

LPI on Health - 2009 Diet and Optimum Health Conference

Dr. Leon Schurgers, University of Maastricht & Dr. Sarah Booth, Tufts University
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Introduction/Conclusion: Naomi Hirsch, Environmental Health Sciences Center, OSU

Host: Sandra Uesugi, Environmental Health Sciences Center, OSU

Guests: Dr. Leon Schurgers, University of Maastricht and Dr. Sarah Booth, Tufts University

[THEME MUSIC]

HIRSCH: Welcome to LPI on Health, a podcast series to inform you about the recent micronutrient research and events coming out of the Linus Pauling Institute at Oregon State University. For more information, visit our website at <http://lpi.oregonstate.edu>.

[THEME MUSIC]

UESUGI: This is Sandra Uesugi with the Environmental Health Sciences Center at Oregon State University. You've probably heard of the vitamins A, the family of Bs, C, D, E and then we jump to vitamin K. Named for the German word koagulation, spelled with a K, vitamin K has long been known to play an important role in the blood clotting process. For many years, that was believed to be the only purpose of vitamin K in the body.

However, recently, research has revealed that there are many new and still yet undiscovered roles for vitamin K in the body. At the 2009 Linus Pauling Institute Diet and Optimum Health Conference in Portland, Oregon, I spoke with Dr. Sarah Booth and Dr. Leon Schurgers, two researchers working to discover new roles and expand our knowledge of vitamin K.

SCHURGERS: My name is Leon Schurgers. I'm an Assistant Professor of Biochemistry at University of Maastricht in the Netherlands, and I'm doing research there on vitamin K, vitamin K dependent proteins already for 15 years. And that is in the Cardiovascular Research Institute, so my work is mainly focused on vitamin K and cardiovascular disease.

BOOTH: I'm Sarah Booth. I'm a Professor of Nutrition and a senior scientist at the Human Nutrition Research on Aging at Tufts University. I also do vitamin K research, and I do a whole range of vitamin K research ranging from food analysis to the role of vitamin K in the prevention of chronic disease.

SCHURGERS: Well, for many years the studies conducted with vitamin K were only focusing on the clotting system because the proteins, which are vitamin K dependent, were only discovered in the liver, which is synthesized in the liver, and they were the clotting factors. And in the 70s, a protein called osteocalcin was discovered, and in the 80s a protein called matrix gla protein. So at that time, everything concerning the research shifted from the clotting system to what's extra-

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hepatic. And there where the interest in vitamin K for extra-hepatic tissues came from.

BOOTH: I would also add that we're now finding that vitamin K has roles that intriguingly parallel the new discoveries of vitamin D, which always raises the question, "Do they work together?" And where there's a series of studies that have come out that are very, very intriguing that suggest that vitamin K may have a role in regulation of energy, specifically diabetes, there's also some areas of vitamin K research such as inflammation, apoptosis that are really stretching into areas that we fully don't understand. We don't understand the mechanisms but I just think it's an exciting time because I think that the roles of vitamin K are far more expansive, as Leon said, beyond that of clotting.

UESUGI: And you mentioned that, this is something may not know, that vitamin K is actually a family of compounds, not just one.

SCHURGERS: Yes, you have two forms of vitamin K, which is K₁, also called phyloquinone, which is in green leafy vegetables, tightly bound to the chloroplast membrane. And then you have the K₂ which are produced the bacteria so you find them in fermented products. And especially the K₂, it's more popular in research in Asian countries because you find there are a lot of food products, which are fermented such as natto, which is a fermented soybean and very rich in MK-7 whereas the Western diet is mainly containing, let's say, the green leafy vegetable derived K₁. And that is also, of course, and I think that is also Sarah's work, a little bit healthy lifestyle food.

BOOTH: I would also say that there has been a real paradigm shift in our understanding of vitamin K. We're now finding in the body that vitamin K transforms from a dietary form to another form in certain tissues. And similar to the other fat soluble vitamins, and I think that vitamin D, vitamin E, and also vitamin A are also examples and far better characterized, we have metabolites, metabolites that we were unaware of in the past that may have biological roles, be them positive or negative, we don't know. So I think that vitamin K is actually in a place right now where we're seeing a lot of parallels to what's already known for other fat soluble vitamins.

UESUGI: You mentioned the fermented foods. Is it present in tempeh?

SCHURGERS: Um, no.

BOOTH: It's not. We um...no...

UESUGI: It's a little more palatable than natto...

BOOTH: [laughs]

SCHURGERS: It depends on the bacterial strain.

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BOOTH: I wanted to add a comment about the foods that dovetails Leon's presentation earlier. Some of the work that Leon and his colleagues are doing in the Netherlands is being driven by your diet...

