Vitamin D

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Host: Welcome to AACE's Bone Resource Center Podcast Series. This podcast series is intended for endocrinologists and other interested clinicians that treat patients with bone disorders. Each podcast will feature experts in the field discussing diagnosis and management of different bone-related disorders.

Dr. Elizabeth Holt: Hello. This is Dr. Elizabeth Holt. I'm a private practice endocrinologist in Raleigh, North Carolina and today I'm interviewing Dr. Vin Tangpricha who is a Professor of Medicine at Emory University in the Division of Endocrinology.

He's also on the Board of Directors for AACE and ACE where he's a fellow and he has a PhD on vitamin D where he studied with Dr. Michael Holick at Boston University. And we're here to talk to him today about vitamin D. Welcome, Dr. Tangpricha.

Dr. Vin Tangpricha: Thanks, Dr. Holt, for having me on this podcast.

Dr. Elizabeth Holt: You're welcome. So, let's talk about vitamin D. So, what is vitamin D?

Dr. Vin Tangpricha: Well, actually, vitamin D isn't really a vitamin despite its name. It's actually a steroid hormone. It was, unfortunately, named a vitamin about 100 years ago because they actually didn't know what the chemical structure was and it was the next vitamin to be named after vitamin C.

And they knew it was important for bone but they didn't know what the compound really was and it wasn't until much later that we found out it was a steroid hormone. If you look at the structure of vitamin D, it has the steroid backbone and actually vitamin D even has its own nuclear steroid receptor.

So, in fact, what's named a vitamin D is really a hormone and that's why us endocrinologists are very interested in this.

Dr. Elizabeth Holt: And that's why we're having the podcast. Well, thank you. So, let's talk about vitamin D deficiency. Is that truly a disorder that we need to be worried about?

Dr. Vin Tangpricha: I think so. I mean, vitamin D deficiency is still a condition that exists today. I know the situation is getting better as the message is going out that vitamin D is important for bones and maybe other health issues.

But we really figured out that vitamin D deficiency was a major problem, especially in nursing home and institutionalized patients in the early 1990's when rates of vitamin D deficiency were very high, maybe in the 60% to 90% of residents in nursing homes and institutions had low vitamin D levels.

Dr. Elizabeth Holt: Why would that be? Why was there such a high rate of vitamin D deficiency in that population?

Dr. Vin Tangpricha: Well, back then in the 1990's there was very little vitamin D supplementation. I remember when I was a fellow and I'd go to our local pharmacy there would be very little that you could buy over the counter. But nowadays you can buy vitamin D in many different dosages from over the counter or mail order sources.

And so, I think over the past 20, 30 years the message has gone out that vitamin D is important and I think that's why the levels have gradually come up. It's not perfect for everyone; there's still pockets of populations that have low vitamin D status, but in general I think the population has improved to some degree.

Dr. Elizabeth Holt: Can't we get vitamin D from some food sources?

Dr. Vin Tangpricha: Well, there's very few foods that Americans eat on a daily basis that have vitamin D naturally. The foods that have vitamin D naturally are like your fatty fish: salmon, mackerel; mushrooms if they're eradiated have vitamin D. But there's very few other foods unless they're fortified—like milk, yogurt, cereal—that have vitamin D.

And so, if you actually look at the daily American intake of vitamin D, it's actually very low, even below the recommended daily allowance for vitamin D.

Dr. Elizabeth Holt: So, should we be screening people for vitamin D deficiency?

Dr. Vin Tangpricha: Well, that's a very controversial question because we know that a large proportion of the US population is low in vitamin D and you could probably ask a few questions looking for risk factors, like: Do you take any vitamin D-containing foods? Do you go outside much in the sun?

And if they answer no to many questions, then they're probably going to be low on vitamin D. So, many people have advocated just to give them vitamin D rather than screen for it because you know it's probably going to be low.

Dr. Elizabeth Holt: What's a normal vitamin D level?

