



DaVinci®

*Laboratories
of Vermont*

Innovative by nature

A·D·K

Be Strong[™]



Dear Practitioner,

While it is widely known that calcium is needed for maintaining bone structure and the fight against osteoporosis, many people are not aware of the conflicting evidence about calcium supplements. To that end, people who take calcium supplements without the supervision of a doctor may not understand the role of other vitamins in calcium utilization, particularly vitamin D. Even many practitioners disagree about the complicated role of calcium and how it interacts with other minerals and vitamins in the body.

Then in April 2011, the British Medical Journal published a study concluding that calcium supplements could increase the risk of cardiovascular events, and this included supplements with or without vitamin D. Researchers warned that a “reassessment of the role of calcium supplements in osteoporosis management is warranted.”¹

What many patients and practitioners may not understand is what Dr. Kate Rheaume-Bleue, B.Sc., N.D. calls “The Calcium Paradox,” which is the phenomenon at the root of the claims made by the study reported in the British Medical Journal in 2011: Women who take calcium supplements are at a higher risk for heart disease due to the calcium buildup in their arteries, but without calcium supplements, they are at a higher risk for osteoporosis.

*To confuse matters more, it was not clear if the bone benefits outweighed the risk of a cardiovascular event. In her book, *Vitamin K2 and the Calcium Paradox* Dr. Rheaume-Bleue argues that this is the wrong question to ask. Instead, we should be asking “How can the body guide calcium safely into the bones where it helps us, and keep it away from soft tissues like arteries where it harms us?”²*

Throughout the book, she uncovers some of the widely misunderstood facts about the role of vitamin A, vitamin D3, and vitamin K2, and how they work synergistically to support calcium utilization in the body, among other important functions. While the combination of vitamin A, vitamin D3, and vitamin K2 is not commonly used in a bone integrity support product, new research has supported the need for this product on the market.

In light of these recent findings, DaVinci® Laboratories has created a new A • D • K supplement that we are very excited to present to you and your patients. Specific amounts of A, D3, and K2 work together to help the body utilize calcium in the bones and help support bone structure. In addition to the bone structure benefits that many patients are seeking, this new product also helps support cardiovascular function.**

To your patients’ and your practice’s good health,

*Dom Orlandi
President, DaVinci Laboratories*

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Introduction

According to the Center for Disease Control website, "Heart disease is the leading cause of death for both men and women. **More than half** of the deaths due to heart disease in 2009 were in men." While it may not be surprising that more men than women die of heart disease, the fact that osteoporosis is a rising problem in males may be news to many men, as well as their doctors.

The National Institutes of Health online reports "in the past few years the problem of osteoporosis in men has been recognized as an important public health issue, particularly in light of estimates that the number of men above the age of 70 will continue to increase as life expectancy continues to rise."

When you consider the fact that both men and women are suffering from hardened arteries and osteoporosis, it's hard to believe that both issues are related to calcium; however, it isn't the lack of calcium intake, but rather, it's the lack of absorption that's the actual root of the problem.

To illustrate this more clearly, here are some facts and statistics from the CDC:

- "By the age of 20, the average woman has acquired most of her skeletal mass. A large decline in bone mass occurs in older adults, increasing the risk of osteoporosis. For women this occurs around the time of menopause."
- "Inadequate calcium consumption and physical activity early on could result in a failure to achieve peak bone mass in adulthood."
- "Excessively high levels of calcium in the blood known as hypercalcemia can cause renal insufficiency, vascular and soft tissue calcification, hypercalciuria (high levels of calcium in the urine) and kidney stones."
- "Vitamin D promotes calcium absorption in the gut and maintains adequate serum calcium and phosphate concentrations to enable normal mineralization of bone and to prevent hypocalcemic tetany."
- "The best way to get enough vitamins is to eat a balanced diet with a variety of foods. You can usually get all your vitamins from the foods you eat."

