Many Benefits Of Vitamin K

Vitamin K was first discovered in 1935, when it was found to be an essential nutrient to prevent abnormal bleeding in chickens.⁸ For decades thereafter, vitamin K was identified as the “coagulation vitamin” (in fact, the initial “K” comes from the German spelling, *koagulation*).

During that time, it was established that vitamin K worked by activating certain proteins made in the liver that are required for normal blood clotting. Without sufficient vitamin K, blood would not clot, and severe bleeding would ensue.^{9,10}

Vitamin K activates those blood-clotting proteins by making a small but vital chemical change in the proteins' structure, specifically on the protein building block called **glutamic acid**.¹¹

By the turn of the 21st century, scientists had learned that vitamin K produces similar changes to glutamic acid molecules to activate a handful of other vital proteins in the body, with the collective name of **Gla-proteins**.¹²⁻¹⁶ According to 2014 research, 16 different vitamin K-dependent Gla-proteins have been identified.¹⁷ This means that they depend on vitamin K to activate them in order to carry out their intended role.

With the discovery of the Gla-proteins, scientists learned that vitamin K is vital for much more than the healthy clotting of blood. For example, the Gla-protein in bone, called **osteocalcin**, is responsible for making sure calcium is deposited in bones, while the Gla-protein in arterial walls, called **matrix Gla protein**, prevents calcium from being deposited in arteries.¹⁸

Insufficient blood clotting was thought to be the main sign of vitamin K deficiency. However, scientists have since learned that you can have enough vitamin K to promote healthy blood clotting, yet still not have enough vitamin K for it to activate the Gla-proteins necessary to help prevent cardiovascular disease, osteoporosis, diabetes, and cancer, all conditions in which vitamin K-dependent proteins are known to be factors.^{13,14,19} Fortunately, studies show that vitamin K supplementation can significantly increase the amount of activated Gla-proteins in tissues—without over-activating the clotting proteins.¹⁸

Vitamin K And Atherosclerosis

As we age, calcium that belongs in our bones begins to make its appearance in other unwanted areas, including inside the linings of major arteries.²⁰ Over time, normal smooth muscle cells in artery walls transform into bone-like cells through the deposition of calcium, essentially turning sections of artery into bony tissue that is not resilient and flexible, and does not have the ability to effectively regulate blood flow.^{19,21} This process lends literal reality to the term “hardening of the arteries,” which we now know as late-stage atherosclerosis.

Nature has provided a powerful inhibitor of arterial calcification in the form of **matrix Gla protein**, one of the 16 Gla-proteins activated by vitamin K. This specific Gla-protein is produced in arterial walls, but is only activated when sufficient vitamin K is present.^{3,14,15,19,22-24} In the absence of sufficient vitamin K, arterial calcification is able to continue unopposed, leading to advanced atherosclerosis and its deadly consequences, heart attacks and strokes.^{14,16} Indeed, in older men and women who had the highest levels of inactive matrix Gla protein (indicating low vitamin K levels), there was a nearly **3-fold** increased risk of cardiovascular disease compared to those with the lowest levels.²³

Researchers have known for nearly 20 years that insufficient vitamin K intake in the diet is related to atherosclerosis in the aorta, the body's largest blood vessel.¹⁶ Since that time, a host of

basic science and laboratory studies have indicated that higher vitamin K intake is essential for preventing atherosclerosis in major vessels of all kinds. Animal studies even show that vitamin K can “rescue” calcified arteries that occur as a result of the overuse of drugs that inhibit vitamin K, such as certain blood thinners.^{25,26}

Another way matrix Gla proteins help protect against atherosclerosis is by inhibiting the production of inflammatory signaling molecules (cytokines), which contribute to plaque formation and calcification.²⁷ People with the highest dietary intake of vitamin K have significantly lower levels of those inflammatory markers, and also of substances involved in appetite generation and insulin resistance, both of which are important in preventing atherosclerosis.²⁸ (Some of these effects may be related to increased levels of another vitamin K-dependent Gla-protein that suppresses inflammation and promotes glucose tolerance.)²⁹

