Health Freedom alert

The Vitamin K Ban

In Canada, the free sale of vitamin K supplements is **against the law.**

Women are being **hospitalized,** institutionalized, and sent to an early grave by lack of access to an **essential nutrient.**

From rom hip fracture, and perhaps from a hitherto-invisible connection to a **silent killer.**

Demand access to vitamin K. Demand control over **your own body.** Tell HPB that vitamin K **is not a drug.**

It's no secret that osteoporosis in postmenopausal women has an enormous cost, with quality of life, and life itself, at stake as well as dollars. In the United States, about **one person in ten has osteoporosis**. Most of these cases are women. Over 210 thousand hip fractures related to falls happen in older American adults each year – and it's women, again, who endure over three quarters of these fractures.

Hip fractures account for a third of the hospital beds occupied in American hospitals. By the age of ninety, fully one third of adults will suffer from a broken hip – and among older adults, **fully one half of hip fracture victims will never return to their normal lives**. The loss in quality of life from a debilitating fall is so severe that a *British Medical Journal* study found that **eighty percent of women would rather die than suffer the loss of quality of life** that follows institutionalization after a hip fracture[1].

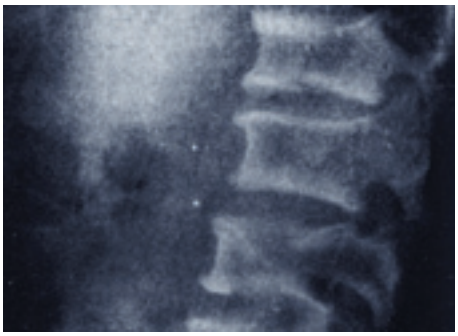
And make no mistake: loss of life itself is a very real possibility. In 1996, the Centers for Disease Control reported that the number of fall-related deaths in older women had been steadily *increasing* since 1987. Depending on which study one relies upon, a hip fracture in an older person can **increase risk of death in the next year by anywhere from 12 to 37%**. Things may be worse in Canada: an investigation comparing women with hip fractures in Manitoba to similar subjects in New England found that, thanks in large part to longer waiting times for surgery (influenced, no doubt, by government cutbacks in the Medicare system), when Canadian women broke a hip, they were **35% more likely to die as a result** than their American counterparts[2]. The annual cost to the American Medicare system from hip fractures was $2.9 billion US as of 1991; the total cost to all parties – from government health care expenses, to private insurance to claims, to the costs incurred by individual victims and their families – exceeds $10 billion US.

The Invisible Deaths

Now, those are scary statistics. But they get scarier when you realize that **osteoporosis is associated with death from a lot more causes than hip fracture.**

In an overlooked, underemphasized report published in *The Lancet*[3], the research group following the Study of Osteoporotic Fractures decided to look at deaths in women with osteoporosis that did *not* involve causes obviously related to the disease, like broken hips or other trauma.

What they found was more than a little surprising. Comparing women with the lowest **bone mineral density (BMD)** in their wrists, to those with the highest density, the scientists found that the thinner-boned women had only a few more deaths related to fractures (3 vs. 1, out of groups of 1920 women each) – but that **the women with the thinnest bones were 70% more likely to die from causes that had *nothing to do* with falling or fracture**.



Most remarkably, and specifically, **low bone density was powerfully associated with death from *stroke***. When the researchers compared the risk of stroke death in women whose bone mineral densities were at the low end of average, to that in women whose BMDs were at the high end of average (ie. one "*standard deviation*" above or below the mathematical mean), the researchers found that the **thinner-boned woman is about three times more likely to die of a stroke**.

That's an astounding difference. To put the increased risk into perspective, consider the increased risk of stroke associated with high **systolic blood pressure (SBP)**, which is the pressure the blood is put under from the combination of the the force of the heart's contraction, and the resistance generated by the arteries. SPB (which is what's indicated by the first, higher number on a blood pressure reading, like the "140" in 140/80), is usually thought to be the greatest single risk factor for stroke in a given age group, aside from the presence of cardiovascular disease itself.