Dr. Vin Tangpricha: This is somewhat of a moving target and when we say vitamin D level, we mean a 25-hydroxy vitamin D; that's the major, certainly, form of vitamin D. And so, there's two camps on this: the AACE and Endocrine Society believes that 30 nanograms per milliliter should be considered a normal or healthy level for vitamin D status. There is another group, The Institute of Medicine, that believes that 20 nanograms per milliliter is sufficient.

There's slight differences between the two groups: the Endocrine Society and AACE are more focused on people seeing healthcare providers. So, those societies are more focused on people that might be having osteoporosis or other health conditions; whereas, the Institute of Medicine is making guidelines for the general population and they believe that 20 is a good level to prevent most health concerns in the US population.

Dr. Elizabeth Holt: So, if you diagnose vitamin D deficiency whether you go with 30 or 20, what do we do? What are the consequences, first of all?

Dr. Vin Tangpricha: Well, if you have a low vitamin D level, below 25-hydroxy vitamin D level, you are at risk for developing issues related to bone. Now, in children, if you have a low vitamin D level, you would be at risk for developing rickets and we're talking about very young children who may be breastfeeding and mother might be insufficient in vitamin D, so they're not getting any vitamin D from the breast milk and being exposed to sunlight. These children are at risk for rickets and stunted bone growth.

Adults who develop low vitamin D develop a condition called osteomalacia which is a condition where you don't have enough mineral in the bone due to inadequate vitamin D-mediated absorption of calcium and so you have

something that manifests as bone pain and that could eventually develop into osteoporosis.

Dr. Elizabeth Holt: So, how do we treat vitamin D deficiency?

Dr. Vin Tangpricha: Well, the simplest thing to do is to increase either intake of vitamin D-containing foods or to take a vitamin D supplement. In the United States, many of us don't get much sunlight exposure mostly because of our lifestyle. So, it might be just easiest to take a vitamin D supplement.

Of course you could try to go outside to get more sunlight, but there are times of the years that there just isn't enough sunlight from, I would say, November to March or so for most of North America. You're not going to get much UV light that converts vitamin D in the skin. So, that may not work year-round.

So, the simplest thing is most people just take a vitamin D supplement and there's a simple rule of thumb many people call the Heaney rule named after a Bob Heaney through Creighton University.

So, if you increase your vitamin D one nanogram per milliliter, you have to take an additional hundred International Units of vitamin D. And so, that's a good rule of thumb. So, if you're at 20 nanograms per milliliter and you want to go to 30 grams per milliliter, that's a 10 nanogram per milliliter change. So, you would have to take 1,000 International Units of vitamin D to move from 20 to 30.

And I sometimes use that in my practice too to give me an idea how much vitamin D I need to give a patient to improve their vitamin D status.

Dr. Elizabeth Holt: So, that's a daily dose, an extra 1,000 a day?

Dr. Vin Tangpricha: That's a daily dose and that's on top of what people are already taking. So, if someone's already taking 1,000 units of vitamin D and their 25-hydroxy vitamin D is 20 and you want to move them to 30, they would have to take another 1,000 units of vitamin D on top of their 1,000. So, their total daily supplementation would be 2,000 International Units.

Dr. Elizabeth Holt: And when they get to a level of 30, can they then go back to 1,000 units a day?

Dr. Vin Tangpricha: That's a good question. I believe they can, but they probably need to be rechecked again. It also depends on the season as well; what they might take in summer might differ from what they take in winter. They may need more in winter compared to summer.

Dr. Elizabeth Holt: What about intermittent high dosing of vitamin D? I have some patients who like to take 50,000 units once a month so they don't have to do a daily pill.

Dr. Vin Tangpricha: So, there's been many studies looking at intermittent high-dose vitamin D and that refers to either weekly, monthly or even quarterly high-dose vitamin D given as 50,000 or more units of vitamin D.

Recently there's been a controversy about this. There were two large studies published showing that intermittent high-dose vitamin D might promote falls. One study that was mostly quoted is a study that was done looking at elderly patients who were given a single bolus dose yearly of vitamin D and over a three-year period they seemed to have more falls than those receiving placebo.

We don't really know why that occurs. Maybe the up-and-down level 25 D has some effect on muscle function or some people feel obviously the intermittent dose, if you're giving less frequently than a month, that they're only protected for a few months, especially if you give the yearly dosing and the rest of the year they're low and maybe that's not a good thing and that might promote falls.