Human Studies On Vitamin K

Human studies on dietary vitamin K intake have been somewhat inconsistent, probably because of confusion about which form of the vitamin is most important.³⁰

Vitamin K₁ (*phylloquinone*) is the main dietary form of the vitamin, but vitamin K₂ (*menaquinone*) has a stronger relationship to arterial calcification.¹⁵

In one study, people with the highest intake of vitamin K₂ were **57%** less likely to die of coronary heart disease compared with those with the lowest intake.³ In another study, women with the highest intake of vitamin K₂ were found to be at a **20%** lower risk for coronary artery calcification compared with women with the lowest intake levels, while the same study found that vitamin K₁ had no significant impact.³⁰

Vitamin K supplementation studies suggest that both forms of the vitamin contribute to protection from arterial calcification in atherosclerosis, with a slight edge for vitamin K₂. For example, when healthy men and postmenopausal women supplemented with **500 micrograms** of vitamin K₁ per day, they experienced a modest **6%** reduction in the progression of arterial calcification, but only in subjects with the most advanced disease at baseline.²² And a study using vitamin K₁ in combination with vitamin D and minerals demonstrated that the combined supplement could slow the loss of arterial suppleness and promote elasticity.¹⁴

Similarly, supplementation with both **180** and **360 micrograms** of vitamin K₂ significantly reduced the amounts of inactivated matrix Gla protein, thereby lowering the risk of atherosclerosis with calcification; placebo recipients in that study showed no effect.³¹ In another study, a group of kidney disease patients on hemodialysis (who have a very high risk for advanced atherosclerosis with calcification) took either **135** or **360 micrograms** of vitamin K₂. Supplementation dramatically decreased the amount of inactivated matrix Gla protein by **77%** at the lower dose, and **93%** at the higher dose.³²

Intriguingly, it is now apparent that women with atherosclerosis are more likely to have lower bone mass than women without atherosclerosis. They're also more likely to have lower

circulating vitamin K levels, highlighting the age-related trade-off between calcium in bones (which is desirable) and calcium in arterial walls (which is undesirable).²⁰

Vitamin K And Osteoporosis

Sufficient vitamin K is also required in order to activate the Gla-protein **osteocalcin**, which binds tightly to bone minerals to create strong bones.³³ With inadequate vitamin K, bones can't hold on to vital calcium, which leads to osteoporosis.³⁴ To make matters worse, the calcium has to go somewhere, so it enters the bloodstream, where it contributes to stiffening arteries.³³

Fortunately, supplementation with vitamin K is an effective means of protecting your bones from osteoporosis.

A study of healthy postmenopausal women between 50 and 60 years old demonstrated that three years of supplementation with **1 mg/day** of vitamin K₁, plus **8 micrograms (320 IU)/day** of vitamin D together with minerals, reduced the loss of bone in the hip and spine compared both to placebo recipients and to those supplemented with vitamin D and minerals alone.³⁵

In another study, postmenopausal women with pre-existing osteoporosis took **1,500 mg** of calcium carbonate and **45 mg** of vitamin K₂ or placebo each day for 48 weeks. Compared to baseline values, the women experienced an increase in spinal bone mineral density and a **55.9%** reduction in inactive osteocalcin levels, while a **9.3%** reduction occurred in the group taking only the calcium supplement.³⁶ The same dose of K₂ was later shown to maintain hip bone strength and improve the overall geometry of the femoral neck over a three-year period, while placebo recipients lost hip bone strength during that time.³⁷

Even lower doses of **180 micrograms/day** of vitamin K₂ (especially in the form of longer-lasting MK-7, which is derived from *natto* or fermented soybeans), when given for three years, increased the amount of activated osteocalcin and produced significant improvements in bone mineral content and density in the lower spine and femoral neck, while also increasing bone strength and preventing loss of height in spinal vertebrae.³⁸