Comparing women whose SBPs are one standard deviation *above* the mean to women one standard deviation *below* it (the highest and lowest values at which a woman is still statistically within the "average" range), it's been found that the woman with the higher average-range systolic blood pressure is 1.7 times more at risk for stroke death than the woman with the lower SBP[4]. But the study of Osteoporotic fractures found that low-average vs. high-average BMD *tripled* risk of stroke death. In other words, the risk of stroke death associated with having low-normal vs. high-normal BMD appears to be nearly **twice as great as the risk from being equally far from the statistical average in systolic blood pressure**!

What could account for this connection? The authors of the paper theorized that the reason for the unexpected observation might be indirect. After all, women with osteoporosis often haven't taken proper care of themselves in other ways – like eating a good diet and getting plenty of exercise, the pillars of preventative medicine. So maybe, the researchers speculated, having a low BMD might not actually be a *cause* of the increase in death, but a sort of "marker" for general health status. Women with lower general health, on this theory, are more likely both to have osteoporosis, *and* to die from any particular cause you care to mention – including stroke.

When the researchers tried to factor in other measures of overall health, they found that some – but not all – of the connections disappeared. But **the increase in stroke risk could not be eliminated by accounting for overall health**. And in fact, **the numbers actually get scarier when you adjust for obvious stroke risk factors**. Taking into account known predictors of stroke like age, smoking, synthetic hormone-replacement therapy, diabetes, or even previous strokes, actually *increased* the predictive power of low BMD by an additional 9%!

The Connection Deepens

In a later report[5], the same osteoporosis/stroke death association was again found when the investigators measured the women's bone density at another site in their bodies: as measured in either the heel or the wrist bone, **women with the lowest bone density were 1.83 times as likely to suffer a stroke** as those with the highest bone density. Lamely, the authors concluded that "Most likely, low bone density does not cause stroke; some other process probably results in both osteopenia and cerebrovascular disease." But they were again unable to make the association "go away" after adjusting for numerous other risk factors and measures of general health.

And, in fact, this same group also found[6] that **high blood pressure, the classic risk factor for stroke, is *itself* linked to greater bone loss in women**! The Study's scientific team later looked at the same women's blood pressures, comparing their BP with their rate of bone loss. They found that, after adjusting for other risk factors, hypertension was correlated with bone loss: the faster a woman was losing bone mass, the higher her blood pressure. Women with the lowest blood pressures were losing about 0.34% of their bone mass per year, while women with the highest blood pressures were losing 0.59%. In other words, the faster the rate at which a woman was losing bone, the higher her blood pressure was found to be.

The latest report from the Study of Osteoporotic Fractures[7] once again confirms that women with low bone mineral density are at greater risk of death from many more causes than broken hips. Spinal fractures are the cause of the extreme loss of posture and humped backs in many older women. Women who had just one spinal fracture increased their odds of death from all causes by 23%, as compared with women without fractures. And **women who had the *most* spinal fractures were more than twice as likely to die over the course of the study** than

were women with intact spines. Most frighteningly, spinal fractures often happen in women without triggering any detectable symptoms: about a quarter of women with spinal fractures didn't even know they had them, until the sophisticated radiographic technology used in this study revealed them.

What's going on? What's the connection between fragile bones and death from stroke?

The "K" Factor[13]

The "missing link" which ties thin bones to stroke deaths could very well be the only vitamin to be banned from free and open sale in Canada. **Vitamin K** is found naturally in plants as **phylloquinone (K_1)**, and a closely related molecule with lower biological activity is synthesized by friendly bacteria in the form of **menaquinone (K_2)**.

This essential nutrient is still thought by many to be a simple factor in blood clotting. In fact, when the Canadian government last issued its nutritional reccomendations in 1990[8], blood clotting was the *only* function known for this nutrient. How ironic, then, that it's vitamin K's essential role in maintaining normal blood clotting that led Canada's Health "Protection" Branch (HPB) to ban this nutrient from sale in vitamin and mineral products in Canada. The unreasoning fear is that it might alter the activity of some blood thinning drugs (coumadin/warfarin), which work by interfering with vitamin K's action.

The fact that any such problems can be adjusted for with proper dosing – and that such individualized dosing is usually required *anyway*, because of widely varying individual responses to such drugs – seems to be over the heads of Canada's health Gestapo. So is the fact that their policy actually puts a woman at *greater* risk of problems with her medication.