So, I don't think we really know why intermittent high-dose vitamin D might result in falls and so I think the field is moving towards a daily supplementation now.

Dr. Elizabeth Holt: What's the role of vitamin D supplements in people who have osteoporosis?

Dr. Vin Tangpricha: Well, the AACE osteoporosis guidelines recommend giving vitamin D to patients especially if they have low vitamin D status because of the importance of vitamin D on bone. We know that vitamin D improves the efficiency and absorption of calcium in the intestine. And so, it seems very reasonable that a target of 30 nanograms per milliliter for 25-hydroxy vitamin D would result in more efficient calcium absorption.

There have been a few studies, early studies, conducted in elderly patients with osteoporosis showing a benefit of calcium plus vitamin D compared to placebo reducing the risk of fractures. These were two studies published by Bess Dawson-Hughes from Tufts in the early 90's, both published in *The New England Journal of Medicine,* showing a fracture benefit.

But more recent studies haven't been able to demonstrate efficacy and that's for many reasons. I think that in the early 90's, as I said, many people had very, very low vitamin D status, but nowadays I think the 25-hydroxy vitamin

D has gradually increased and we don't really see the strong benefits for people who have adequate vitamin D status. And so, I think with any nutrient, it only helps people who are low in vitamin D.

Dr. Elizabeth Holt: There's a threshold effect for vitamin D, isn't there?

Dr. Vin Tangpricha: I think so. But I think above 30 is more than adequate to reach that threshold for most people with osteoporosis and I think it's still reasonable to try to shoot for that goal.

Dr. Elizabeth Holt: So, once you've treated somebody for their vitamin D deficiency, what's the role of ongoing monitoring of vitamin D levels?

Dr. Vin Tangpricha: Once you've got a patient up to a 30 nanogram per milliliter cutoff for 25-hydroxy vitamin D, I think you have to make sure their ongoing supplementation is going to keep them there. And one simple trick that I do is just check a 25-hydroxy vitamin D at the lowest point of the year which is typically in a winter.

And so, if at the end of winter, roughly around March or April, their 25-hydroxy vitamin D is above 30 and they're on a daily vitamin D supplement, I feel comfortable that that daily dose is going to keep them sufficient all year round just because we know that levels will tend to rise during the summer and fall. And so, what I'm really doing is protecting the dip that people see seasonally, especially during the dark months.

Dr. Elizabeth Holt: And will you continue to monitor that annually?

Dr. Vin Tangpricha: As a consultant I will, I mean, check a 25-hodroxy vitamin D to ensure it's sufficient, especially with patients with osteoporosis. I think for the

general population I don't think that is recommended because the benefits of vitamin D supplementation for those generally healthy people have not been as established and the data is much more stronger for people with established diseases like osteoporosis.

Dr. Elizabeth Holt: Well, that's all very interesting. Do you have any last words for people today?

Dr. Vin Tangpricha: Well, I think if people can just remember that vitamin D is still important for bones, it works best for those who are severely low in vitamin D status, it may have benefit for those at higher levels, but I think 30 nanograms per milliliter is a reasonable cutoff to shoot for.

There's still a lot of research going on in vitamin D, looking at vitamin D in other conditions. So far the data is mixed. There was a recent paper published in *The New England Journal of Medicine* called "The VITAL Study" that didn't show benefit of vitamin D on cardiovascular outcomes.

But I just want to make sure the audience understands that vitamin D is definitely important for bone; whether or not it's good for other conditions, we'll have to wait and see the results of some upcoming trials.

Dr. Elizabeth Holt: So, the jury is still out there.

Dr. Vin Tangpricha: Yes.

Dr. Elizabeth Holt: Well, thank you for your comments.

Dr. Vin Tangpricha: Well, thank you for having me and I hope the audience enjoyed our conversation today.

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Host: Thank you for listening to AACE's Bone Resource Center Podcast Series. You may find more information and resources about the diagnosis and treatment of bone-related disorders on AACE's Bone Resource Center along with a transcript of this podcast.

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