Yet it is that final bullet point that is somewhat misleading. Because of the lack of nutrients in conventionally grown crops and factory farm animals, the average American diet typically does not provide all the vitamins a healthy person needs. In addition, new research about the importance of vitamin K, vitamin deficiency, and the combination of A, D, and K (specifically, K2) that begs further examination of how certain vitamins work together to help the absorption of vital nutrients.

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The Calcium Paradox

The formula in **A • D • K** from DaVinci® Laboratories is based on scientific research examining the synergistic effects of vitamins A, D3, and K2. In her well-researched and documented book, *Vitamin K2 and the Calcium Paradox*, Kate Rheaume-Bleue, ND argues that the combination of vitamins A, D and K are “intricately interrelated in complex ways that modern science doesn’t yet entirely understand.”²

Dr. Rheaume-Bleue points out that the “bone-building benefits of vitamin D” depend on vitamin K2, and when vitamin D is “assisted by vitamin A,” this relationship “stimulates the production of osteocalcin,” which is activated by vitamin K2.*² She contends that these fat-soluble vitamins are “profoundly different” than other nutrients because they bind to proteins, especially K2, which allows the proteins to bind to calcium so that it can be better utilized in the body.*²

The Synergistic Effect of Vitamins A, D, and K

Vitamin A is a fat-soluble vitamin with multiple functions in the body, including normal development, growth and maintenance of the skeleton throughout life.* Vitamin A supports the number and activity of osteoclast cells, which break down bone tissue, an ongoing process of skeletal maintenance called bone remodeling.*

Vitamin A supplements may be one of the only reliable sources of this vitamin. Contrary to popular belief, carrots do not contain any vitamin A. This is due to a lot of misleading information available to the public, according to Dr. Rheaume-Bleue. She claims that a deficiency is far more likely than too much vitamin A, which has been a common belief for a long time due to its fat-soluble properties.²

Vitamin D3 (cholecalciferol) is a fat-soluble vitamin that is essential for maintaining normal calcium metabolism.* It supports calcium absorption in the gut and helps maintain adequate serum calcium and phosphate concentrations to enable normal mineralization of bone.* Vitamin D3 also supports cardiovascular function and blood pressure within normal ranges.*²

Vitamin K2, known as menaquinone (MK-7), is the form that has been shown to support normal bone formation.* It is responsible for the carboxylation of specific bone proteins that play a regulatory role in bone metabolism.* Factors that cause a Vitamin K deficiency include: poor diet and the use of certain prescription drugs, as well as long term use of antibiotics.*²

Vitamin K1 vs. K2

In Chapter 3 of Dr. Rheaume-Bleue’s book, she takes an in depth look at how much vitamin K2 is needed and where to get it. She also makes the distinction between vitamin K1 and K2. Vitamin K1 (found in nutrient rich greens) is the precursor to K2, which is the form that supports calcium utilization. While humans cannot convert vitamin K1 into K2, animals can, which is why meat and dairy products are another source of K2.²

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However, people in the U.S. have developed a K2 deficiency over the course of the 20th Century, namely due to the development of large beef and poultry feedlots and factory farming practices. Most modern factory farms use corn because it is cheap and fattens the animal more quickly. But this means that grain-fed animals are not as healthy, and the meat is higher in saturated fats. It also means that the animal product doesn't provide a good source of K2. According to Dr. Rheume-Bleue's research in her book, standard grain "contains only a fraction of the necessary K2 precursor found in green grass"²

She concludes that before the rise of commercial feedlots, vitamin K2 was abundant in our diets because most animals grazed on pastures. If factory farming and grain-fed animal products are the norm, how do we ensure that we are getting enough K2? Supplements are only part of the answer. Knowing where our food comes from is another large piece of the puzzle.

As a strange twist of fate, the discovery of vitamins A and D sparked the enormous shift in how livestock animals are raised in the U.S., starting as early as the 1920s. Dr. Rheume-Bleue explains, "Adding these specific nutrients to feed meant that cattle, poultry and swine could survive without sunlight, a source of vitamin D, and without green grass, a source of nutrients from which animals can derive vitamin A."²

Buying quality animal products is one way to get a number of essential vitamins and minerals, not just K2. Without perhaps understanding the full extent of the health benefits of eating meat from grass-fed animals, "Localvore" movements across the country are leading the way to better health by promoting locally-grown, free range, and grass-fed beef, chicken, and pork. But some of these labels can be confusing.