The danger stems from the fact that, predictably enough, the ban has led many supplement companies to *include* vitamin K in their osteo formulas (in order to ensure that they actually protect women from osteoporosis), but without putting it on the label (in order to avoid having the product confiscated by HPB). Thus, as a result of HPB's regulations, many women are taking vitamin K supplements, but neither they – nor their physicians – know it.

These same regulations have led other companies to let it be *believed* that they have phylloquinone "hidden," unlabelled, in their formulas, when actually there is actually no vitamin K in the product at all. Women who use these products think that they *are* taking vitamin K supplements – when they aren't.

As a result, the warfarin dose a woman needs could be upset by a woman unknowingly changing brands from an osteo formula with undeclared vitamin K to one

without it – or vice-versa. The situation is the ironic, twisted mirror image of the adulteration of moonshine with rubbing alcohol when booze was banned under Prohibition – and is completely predictable. Canada's health bureaucracy has either failed to grasp the implications of their own rules, or is quietly ignoring women's suffering and death in order to preserve its regulatory regime.

But it's not vitamin K's ability to preserve healthy blood clotting that makes so many women want to take it. By now, most health-conscious Canadians are also aware of **vitamin K's crucial role in maintaining bone health**. In the most recent study on the subject[9], Dr. Sarah Booth and colleagues used information collected in the famous Framingham Heart Study to assess the relationship between vitamin K intake and hip fracture. They found that **the people in the study who consumed the least vitamin K were nearly three times as likely to suffer a hip fracture** than were those consuming the most.

What's especially interesting is that **the average person in the *low* vitamin K group was actually consuming only just a little bit less than the 65 microgram Reccomended Daily Allowance (RDA)** for women of average weight: the low-vitamin-K group averaged 56 mcg/day. And, indeed, a previous study[10] on over 72 000 women nurses found that the nurses had to consume more than a **"threshold" level of 109 mcg of vitamin K per day** before fracture incidence was reduced. **The authors concluded that this "suggests the need for a higher vitamin K requirement than the current reccomended daily allowance"**. And just this summer, **a randomized, controlled trial has confirmed that vitamin K from supplements slows bone loss and reduces the incidence of fractures** in subjects with osteoporosis[11].

The Calcium Connection

For the last couple of decades, women have been bombarded with reminders about the importance of calcium for protection against osteoporosis. And clearly, calcium *is* a critical factor in maintaining your bone health. But calcium only helps build a healthy skeleton if it actually gets taken up into your bones. This is where vitamin K comes into the picture. **Vitamin K has only one *essential* function in the body, and this function explains at once its clot-regulating, bone-building, and possible stroke-fighting powers**. Basically, **vitamin K's main job is to regulate calcium** – where it goes, and what it does. **Vitamin K works by "activating"** (technically, "*gamma-carboxylating*") **a family of important**

proteins which bind to calcium in the body, ensuring that it goes where it's needed.

One of these proteins, called **osteocalcin**, is actually the most abundant protein in bones, aside from the **collagen** which gives bones their flexibility. Osteocalcin takes calcium out of your blood and incorporates it into your bone structure, mineralizing and strengthening it. But **osteocalcin requires "activation" by vitamin K to do its job**. Even so, it's a bit stunning to learn that elderly **women whose calcium-binding proteins are the least "activated" are nearly *six times* more likely to suffer a hip fracture** in the next year-and-a-half than women whose osteocalcin is the most "activated"[12].

Thus, while it's important to ensure that you're consuming adequate calcium, bone health is also dependent on vitamin K, which ensures that you'll be able to *use* that calcium to build and maintain strong bones.

But if you're not getting enough vitamin K, the calcium you get from diet or supplements may not be getting into your bones– but it still has to go *somewhere*. So where does it go?

Would you believe: into your arteries?

Low Vitamin K, Hard Arteries

There are two similar-looking words used for age-related dysfunction of the arteries. These two words are often used as if they *were* the same, but they are actually distinct problems. **Atherosclerosis** refers to the artery-choking the buildup of fatty plaque which most people associate with cardiovascular disease (CVD). By contrast, **arteriosclerosis is the *hardening*, but not necessarily the *clogging*, of the arteries**. While atherosclerosis (fatty plaque) does tend to also cause arteriosclerosis (artery hardening), arteriosclerosis can also happen for other reasons. And the number one non-plaque reason for arteriosclerosis is **the formation of artery-hardening calcium deposits**.

