

# THE RIGHT VITAMINS FOR OSTEOPOROSIS

Osteoporosis, defined by porous bones, is a common problem in Western countries. It is especially common among elderly women and strongly raises the risk of fractures.

**+** **Osteoporosis is a common disease characterised by low bone strength that results in an increased risk of fracture. In SA, one in three women and one in five men will develop osteoporosis.**

## PREVENT FRACTURES

Fractures are associated with serious clinical consequences, including long-term disability, increased risk of death, and high healthcare costs. Early identification and intervention with patients at high risk for fracture is needed to reduce the burden of

osteoporotic fractures.

The management of a patient with a confirmed diagnosis of osteoporosis or low bone mass (osteopenia) includes assessment of fracture risk, evaluation for secondary causes of skeletal fragility, making decisions on initiation of treatment, and identification of all relevant clinical factors that may influence patient management.

A three-year trial in 244 postmenopausal women found that those taking vitamin K2 supplements had much slower decreases in age-related bone mineral density.

Lengthy studies on Japanese women have shown similar benefits, although they used very high doses. Out of 13 trials, only one failed to show significant improvement.

Seven of those trials also reported fractures and found that vitamin K2 reduced spinal fractures by 60%, hip fractures by 77% and all non-spinal fractures by 81%.

## VITAMIN K

Vitamin K2 is rare in the Western diet and hasn't received much mainstream attention. However, this powerful

nutrient plays an *essential* role in many aspects of health.

It has been postulated that vitamin K2 may just be the 'missing link' between diet and several diseases.

Vitamin K was discovered in 1929 as an essential nutrient for blood coagulation. The initial discovery was reported in a German scientific journal, where it was called *Koagulationsvitamin*. That's where the 'K' comes from.

**The three types of vitamin K are:**  
**1. Vitamin K1**, or phylloquinone, is

## CONDITIONS, DISEASES AND MEDICATIONS THAT CAUSE OR CONTRIBUTE TO OSTEOPOROSIS AND FRACTURES

### LIFESTYLE FACTORS

Low calcium intake  
Vitamin D insufficiency  
Excess vitamin A  
High caffeine intake  
High salt intake  
Aluminum (in antacids)  
Alcohol (three or more drinks/d)  
Inadequate physical activity  
Immobilisation  
Smoking (active or passive)  
Falling  
Thinness

Marfan syndrome  
Riley-Day syndrome  
Hemochromatosis  
Menkes steely hair syndrome  
Hypogonadal states  
Androgen insensitivity  
Hyperprolactinemia  
Turner's and Klinefelter's syndromes  
Anorexia nervosa and bulimia  
Panhypopituitarism  
Athletic amenorrhea  
Premature ovarian failure

Gastric bypass  
Malabsorption  
GI surgery  
Pancreatic disease

### HAEMATOLOGIC DISORDERS

Haemophilia  
Multiple myeloma  
Systemic mastocytosis  
Leukemia and lymphomas  
Sickle cell disease  
Thalassemia

End stage renal disease  
Parenteral nutrition  
Chronic metabolic acidosis  
Epilepsy  
Post-transplant bone disease  
Congestive heart failure  
Idiopathic scoliosis  
Prior fracture as an adult  
Depression  
Multiple sclerosis  
Sarcoidosis

### GENETIC FACTORS

Cystic fibrosis  
Homocystinuria  
Osteogenesis imperfecta  
Ehlers-Danlos syndrome  
Hypophosphatasia  
Parental history of hip fracture  
Gaucher's disease  
Idiopathic hypercalciuria  
Porphyria  
Glycogen storage diseases

### ENDOCRINE DISORDERS

Adrenal insufficiency  
Diabetes mellitus  
Thyrotoxicosis  
Cushing's syndrome  
Hyperparathyroidism

### RHEUMATIC AND AUTOIMMUNE DISEASES

Ankylosing spondylitis  
Lupus  
Rheumatoid arthritis

### MEDICATIONS

Anticoagulants (heparin)  
Cancer chemotherapeutic drugs  
Gonadotropin releasing hormone agonists  
Anticonvulsants  
Cyclosporine A and tacrolimus  
Lithium  
Aromatase inhibitors  
Depo-medroxyprogesterone  
Barbiturates  
Glucocorticoids ( $\geq 5\text{mg/d}$  of prednisone or equivalent for  $\geq 3$  mo)