Vitamin K₂ has recently been recognized by the European Food Safety Authority as having an important role in maintaining normal bone health.³⁸ When added to *alendronate*, a common anti-osteoporosis drug, vitamin K₂ significantly increased bone mineral density in the femoral neck compared with alendronate alone.³⁹

Vitamin K And Diabetes

Type II diabetics have an increased risk of bone fracture. This is likely due in part to the incomplete activation of the Gla-protein osteocalcin (caused by lack of vitamin K), and the decrease of calcium being deposited in bone that occurs as a result.⁴⁰ Conversely, people with the highest vitamin K₁ intakes have reductions in inflammatory markers related to diabetes.²⁸

Vitamin K has also been found to have a direct impact on the diabetic state itself. In a group of healthy volunteers between 26 and 81 years old, higher dietary vitamin K₁ intake was associated

with greater insulin sensitivity and lower post-meal glucose levels.⁴¹ And in a study of older adults at high risk for cardiovascular disease, the risk of developing type II diabetes was reduced by **17%** per **100 micrograms** of K₁ intake per day.⁶

Another study demonstrated that both vitamins K₁ and K₂ reduced the risk of developing diabetes. However, the stronger and more significant association occurred with K₂, which reduced the risk of type II diabetes by **7%** for each **10-microgram** increase in intake.⁵

In addition to reducing the risk of diabetes, vitamin K has been shown to reduce the effects of diabetes as well.

Supplementation studies in animals show that diabetic rats, like diabetic humans, develop bone mineral loss. However, when diabetic rats were supplemented with vitamin K₂, not only was osteopenia prevented, hyperglycemia was prevented as well.⁴²

Human supplementation studies demonstrate that both K₁ and K₂ are effective in combating the effects of diabetes. In older, non diabetic men, three years of supplementation with **500 micrograms/day** of vitamin K₁ produced a significant reduction in insulin resistance compared with controls.⁴³ And in a study of healthy young men, just four weeks of supplementation with **30 mg** of K₂ three times daily improved insulin sensitivity.⁴⁴ This may have occurred as a result of an increase in the vitamin K-dependent Gla-protein osteocalcin, which has been shown in animal studies to increase insulin secretion and sensitivity.⁴⁵

TYPES OF VITAMIN K

It is clear that vitamin K affects specific and vital proteins throughout the body, well beyond the blood-clotting functions originally described for the vitamin. Less clear, at least for now, are differences in impact on the human body of several different types of vitamin K.

Phylloquinone, or K₁, is the predominant source of vitamin K in the diet,⁵⁵ but it becomes converted to menaquinone, or K₂, in animals, including humans.⁵⁶ Vitamin K₂ itself has several different subtypes, based on molecular structure variations. The subtype MK-4, or menaquinone-4, predominates in animal tissues; it is the natural product of K₁ modification in the gastrointestinal tract.⁵⁷

It is likely that both K₁ and K₂ are necessary for overall normal vitamin K function, and it appears that supplementation with both is useful, especially for the mounting number of biological tissues other than blood clotting that rely upon adequate vitamin K. The subtype of K₂ called MK-7, menaquinone-7 has recently been shown to be more bioavailable than MK-4.⁵⁸

Vitamin K And Cancer

Studies of vitamin K intake reveal potent preventive properties against several types of cancer, including prostate, colon, and liver cancers.⁴⁶

When prostate cancer cells in culture are treated with vitamin K₂, both those sensitive to male hormones (androgens) and those resistant to male hormones are unable to reproduce, and eventually die.⁴⁷ Vitamin K₂ has been associated with a **63%** lower risk of advanced prostate cancer in men with the highest intake of the nutrient.⁷ Similarly, a higher ratio of vitamin K-activated osteocalcin versus inactive osteocalcin correlates closely with reduced prostate cancer risk, demonstrating the molecular connection.⁴⁸

In human colon cancer cells, vitamin K₂ has been shown to induce cancer cell death by several different mechanisms and to suppress the growth of colon tumors implanted into mice.^{49,50}

