

Diet and Skin Health
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Zoe Draelos, MD, FAAD, interviewed by Elisa Gallo, MD, FAAD

TODD E. SCHLESINGER, MD, FAAD: This episode has been sponsored by the Almond Board of California. Hello and welcome to *Dialogues in Dermatology*. I am Dr. Todd Schlesinger, your Editor-in-Chief. We have another exciting podcast for you today. We hope that you enjoy.

ELISA GALLO, MD, FAAD: This is Dr. Elisa Gallo for *Dialogues in Dermatology*. And today, we're going to be interviewing Dr. Zoe Draelos, from Dermatology Consulting Services in High Point, North Carolina. Welcome, Dr. Draelos.

ZOE DRAELOS, MD, FAAD: Thank you very much.

ELISA GALLO, MD, FAAD: Today, we're going to be talking about a very interesting topic: nutraceuticals and how it relates to skin, hair, and nail supplements for our patients. Dr. Draelos, please tell us how you got involved in this area.

ZOE DRAELOS, MD, FAAD: Well, I had a lot of patients come to my clinic and ask, "What kind of vitamins should I take? You know, I don't feel like my hair is as thick as I would like it. Is this bottle of vitamins good?" And then I ventured into a vitamin store and realized that there are shelves and shelves of supplements for skin, hair, and nails. There are more hair, skin, and nail supplements than anything else. And so as I waded down the aisle and looked at all these bottles, I realized that dermatologists really need to know what's in the supplements, what's necessary, can diet be adjusted to include some of these materials that are necessary, and how do you make a recommendation?—

--Certainly, there has to be some type of logic, some rationale for how you counsel your patients. So this talk on nutraceuticals was really aimed at providing that advice for the practicing dermatologist.

ELISA GALLO, MD, FAAD: I'm looking forward to hearing more about what you recommend. Because, as you said, it is overwhelming to see what is out there. And I think that if we can help our patients hone in on what is factual versus advertisements that they really don't need to be focused upon, that would be helpful to them.

ZOE DRAELOS, MD, FAAD: The first thing that's out there that's relatively new are collagen supplements. So collagen supplements are hydrolyzed collagen and this collagen actually came from the Orient. The whole concept actually came from the Orient, whereby people were boiling pigs' feet and chicken feet and eating the collagen. So now, you can buy collagen powder. Of course, the skin, hair, and nails are pure protein. So the idea is that the collagen supplement provides the raw materials that are necessary and the building blocks for skin, hair, and nails.—

--However, you can get this from any source of protein. But a collagen supplement might be worthwhile for people that have difficulty with digestion. For example, if there are stomach acid issues, if they've had some of their gut removed, indeed a collagen supplement, where you have hydrolyzed collagen, might be more easily absorbed. But for the normal individual, it is not necessary to take a collagen supplement. Then the other supplements that are out there are really vitamin supplements.

ELISA GALLO, MD, FAAD: Dr. Draelos, I'd like to further evaluate with you the vitamin supplements that are available and what your recommendations are in terms of which vitamins, or in certain cases food sources, would be good for skin-related issues.

ZOE DRAELOS, MD, FAAD:

It might surprise you that the most concentrated vitamin that's present in skin, hair, and nail supplements is vitamin A. Nothing special, vitamin A is certainly necessary for vision, skin health, activities of immune function, and gene transcription. We also know that retinoic acid regulates gene transcription by bonding to the nuclear retinoic acid receptors. But actually, you don't need to take a skin, hair, and nail supplement for this, you can just eat two-thirds of a cup of carrots every day.—

--The second most common vitamin in skin, hair, and nail supplements is actually vitamin C, ascorbic acid. And of course, it's very necessary for tissue repair and collagen. But you don't need to take a skin, hair, and nail supplement to get that. You basically can get that by eating a cupful of tomatoes daily or a handful of cherry tomatoes. So if you like tomatoes, it isn't necessary to take a skin, hair, and nail vitamin for either vitamin A or vitamin C.—

--The third vitamin that's usually found in skin, hair, and nail vitamins is vitamin D. And it's interesting that vitamin D really isn't a vitamin, it's a sex hormone. And the amount that's usually present in these vitamins is somewhere between 400 and 800 international units. Well, that's not enough for most people, especially a postmenopausal woman, where at least 2,000 international units is necessary. And vitamin D is really hard to consume in a diet, so it is best to take a vitamin D supplement.—

--But then dermatologists really should be following vitamin D levels in their patients, and getting serum vitamin D levels, and continue to increase the dosage of vitamin D supplementation exogenously, until people get into the normal range.