### GASTROINTESTINAL DISORDERS

Celiac disease  
Inflammatory bowel disease  
Primary biliary cirrhosis

### MISCELLANEOUS CONDITIONS AND DISEASES

Alcoholism  
Emphysema  
Muscular dystrophy  
Amyloidosis

**YOUR BONES AND HEART WILL LOVE YOU\*\***

**MenaCal.7™**  
45 µg MENA7™ + 500 mg CALCIUM + 1000 IU VITAMIN D<sub>3</sub>

**SA'S #1 SCRIPTED CALCIUM SUPPLEMENT\***  
\*Ref. Impact Rx, May 2016

**Ascendis HEALTH**

found naturally in plants, especially green vegetables; K1 goes directly to your liver and helps you maintain healthy blood clotting

**2. Vitamin K2**, also called menaquinone, is made by the bacteria that line your gastrointestinal tract; K2 goes straight to your blood vessel walls, bones, and tissues other than your liver

**3. Vitamin K3**, or menadione, is a synthetic form I do not recommend; it's important to note that toxicity

has occurred in infants injected with this synthetic vitamin K3.

It also plays a role in removing calcium from areas where it shouldn't be, such as in the arteries and soft tissues.

The main function of Vitamin K is to activate the calcium-binding properties of proteins. K1 is mostly involved in blood clotting, while K2 helps regulate where calcium ends up in the body. Vitamin K2 activates the calcium-binding activity of Matrix gla protein and osteocalcin, which help to build

and maintain bones. It also works synergistically with a number of other nutrients, including calcium and vitamin D.

Vitamin K2 can be broken into two additional categories:

1. MK-4 (menaquinone-4), a short-chain form of vitamin K2 found in butter, egg yolks, and animal-based foods
2. MK-7 (menaquinone-7), longer-chain forms found in fermented foods. There's a variety of these long-chain forms but the most common one is

MK-7. This is the one you'll want to look for in supplements, because in a supplement form, the MK-4 products are actually *synthetic*. They are not derived from natural food products containing MK-4.

Vitamin K1 exclusively participates in blood clotting - that is its sole purpose. K2 on the other hand comes from a whole different set of food sources, and its biological role is to help *move calcium* into the proper areas in your body, such as your bones and teeth.

The MK-7 - these long-chain, natural bacterial-derived vitamin K2 - is from a fermentation process, which offers a number of health advantages:

- a. It stays in the body longer
- b. It has a longer half-life, which means you can just take it once a day in very convenient dosing.

### HOW MUCH VITAMIN K2 DO YOU NEED?

The optimal amounts of vitamin K2 are still under investigation, but it seems likely that 180 to 200 micrograms of vitamin K2 should be enough to activate the body's K2-dependent proteins to shuttle the calcium where it needs to be, and remove it from the places where it shouldn't. A Western diet contains as little 10% of that or less.

She estimates that about 80% of Americans do not get enough vitamin K2 in their diet to activate their K2 proteins, which is similar to the deficiency rate of vitamin D. Vitamin K2 deficiency leaves patients vulnerable for a number of chronic diseases, including:

#### Osteoporosis

- Heart disease
- Heart attack and stroke

#### Inappropriate calcification, from heel spurs to kidney stones

- Brain disease
- Cancer

When lacking vitamin K2, patients are at much greater risk for osteoporosis.

Researchers are also looking into other health benefits. For example, one recent study published in the journal *Modern Rheumatology* found that vitamin K2 has the potential to improve disease activity besides osteoporosis in those with rheumatoid arthritis (RA). Another, published in the journal *Science*, found that vitamin K2 serves as a mitochondrial electron carrier, thereby helping maintain normal ATP production in mitochondrial dysfunction, such as that found in Parkinson's Disease.

#### According to the authors:

"We identified *Drosophila* UBIAD1/Heix as a modifier of pink1, a gene

**MenaCal.7™**  
45 µg MENA Q7™ + 500 mg CALCIUM + 1000 IU VITAMIN D<sub>3</sub>

**YOUR BONES AND HEART WILL LOVE YOU\*\***

**SA'S #1 SCRIPTED CALCIUM SUPPLEMENT\***  
\*Ref. Impact Rx, May 2016

**Ascendis HEALTH**

MenaCal.7™ is formulated with vitamin K2 to help keep calcium in your bones where it belongs and out of your arteries, reducing the risk of calcification and associated heart attack\*\*