Grain-fed vs. Grass-fed

It may seem like a luxury to some, but part of getting the right amount of minerals and vitamins includes making healthier food choices. This means we need to increase our awareness of where our meat comes from and how the animals are raised. A little education goes a long way.

For instance, many consumers don't realize that "free range" is not the same as "grass-fed." Buying cage-free eggs doesn't mean that the hen has been fed the nutrient-rich grass needed to produce eggs with a higher nutrient content, which includes higher levels of vitamin A, E, D, K2, and Omega-3 fatty acids. It only means that the hen was not raised in a cage but may still have been fed mostly grain.

Why should any of this matter outside of environmental or ethical concerns? Dr. Rheume-Bleue compares the official nutrient data for commercial eggs with the eggs from grass-fed hens. The results are staggering.

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Hens raised on pasture have:

- *one-third less cholesterol*
- *one-quarter less saturated fat*
- *two-thirds more vitamin A*
- *two times more omega-3 fatty acids*
- *three times more vitamin E*
- *seven times more beta-carotene*
- *50 percent more folic acid*
- *70 percent more vitamin B12*
- *four to six times more vitamin D²*

Even though some people argue that buying meat, eggs, or dairy from animals that were raised on pastureland is too expensive, they cannot argue with the nutritional deficit in most commercial products. In addition, it is widely accepted—even outside of “foodie” circles—that the taste and quality of grass-fed products are superior to that of standard grade.

However, with all the confusing labels surrounding the free range and organic movements, it’s hard to tell just how much vitamin K2 we are getting in our diets. In addition, the movement toward free range and grass fed is a slow one, and most consumers cannot afford these expensive items. Additionally, vegans are another subset of the population who can only get K2 through a supplement. Even if the majority of people who consume animal products are buying more nutrient rich meat and dairy, is it enough?

Enter Healthy Alternatives

While getting the extra support for certain health needs can be found in natural supplements, it’s important to speak with patients about how a balanced diet and exercise are also a vital part of their overall health. This is part of why it’s so important for health practitioners to recommend a comprehensive course of action for total wellness.

The Center for Disease Control notes that “recommendations from health care providers are the most influential factor in convincing people to be physically active” and to take courses in self-management. This is why at DaVinci® Laboratories, we always encourage doctors to discuss the benefits of a healthy diet and exercise, along with the benefits of additional support from natural supplements.

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The Difference Your Patients Are Seeking

There is a growing movement toward natural, alternative and non-prescription solutions for everyday health. Harvard Medical School has estimated that 50 percent of people in the U.S. between the ages of 35 and 49 years have used at least one alternative therapy, while the National Center for Health Statistics confirms that in 2007, almost 4 out of 10 adults (38.3%) had used some type of complementary and alternative medicine (CAM) in the past 12 months.

The 2007 National Health Interview Survey (NHIS) alerts us to the fact that 38.1 million adults in the United States made visits to CAM practitioners during the last year, spending \$33.9 billion out of pocket on visits and purchases of CAM products, classes, and materials. Calcium is among one of those out of pocket purchases, and more and more doctors are recommending calcium supplements for patients as they age. However, as Dr. Rheume-Bleue argues, doctors are doing patients a disservice if that calcium is not being absorbed properly.

Calcium Supplements and Absorption

Calcium supplements are perhaps the most confusing since there are conflicting opinions about how much calcium is needed on a daily basis to support bone integrity. But what cannot be argued is how calcium is absorbed. The American Academy of Orthopaedic Surgeons states, "Not all the calcium consumed — whether through food or supplement — is actually absorbed in the intestines."

AAOS also points to research suggesting that when calcium is taken in doses less than 500 mg, it is absorbed "most efficiently." In addition to dosage, absorption is determined by the presence of other vitamins. Some research shows that when vitamins A, D, and K are combined, calcium is utilized more efficiently in the body. The AAOS encourages patients to speak with a doctor or specialist before taking a calcium supplement. While the combination of ADK has not been recommended for supporting bone and cardiovascular health, doctors who are recommending calcium supplements may want to consider the new research on calcium absorption and ADK supplements.

