

How This Liver Enzyme Gets Rid of Harmful Substances In Your Body

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Hello, my name's Lara Pizzorno. I'm the author of "Your Bones," and I'm here to share some information with you that I very much hope will help you to have healthier bones. You may be really happy to learn that this is the last video in our series about the single nucleotide polymorphism that impact how much Vitamin K2 you need and which form, the MK4 form or the MK7 form of Vitamin K2, may work best for you.

So our last SNP or single nucleotide polymorphism video is about an enzyme called cytochrome P450 4F2.

So what is it?

It's an enzyme found in your liver, in the cytochrome P450 family in the phase one system in your liver, that helps you clear out all kinds of substances that your body doesn't want hanging around. Not just vitamins that have already been used, but your own hormones, drugs, environmental toxins, and much more. Humans excrete Vitamin K of both the K1 and K2 forms of vitamin K using a common pathway for elimination in your liver. This pathway begins with the action of the phase one liver detox enzyme, cytochrome P450 4F2.

And in the case of all forms of Vitamin K, after cytochrome P450 4F2 works its magic, the products that result are sent to the phase two part of the liver detoxification process and made water soluble by being combined mainly with glucuronic acid, in the case of the Vitamin K product. So not surprisingly, this process is called phase two glucuronidation. Once these products have been glucuronidated and made water soluble, the **Vitamin K is ready to be excreted**, and it can be put into bile which goes into feces or added to urine and eliminated from your body.

So now you know how your body eliminates used up Vitamin K. If you listen to the other four videos talking about single nucleotide polymorphisms or SNPs that affect how our bodies make use of Vitamin K, by now you will not be surprised to hear that the cytochrome P450 4F2 enzyme doesn't work at the same speed in every one of us. How quickly or how slowly your cytochrome P450 4F2 enzyme works is going to affect the rate at which your body eliminates Vitamin K.

And thus it's going to impact *how much Vitamin K you need* to have healthy bones.

If your genetic inheritance includes a single nucleotide polymorphism or SNP, for a slow version of the cytochrome P450 4F2 enzyme, then you will remove Vitamin K from your body more slowly than the average person, and your needs for supplemental Vitamin K may be lower than those of the average person. And this may also mean that you need a lower dosage of MK7 than the average person does or even that MK4 will be a good fit for you.

If you're taking an older blood thinning medication and you have the slower version of cytochrome P450 4F2, you won't be able to take the MK7 version of K2.

You probably won't be able to take K2 at all, but you will require about one milligram per day higher dosage of blood thinning medication than individuals who have the normal faster version of cytochrome P450 4F2. I'm going to do an entire video on this medication and the issues surrounding it for Vitamin K. But for now just let me tell you that the impact of cytochrome P450 4F2 on Vitamin K excretion was actually discovered by researchers who were trying to figure out why some patients needed a higher dosage of blood thinning medication than other patients did.

Carriers of the SNP or the slower version of cytochrome P450 4F2 required higher doses because their cytochrome P450 4F2 enzyme did not process Vitamin K for elimination as rapidly as normal. So Vitamin K remained in higher concentrations in their livers. The slower version of the cytochrome P450 4F2 enzyme is present in about 30% of us or one out of three of Caucasians and 30% of Asians. But it's only found in around 7% of seven out of 100 of African-Americans.

Carriers of the slower version of cytochrome P450 4F2 are likely to require less Vitamin K than non-carriers to maintain an equivalent Vitamin K status. So genetic testing is available through 23andMe that can be used to determine whether the cytochrome P450 4F2 enzyme that you have inherited is fast, slow, or the average version. The problem with the 23andMe analysis, however, is that all 23andMe is allowed to share with us because the government prevents them from doing any more is to give us the raw data with no interpretation of what it means.

So unless you are both very well informed in the area of genetics and are willing to spend many hours trying to decipher your raw data from 23andMe, it's virtually impossible for us normal people to make sense of the results.

But the *really good news* is that programs are right now being developed that will analyze the 23andMe results for all the most important SNPs related to your bones health, and this information will soon be available to us.

In the meantime, if you want to get some idea of whether you inherited a fast, slow, or average cytochrome P450 4F2 enzyme, then you can get some insight into how quickly yours works by running a commonly available lab that checks what is called your prothrombin time. This is a measure of how quickly your blood forms a clot after a tissue factor that promotes blood clotting has been added to it.

Because there are many different kinds of tissue factors used in this test, the INR or International Normalized Ratio was developed so that we could have a standardized answer. What they do is compare the results of your test, your prothrombin time, with that of a normal control sample. And the ratio of your prothrombin time to the normal control sample is called your INR or International Normalized Ratio. If your INR is at the lower end of the range, this suggests that your blood is more likely to clot more quickly than the average person and this suggests that your excretion of Vitamin K is slower than average. So you may need less Vitamin K than the average person, and you may find that you require a lower dose of MK7 or even that MK4 works well for you. If your INR is normal or at the high end of the reference range, this means that your blood clots more slowly than that of the average person. And this suggests that your Vitamin K levels are lower than average. So MK7 will serve you best and you may even need a higher than average dose of MK7.

I know this has all been very complicated but so are we. Each of us is unique and the more that you can learn about the way that your body functions, the better job you can do of providing what your bones need to be gloriously healthy. My goal is to continue to share with you all the latest scientific discoveries that can help us reach our unique and uniquely beautiful potentials.

Thanks for tuning in, and I do hope this information has been helpful for you.

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