Supplementation studies also reveal vitamin K's powerful effect on the most common kind of liver cancer, called *hepatocellular carcinoma*. This cancer is almost always associated with alcoholism or hepatitis B or C infection.⁵¹ Although surgical or radiation treatment can destroy the primary tumor, recurrence is common and typically determines the long-term prognosis.^{52,53} Several human studies show that vitamin K₂ supplementation can dramatically reduce the recurrence rate in *hepatocellular carcinoma* and may impact the survival rate as well.^{52,53}

As with most nutrients, vitamin K is not the single answer to cancer prevention, but it shows tremendous promise, which highlights the importance of maintaining adequate levels through boosting your intake. A large European study showed that **cancer death** was **28%** less likely overall in those with the highest versus lowest intakes of vitamin K₂.⁵⁴

Impact Of Vitamin K ₂ Supplement On Liver Cancer Patients ⁵³						
	Recurrence Rate, %			Survival Rate, %		
	12 mo	24 mo	36 mo	12 mo	24 mo	36 mo
Vitamin K₂ 45 mg/day	12.5	39.0	64.3	100	96.6	87.0
Controls	55.2	83.2	91.6	96.4	80.9	64.0

Summary

A recent large study confirms that people with the highest vitamin K intakes are significantly less likely to die from any cause, compared with those having the lowest intakes.

Because of its unique ability to activate proteins involved in atherosclerosis, osteoporosis, diabetes, and cancer, vitamin K is capable of opposing many of the leading causes of death in modern-day Americans. A host of new studies details the impact of vitamin K supplementation on preventing these, and possibly other, major age-related diseases.

Once considered just a blood coagulation vitamin, vitamin K₂ has now achieved the status of a multi-function vitamin. If you are interested in a longer and healthier life, consider supplementing with this often- overlooked nutrient.

If you are taking a blood-thinning drug, check first with your doctor to coordinate doses and follow-up testing.

If you have any questions on the scientific content of this article, please call a **Life Extension®** Wellness Specialist at 1-866-864-3027.

THE DANGERS OF BLOOD THINNERS

People at risk for dangerous blood clots include those with various heart rhythm abnormalities (e.g., atrial fibrillation),⁵⁹ as well as those with artificial heart valves,⁶⁰ stents, and other hardware, and those at risk for certain kinds of strokes. For these people, blood-thinning drugs known as anticoagulants offer significant protection.²⁶

But many traditional blood thinners, such as **Coumadin®** (*warfarin*), act specifically by inhibiting the action of vitamin K to produce clotting proteins. The emerging science of vitamin K is revealing a disturbing fact: While inhibiting vitamin K action on blood clotting proteins, these drugs also inhibit other vitamin K-dependent proteins, including the **matrix Gla protein** that naturally prevents arterial calcification.²⁶

Studies in both animals and humans now show that the use of anticoagulant drugs such as Coumadin (*warfarin*), while effective at clot prevention, do indeed accelerate arterial calcification, placing patients at increased risk for cardiovascular disasters.^{61,62} The good news is that by supplementing with low-dose vitamin K, you may help rescue arteries from calcification induced by *warfarin*.⁶³

However, if you are taking a blood-thinning drug, **DO NOT** stop using it and **DO NOT** begin any vitamin K supplementation on your own. Instead, speak with your doctor about starting a vitamin K supplement at a proper dose. With careful monitoring of coagulation tests, you are likely to find a balance between the benefits and the risks of anticoagulant use.^{64,65}

Newer blood-thinning drugs such as **Pradaxa®** (*dabigatran*) and **Eliquis®** (*apixaban*) are **not** affected by vitamin K intake, meaning you can take full-dose vitamin K and not compromise the desired anticoagulant effects.

Editor's Note

Science continues to evolve, and new research is published daily. As such, we have a more recent article on this topic: [Enhancing the Life Saving Benefits of Vitamin K](#)

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