Bone Integrity and Rebuilding

Research shows that the combination of vitamins A, D, and K2 may support bone integrity and rebuilding. Vitamin K2 is required for the activation of osteocalcin—a vitamin K dependent protein that transports calcium from the blood to form a healthy bone matrix.

Vitamin K2 has been tested in several clinical trials to examine its effect on bone mass density, which reduces the risk of fracture. In one Japanese study, women were given 45mg a day of the menaquinone-4 (MK-4) form of vitamin K2. The study revealed that the BMD in all the test subjects improved significantly.^{3,4,5,6} However, a similar study was conducted using vitamin K1, and there was no increase in BMD.⁶ This implies that vitamin K2 has a more positive effect on BMD than vitamin K1.

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As mentioned previously in this paper, vitamin K2 can only be found in animal meat or vitamin supplements. But it's important to note that when Vitamin K2 is deficient or not utilized properly in the body, bone structure and function can be compromised.*² Vitamin K2 not only supports the deposition of calcium into bone; it also has a regulatory effect on Vitamins A and D with regard to osteoclast and osteoblast activity.*²

This is partly why vitamins A and D are now being used with vitamin K in bone health supplements. Furthermore, some studies indicate "an intake of 10,000 IU of vitamin A per day, or more, may increase the risk of osteoporosis and hip fracture in postmenopausal women and overall risk of fracture in middle-aged men."^{7,8,9}

Vitamin D3 is also needed for proper bone growth and bone remodeling by osteoblasts and osteoclasts.*² Without sufficient Vitamin D, bones can become thin, brittle, or misshapen. Research shows that K2 partners with Vitamin D3 to inhibit the production of osteoclast cells (cells that break down bone) in order to help bone-building osteoblasts catch up to maintain a healthy balance.*²

Bone remodeling is a natural way the body removes old or weakened bone tissue in order to make room for new, stronger tissue.*² This process is critical to fracture repair and retaining bone density.*² Vitamin A also plays a role in stimulating osteoblasts (bone building cells) to secrete proteins that are required for bone mineralization, including the K2 dependent protein called osteocalcin. Combined, Vitamins A and D support osteocalcin output and the regulation of osteoclasts (bone breakdown cells) and osteoblasts (bone building cells).*²

Heart Health

In terms of heart health, vitamin K2 plays an important role, especially in reducing the risk of unabsorbed calcium collecting in coronary arteries. Some research implies "a higher dietary intake of vitamin K2, especially the MK-4 fraction, is associated with a reduced risk of coronary calcification and mortality from coronary heart disease."¹⁰ This study used dietary vitamin K2 that was obtained mainly from cheese, but it also included vitamin K2 from milk and meat products (in smaller amounts).¹¹ The study also found that the dietary intake of vitamin K1 did not have the same results as the study conducted with vitamin K2.^{10,11}

Overall, the benefit of vitamin K2 versus K1 is the function of K2. Vitamin K2 works primarily outside of the liver in bones and blood vessels. In blood vessels, vitamin K2 helps to maintain arterial elasticity.*² Vitamin D3 also supports cardiovascular function and blood pressure within normal ranges.*² It impacts heart health by supporting the body's natural cytokine production and vascular function.*²

In her book, Dr. Rheume-Bleue explains this synergistic relationship in one, simple statement: "Vitamins A and D collaborate to prop up vitamin K2, and we fully benefit from vitamins A and D only when we have K2 to complete the act and achieve optimal health."² She also points out another distinguishing trait shared by both vitamin A and vitamin D. Like vitamin K2, they can only be obtained from animal products, despite what health experts have been telling consumers for years.

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What Makes A•D•K from DaVinci® Unique?