\*\*Marsesz, Katarzyna PhD. Feb 2015, Integrative Medicine (Encinitas), Vol. 14 No. 1. Proper Calcium Use: Vitamin K2 as a Promoter of Bone and Cardiovascular Health. US National Library of Medicine, PMC4566462: 34 – 39. This medicine has not been evaluated by the Medicines Control Council. This medicine is not intended to diagnose, treat, cure or prevent any disease. Health supplements are intended only to complement health or supplement the diet. MenaCal.7 tablets: Composition: vitamin K2 as MenaQ7™ 45µg; Calcium carbonate 1300mg; vitamin D3 as cholecalciferol 1000IU. MenaCal.7 Chews: Composition: vitamin K2 as MenaQ7™ 45µg; Calcium carbonate 625mg; vitamin D3 as cholecalciferol 1000IU. MenaCal.7 Chews4Kids: Composition: vitamin K2 as MenaQ7™ 45µg; Calcium carbonate 625mg; vitamin D3 as cholecalciferol 1000IU. Contains sugar. Ascendis Supply Chain (Pty) Ltd. Consumer care line/ Verbruikersnavraelyn: 011 036 9420. healthinfo@ascendishealth.com

When taking vitamin D, the body creates more of the vitamin K2-dependent proteins, which move calcium around



mutated in Parkinson's disease that affects mitochondrial function. We found that vitamin K(2) was necessary and sufficient to transfer electrons in *Drosophila* mitochondria. Heix mutants showed severe mitochondrial defects that were rescued by vitamin K(2), and, similar to ubiquinone, vitamin K(2) transferred electrons in *Drosophila* mitochondria, resulting in more efficient adenosine triphosphate (ATP) production. Thus, mitochondrial dysfunction was rescued by vitamin K(2) that serves as a mitochondrial electron carrier, helping to maintain normal ATP production."

People diagnosed with osteoporosis tend to have lower blood levels of vitamin D than other healthy people of their age. The body needs vitamin D to fully absorb calcium.

There is some evidence that getting enough vitamin D will help bones stay more dense compared to not getting enough vitamin D. The people most likely to benefit from taking vitamin D supplements to prevent a broken bone are frail, older people, living in institutions.

Some researchers believe that to help treat and manage osteoporosis and prevent broken bones, it may be necessary to take both calcium and vitamin D supplements together.

### VITAMIN K2 DEFICIENCY

There's no way to test for vitamin K2 deficiency. But by assessing diet and lifestyle, one can get an idea of whether or not patients may be lacking in this critical nutrient. If patients have any of the following health conditions, they're likely deficient in vitamin K2 as they are all connected to K2:

- Osteoporosis
- Heart disease
- Diabetes.

If patients do not have any of those health conditions, but do not regularly eat high amounts of the following foods, then the likelihood of being vitamin K2 deficient is still very high:

- Grass-fed organic animal products (i.e. eggs, butter, dairy)
- Certain fermented foods such as natto, or vegetables fermented using a starter culture of vitamin K2-producing bacteria. Please note that most fermented vegetables are not really high in vitamin K2 and come in at about 50mcg per serving. However, if specific starter cultures are used they can have ten times as much, or 500 mcg per serving
- Certain cheeses such as Brie and Gouda (these two are particularly high in K2)

Note that not every strain of bacteria makes K2. For example, most yoghurts have almost no vitamin K2. Certain types of cheeses are very high in K2, and others are not. It really depends on the specific bacteria.

### THE INTERPLAY BETWEEN VITAMINS K2, D AND CALCIUM

Vitamin D is a critical nutrient for optimal health and is best obtained from sun exposure. However, many are taking oral vitamin D, which may become problematic unless patients are also getting sufficient amounts of vitamin K2. When taking vitamin D, the body creates more of the vitamin K2-dependent proteins, which move calcium around. Until the K2 comes in to activate those proteins, the benefits aren't realised. Taking vitamin D creates an increased demand for K2. Vitamins D and K2 work together to strengthen bones and improve your heart health.

More studies are coming out showing that increased calcium intake is causing more heart attacks and strokes. That created a lot of confusion around whether calcium is safe or not. But that's the wrong question to be asking, because we'll never properly understand the health benefits of calcium or vitamin D, unless we take

into consideration K2, which keeps the calcium in its right place. Those taking oral vitamin D need to also consume in their food or take supplemental vitamin K2.

While the ideal or optimal ratios between vitamin D and vitamin K2 have yet to be elucidated, 150-200 micrograms of K2 will meet the need for the average healthy person. No toxic effects of K2 have been demonstrated in the medical literature. Vitamin K2 activates K2 proteins.

### CALCIUM

Calcium plays a crucial role in all kinds of biological processes. Many high calcium foods also contain naturally high amounts of vitamin K2. Nature cleverly gives us these two nutrients in combination, so they work optimally. Good sources of calcium include dairy, especially cheeses, and vegetables.

Magnesium will help keep calcium in the cell to do its job far better. Those who choose to supplement with calcium, it's important to maintain the proper balance between your intake of calcium and other nutrients such as:

- Vitamin K2
- Vitamin D
- Magnesium. **MC**

References available on request.