Think of the scaly mineral deposits that can develop in a kettle, and you'll have some idea of what's going on in the arteries of a person with calcified blood vessels. When calcium isn't properly incorporated in the bones, it can invade the arteries instead, making them stiff and inflexible. Fortunately, the body has a protein whose job description includes keeping calcium out of the arteries: **matrix Gla Protein, or MGP**.

The vital role played by MGP in preserving the health of your cardiovascular system is illustrated by mice which have a genetic defect which keeps them from making MGP. These mice die from burst blood vessels caused by extensive calcification of their arteries after just eight weeks of life[13a] – the human equivalent of a six-year-old dying of massive arteriosclerosis. And crucially, **this anti-arteriosclerosis protein requires vitamin K "activation" to work**, just like osteocalcin and the other vitamin K-dependent, calcium-regulating proteins we'll meet later in this article. Thus, treating animals with drugs like **warfarin, which block the action of vitamin K, causes a great increase in calcification in arteries** leading out of the heart[13b] and in the rest of the body[13c].

The conclusion is a no-brainer: **low vitamin K levels will greatly increase your odds of arteriosclerosis.** Studies clearly show that **people with low intake**[14] **or blood levels**[15] **of vitamin K are much more likely to have calcium-hardened arteries**. And while a variety of factors are involved in the connection, it's not surprising that **studies *also* show that people with osteoporosis are much more likely to have these calcified blood vessels**[16-19] .

The authors concluded that this "suggests the need for a higher vitamin K requirement than the current recomended daily allowance".

From Hard Arteries to a "Brain Attack"

Stroke is now often referred to as "**brain attack**" because, just as a heart attack is essentially the cutting off of the *heart*'s oxygen supply, so **stroke is essentially the cutting off of oxygen from *brain* cells**. In both cases, the affected cells are starved for the breath of life – and when oxygen is restored, massive free radical damage can occur (this secondary damage is called **reperfusion injury**). The affected cells are damaged or killed, leading to permanent loss of function in that part of the brain or the heart.

"Brain attack" can happen for one of two reasons. In a **hemmoragic, or "bleeding" stroke**, a blood vessel or aneurysm bursts under the force of blood pressure, leading to blood cells literally *drowning* in blood. In a **thrombotic, or "clot" stroke**, an unhealthy blood clot gets lodged in a blood vessel and cuts off the flow of blood to the brain, just like a clog in a pipe. Clot strokes are more common than bleeding strokes – but bleeding strokes when they happen, are much more likely to kill.

Arteriosclerosis is a key risk factor for bleeding stroke, for two reasons. First, **arteriosclerosis raises blood pressure,** both by reducing the ability of the kidneys to regulate blood pressure, and by preventing blood vessels from ballooning

out flexibly in response to the flow of blood. Second, the loss of flexibility induced by **arteriosclerosis makes blood vessels more vulnerable to bursting under pressure**, like an old balloon filled up with water. Arteriosclerosis thus puts blood vessels under more stress from higher blood pressure, creating a perfect recipe for a burst blood vessel. So it makes sense that, by ensuring that calcium goes into a woman's *bones*, instead of into her *arteries*, vitamin K could help prevent this kind of stroke.

Vitamin K preserves the healthy balance of blood-clotting and blood-thinning factors.

Strengthening and Relaxing Arteries

But vitamin K doesn't just prevent blood vessels from becoming *stiffer*. It may also prevent them from becoming *weakened* – thus providing yet another way of protecting arteries from rupturing under pressure. According to a recent review[20a], a poorly-understood, vitamin K-dependent protein called **growth arrest specific protein (Gas6)** "may play a key role in preventing the degeneration of an atherosclerotic [blood] vessel wall."