SCHURGERS: Yes.

BOOTH: ...which includes these highly fermented cheeses. And we don't see parallels in North America. And it's not because of the biology or physiology is different. It's just as a general rule, North Americans do not eat fermented, a lot of these cheese.

UESUGI: What types of cheese are they?

SCHURGERS: Well, you eat more of the processed cheese.

BOOTH: Yes, processed cheese, which has less of the fermentation.

SCHURGERS: Yes.

BOOTH: Hence, less of the menaquinones. So it's very difficult to replicate.

SCHURGERS: Yes.

BOOTH: This is a classic example of something that is very regional based on the diet such as natto and MK-7.

SCHURGERS: Yes. It's actually the Swiss cheese or the Jarlsburg cheese, which is a Norwegian cheese, or the Dutch cheeses, which are very rich in MK-7, 8 and 9. And also some curd cheeses. It doesn't necessary need a lot of fat in it, for example, because cheese is also not very good for you because it contains a lot of saturated fat. So if you go to the curd cheese, which is also very popular in France, they're very low fat, and they are very rich in menaquinones. Still the contribution to the vitamin K of the diet is limited.

UESUGI: I wanted to ask you to comment on green leafy vegetables. I know that people who are on blood thinners and anti-coagulants are discouraged from consuming too much because then that would negate the role of their anti-coagulants.

BOOTH: That actually is not true anymore. I think that's a very historic perception of the recommendations. I...um... Historically people were advised to avoid all forms of vegetables...

SCHURGERS: Yup

BOOTH: ...because people really didn't know who much vitamin K was in the diet. Now the current recommendations are to maintain a constant intake of vitamin K. Work we've done with collaborators at the University of Pennsylvania and also in

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Brazil, what we found is that the absolute intake of vitamin K is not critical because you titrate that warfarin dose relative to the clotting time very quickly.

SCHURGERS: Yes.

BOOTH: What is critical, if somebody goes on a weight loss diet because all of a sudden they're on anti-coagulants for health indications and they start eating lots of vegetables and then they grow tired of it and then they stop, that's where you may have potentially these fluctuations. It is prudent to recommend certain green leafy vegetables over others. For example, spinach has a wide range of vitamin K contents depending on the cultivar, how it's processed, etcetera. And that, we're talking 3-4 fold. Whereas a vegetable such as broccoli, peas, very constant so it falls into that range. So I think that actually there's greater recognition in the medical community that you can't avoid green leafy vegetables.

SCHURGERS: But I agree that the medical community is still stuck with the rules saying, "Avoid all K-rich food items." And that is absolutely not true.

UESUGI: Hopefully your work will help change those recommendations.

SCHURGERS: I would agree with Sarah. I think, if you have a higher intake, the fluctuations are less in the high amount.

UESUGI: And you mentioned that the vitamin K community, the experts in the vitamin K community is very small. Is that because it's relatively newer?

SCHURGERS: Well, up till now it had only one specific function and that is the carboxylation. I think that most of that is known. And nearly all the people working on vitamin K are either retired or on retirement or nearly retired.

UESUGI: Do you see a growth in research in this area?

SCHURGERS: Yes, especially particular to vitamin K dependent proteins. Maybe.

BOOTH: I agree. I think that one of the stumbling blocks for vitamin K historically is that people took the stance, "Well, vitamin K is required for clotting. Healthy adults don't have bleeding problems, so this is not a nutrient that we really need to study." I would actually go beyond what Leon is saying about the vitamin K dependent proteins. I think that we're going to discover a lot of roles for vitamin K that have nothing to do with its role as an enzyme co-factor. And I would also say that the nutrition community does tend to be quite fickle and trendy. And this is the decade of vitamin D. I think we've had a decade of vitamin E. I think we have trends. I think it's reflected in the funding opportunities and you know, I think if we hang around long enough, vitamin K will be the next trend!

SCHURGERS: Yes!

UESUGI: Your time, your spotlight will come!

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BOOTH: [laughs] And I think that the more people who could get excited about vitamin K, the faster that will happen. We just don't have a critical mass in the vitamin K research community.

UESUGI: Well, thanks for paving the way. Thank you very much for taking the time to talk and good luck.

BOOTH: Thank you!

SCHURGERS: Thank you!

[THEME MUSIC]

HIRSCH: Thanks for tuning in. This podcast was produced in collaboration with the Environmental Health Sciences Center with funding from the National Institute of Environmental Health Sciences.

On behalf of everyone at the Linus Pauling Institute, we wish you optimum health. Have an awesome day!

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