The combination of A, D3, and K2 may prove to be an essential tool in supporting bone and heart health, particularly during menopause, after an organ transplant, and many other critical periods of a patient’s health history.* 2 In light of these findings, **A • D • K** from DaVinci® Laboratories is recommended to help support the following:

- Bone structure, density and integrity*
- Proper bone remodeling*
- Calcium utilization*
- Cardiovascular function*

What makes our product unique is that each capsule of **A • D • K** from contains 5,000 IU of Vitamin A (as Retinyl Palmitate), 5,000 IU of Vitamin D3 (as Cholecalciferol), and 500 mcg of Vitamin K2 (as MK-7). This product was formulated with these recommended levels to provide proper support. We hope that you are as excited about this new product as we are, and we encourage you to educate your patients on the many health benefits of the combination of these important nutrients.

Supplement Facts

Serving Size 1 Capsule	
Amount Per Serving	
Vitamin A (as Retinyl Palmitate)	5,000 IU
Vitamin D3 (as Cholecalciferol)	5,000 IU
Vitamin K2 (as MK-7)	500 mcg

Other Ingredients: microcrystalline cellulose,vegetable cellulose (capsule), vegetarian leucine.

Suggested Use

As a dietary supplement, mix 1 scoop (15.5 g) per day in 8 oz. of water and take on an empty stomach at bedtime or right after strenuous exercise or as directed by your healthcare practitioner.

Warning: Do not take this product if pregnant or nursing. If you have a blood-clotting disorder or are taking anticoagulant/anti-platelet drugs such as Coumadin (Warfarin), do not take this product without consulting your healthcare practitioner.

Caution: Individuals taking more than 2,000 IU of Vitamin D per day should have their vitamin D levels monitored. This product is not intended for long term use and should be used under the supervision of your doctor.

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About DaVinci Laboratories

For 40 years, DaVinci® Laboratories has developed and produced leading edge, high quality supplements exclusively for health care professionals. DaVinci® Laboratories is a division of FoodScience® Corporation, which provides the highest quality formulations in the nutritional supplement industry for both human and animal needs.

More than 100 FoodScience® Corporation employees are dedicated to an unmatched commitment of quality and service to meet the diverse needs of our unique customer base. DaVinci® Laboratories holds a current Good Manufacturing Practices (cGMP) certification from the Natural Products Association. They review all elements of the manufacturing process to ensure products meet their established specifications for quality, including identity, purity, potency, composition and contaminants. Our flexible facilities also allow for custom formulations and private labeling for those customers who wish to market their own brand of nutritional products.

DaVinci® Research

DaVinci®'s research focuses on the complex relationships that exist among nutrients and the latest advancements in nutrition to develop and produce some of the most significant products available to holistic practitioners. DaVinci® Laboratories' extensive research into the exciting properties of N,N-Dimethylglycine (DMG) has been unparalleled. The company has been awarded four patents for DMG's beneficial effect in the areas of immune response and cell support.

DaVinci® Specialty Formulations

Ongoing research and development at DaVinci® Laboratories has resulted in the most exclusive line of specialty products, some of which include: pure N,N-Dimethylglycine (Gluconic® DMG); the most complete and powerful multiple vitamin/mineral formulas available (Daily Best™, Kid's Mighty Vites™, Omni™, Omni™ Jr, Spectra™, Spectra™ Man, Spectra™ Senior, Spectra™ Woman, Spectra™ Multi Age, Ultimate Prenatal™); and unique glycosaminoglycan products (Cartilage+™, Disc-Discovery®, Perna® and Perna® Plus). DaVinci® was also the first nutritional supplement company in the United States to introduce Evening Primrose Oil (Gamma-Lin™) to health practitioners in 1980 as well as the first company to offer doctors an efficient and accurate protocol for evaluating the quality of Oil of Evening Primrose.

DaVinci® supports research at the following institutions: University of Southern California Medical School, Los Angeles; Medical University of South Carolina, Charleston; Institute For Child Behavior Research, San Diego; San Diego State University; Northern Kentucky University, Highland Heights; Florida Medical School, Tampa; University of Bridgeport, Bridgeport, Connecticut; Clemson University College of Sciences, Clemson, South Carolina.

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