As well,vitamin K may help to keep blood pressure under control by helping constricted blood vessels to relax. **Vitamin K stimulates the production of nitric oxide (NO) by blood vessels** isolated under test-tube conditions[21]. Not to be confused with *nitrous* oxide, or "laughing gas," **nitric oxide is a major player in helping blood vessels to dialte,** allowing the easy passage of blood. When blood vessels tighten up, blood pressure rises; when blood vessels relax, blood pressure falls. If vitamin K increases the production of NO, it would further explain how this undervalued nutrient helps to keep blood pressure at healthy levels, reducing the odds of bleeding stroke.

Vitamin K Optimizes Blood "Thickness"

Vitamin K may also protect against bleeding stroke through its role in regulating blood coagulation. "Thin" blood increases the risk of a bleeding stroke through the obvious mechamism of increasing bleeding time. Because of this, there's a real risk that **taking blood-thinning drugs like asprin for heart health can backfire – with deadly consequences**. A recent study in the *British Medical Journal*[30] found that, while a small daily dose of asprin could significantly reduce the risk of stroke in persons with *low* blood pressure, **when patients with *high* blood pressure were given asprin daily, their risk of stroke was *increased* by 41%**.

Overall, in fact, risk of all cardiovascular events went *up*, not down, in the high-BP

group. This result is especially alarming when you remember that it's people with high blood pressure who are most at risk from heart and stroke death to begin with, and who are thus most likely to be put on "heart-friendly" anticoagulants. Likewise, a previous report[31] found that physicians taking low-dose asprin, *taken as a group*, did no better in terms of cardiovascular deaths than patients on placebo – while experiencing a 38% higher risk of ulcer. It seems reasonable to assume that the null effect on death rates reflects a higher risk of stroke in physicians with high blood pressure "cancelling out" a lower risk in physicians with low BP.

That explains why vitamin K protected women against *bleeding* strokes. But what about *clot* strokes?

After all, if vitamin K is required for blood clotting, wouldn't it *increase* the odds of a dangerous clot forming? But while blood clotting seems like a simple process, it's actually remarkably complex, involving the interaction of thirteen different protein factors. **Prothrombin**, a protein which is needed for blood coagulation, needs to be "activated" to work, and the blood-thinning drug **coumadin** works by inhibiting the "activation" of prothrombin by vitamin K. But that isn't the end of the story, because **vitamin K also "activates" proteins that are required to *prevent* unwanted blood clots** (such as **protein C and protein S**).

As a result, it's been shown in test tube experiments that, when clot-forming **platelets** are exposed to many of the factors which would normally trigger the formation of a blood clot, **vitamin K actually *reduces* the tendency of platelets to clump together**[22]. And, interestingly, it was found that excessively high levels of calcium could prevent vitamin K from keeping platelets from sticking.

In other words, it's just too simplistic to say that vitamin K is a "blood clotting" vitamin. Rather, vitamin K is a clot-*regulating* vitamin. Vitamin K does not *force* blood to clot; instead, the picture that's emerging is that **vitamin K preserves the healthy *balance* of blood-clotting and blood-thinning factors**, ensuring that clotting can happen when it's needed, but also helping to keep unhealthy blood clots from forming. By optimally regulating blood clotting, then, vitamin K may help prevent a "clot" stroke, just as its calcium-regulating powers can prevent a "bleeding" one.

As we've already seen, women who have osteoporosis are more likely to have high blood pressure[6] and to die of stroke[3,5].

The Vitmain K ban

From the evidence above, it appears that **low intake of vitamin K is the factor linking thin bones with stroke deaths**. Tying this all together, a recent case-control study found that, compared to healthy controls, **stroke patients are more likely to have both low vitamin K levels, *and* bone mineral loss**[20].

How Can Women Get Enough?

Vitamin K is available from a variety of foods, but the only rich sources are **green, leafy vegetables**[32]. A diet rich in foods like **Brussels sprouts, mustard greens, and**

broccoli will contain a good portion of phylloquinone. At the same time, simply eating a lot of these foods is not a solution to the ban on vitamin K supplements. For one thing, **some vitamin K-rich foods (such as spinach and chard) are also high in oxalates**, which are acids which inhibit the absorption of calcium. Thus, while these foods are very healthy and should certainly not be avoided altogether, eating very large amounts of them on a consistent basis is probably not the best way to guard your bone health. **Kale** is an exception to this rule: it's very high in oxalates, and yet its calcium is among the most bioavailable known[26]. On the other hand, there isn't very *much* calcium in kale, so don't give up your milk for kale salad!

For another thing, **your body needs a little fat to absorb vitamin K**. So a large salad, rich in turnip greens and Romaine lettuce, may be jam-packed with the vitamin itself – but if you choose a "healthy" fat-free dressing, your body won't be able to make use of this nutrient. Instead, **choose a "good" fat source as a dressing**, like a vinaigrette made with **olive or flax oil**, or a dressing based on **avocado**. Olive oil may be particularly good at helping the body absorb some fat-soluble nutrients[27].

But diets vary, and much as we try, it's often hard to eat right – even at the best of times. It can be especially hard to get enough vitamin K from our diets. The median vitamin K intake of a full quarter of the Framingham Heart Study participants (56 mcg)[9] was only a little less than the US RDA (65 mcg) – and the study clearly showed that **risk of fracture continued to go down as the subjects ate more and more vitamin K, up to *four times* the RDA for women**, which was the median intake of the top quarter of the study group.

And studies in postmenopausal women[23-25] suggest that **even the best diets may not provide enough vitamin K to optimally support healthy bones and and blood vessels**. The quarter of the population eating the best North American diets, as we've seen, have a median intake of 254 mcg of vitamin K a day – but these studies have shown that, in women whose vitamin K levels are already "normal," adding extra **vitamin K from supplements, in doses as high as *one thousand micrograms per day*, results in additional "activating" of osteocalcin**[24].

One trial[25] was especially careful, preparing meals that ensured that the women in the study were getting 100 mcg of phylloquinone per day in their diets, and then adding a 320 mcg daily supplement on top (for a total intake of nearly *six-and-a-half times* the RDA). This trial reported that **when women increased their total intake of vitamin K to 420 mcg a day, they had 40% more "activated" osteocalcin than did the same women when they were *already* consuming 150% of the RDA!** Since the median intake of vitamin K in the *top* quarter of participants Framingham subjects was "just" 254 mcg, it seems that taking vitamin K supplements may literally save the lives of women who are already eating some of the best diets in their age group.

Also, **some drugs can deplete the body of vitamin K**. Most famously, the blood thinner **coumadin** works *exactly* by preventing vitamin K from doing its job, so that women taking blood thinners may actually become functionally vitamin K deficient. Other drugs that deplete this vital nutrient include **barbiturates** and such antibiotics as **penicillin, tetracycline, declomycin, and aureomycin**. So women taking these drugs may be at particular risk for bone loss, stroke, and arteriosclerosis.

But vitamin K supplements remain illegal in Canada.

Green Foods for Bone Health

Fortunately, the emerging interest in green foods may yet offer a partial solution to this situation. While common green food formulations focus on microalgae such as **spirulina** and **chlorella**, which have low or undefined amounts of vitamin K, other green foods – powders or concentrates of traditional vegetable food sources – can potentially offer a substantial amount of this essential nutrient in a convenient and reliable form. Thus, while the "superfood" spirulina contains very little phylloquinone, many green, leafy vegetables are excellent sources. Better still, by extracting the natural fat-soluble components of these nutrient-rich plants, a superfood extract may be created which is not only rich in **carotenoids, phytochemicals**, and other nutrients of value to general health, but in nutrients of specific value for the maintenance of healthy bone density. Along with vitamin K, such food concentrates are a rich source of **strontium**, a mineral with proven benefits for bone health[28,29], and which is also banned from direct inclusion in osteo formulas.

Such functional foods are a potential interim solution, which could help to

ensure that women get enough vitamin K to support their bone health. But the simple fact is that **Canadian women should have the free choice of which essential nutrients they put into their bodies**. How many deaths – from bone fractures, stroke, haemorrhage, and other, unsuspected illnesses – have HPB's restrictions already caused? How many *more* deaths will have to come before Canadians stand up and demand an end to the madness which claims that the vitamin K found in spinach is a food, but the vitamin K found in a capsule is a drug?

How long until the bureaucrats acknowledge that a woman's body is her own?

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32. See tables from the USDA at http://www.nal. usda.gov/fnic/foodcomp/data/other/pt104.pdf