ELISA GALLO, MD, FAAD:

That's a very important point, especially considering how much we recommend sunscreen and would prefer our patients to use their sunscreen to prevent skin cancers, as opposed to getting vitamin D from the sun.

ZOE DRAELOS, MD, FAAD:

Absolutely. Vitamin D supplementation is a reason to take a vitamin. If you choose to take a skin, hair, and nail supplement with vitamin D, that's fine. But probably, especially if you're a postmenopausal woman, where most of the vitamin D deficiency signs and symptoms are postmenopausal symptoms, such as depression, hair loss, lassitude, myalgias, arthralgias, all of those have been shown to be linked to vitamin D. So in postmenopausal women, very necessary to take vitamin D, because remember it's a sex hormone.—

--Remember that the recommended daily allowances were arrived at by consensus, they weren't arrived at by fact. So the amount of vitamin D that was recommended was basically to prevent rickets. And certainly, we don't see people walking around with bowed legs. But on the other hand, we see people who are really having trouble with postmenopausal symptoms and vitamin D supplementation can be very important for that reason.

ELISA GALLO, MD, FAAD:

Thank you for that. What do you think about vitamin E?

ZOE DRAELOS, MD, FAAD:

Vitamin E is an interesting vitamin because it is the primary antioxidant in the skin. So vitamin E is present in the skin. It donates an electron to a reactive oxygen species and quenches that reactive oxygen species, so it doesn't damage collagen and elastin fibers. Once vitamin E has donated that electron, however, it no longer has any more electrons to donate. And that's why vitamin C is so important. It's a secondary antioxidant. It's easier to consume in the normal diet.—

--So vitamin C donates an electron to vitamin E, which donates an electron to quench the reactive oxygen species. Vitamin E can be difficult to eat in a diet. However, olive oil is very high in vitamin E and so are avocados. Avocados are one of the most perfect vitamin supplements that occur naturally. If you eat a quarter to a half of a raw avocado every day, you will get all the

vitamin E that is necessary. So vitamin E does have a role in skin health and should be either consumed in the diet or taken in a vitamin source.—

--Alpha tocopherol is the most biologically active, however gamma tocopherol is the most common in the Western diet. So it is important to be sure that when you're eating vitamin E that you get balanced tocopherols.

ELISA GALLO, MD, FAAD: Thank you for that. Let's move on to vitamin B. Now, in the vitamin B family, we have many options to discuss. But thankfully, we can find most of them in a grouping of foods. Can you tell us a little bit about that?

ZOE DRAELOS, MD, FAAD: The B vitamin family is indeed quite large. It includes many different things: thiamine, riboflavin, niacin, and pantothenic acid, pyridoxine. But I want to pull out biotin which is vitamin B7, and folic acid which is vitamin B9. These are found in skin, hair, and nail vitamins in higher concentration, especially folic acid. So folic acid is important for the reproduction of DNA, RNA, and red blood cells, and that's how it's sort of linked into skin, hair, and nail health.—

--But interesting enough, folic acid is very high in avocados. So that quarter to a half of an avocado we discussed earlier will also provide the folic acid you need. One vitamin that's received a lot of attention in skin, hair, and nail vitamins is biotin, also known as vitamin B7. Now, biotin has no recommended daily allowance established for it. Biotin deficiency basically has been associated with poor nail and hair growth.—

--The idea of giving biotin for nails actually came from the veterinarian literature, whereby they would give biotin to racehorses, to prevent their hooves from splitting. Because if the racehorse's hooves split, this valuable investment would be worthless. So biotin supplementation was used for horses and from there, it was adapted to the nails of humans.

Almonds are an excellent source of biotin, as well as eggs. So you can eat a handful of nuts or one egg per week.—

--Indeed, biotin has been associated with problems with hair, as well. The relationship is not that well established. There aren't a lot of good studies on biotin supplementation in humans. But sort of by association, biotin is found in almost all skin, hair, and nail vitamins.

ELISA GALLO, MD, FAAD: And what dose do you typically recommend?

ZOE DRAELOS, MD, FAAD: There is no recommended daily allowance for biotin, no one really knows. But a handful of almonds will certainly take care of it. If you look at the vitamins themselves, they contain about 5,000 mcg of biotin, and that is 1,667% of the recommended daily allowance, if that gives you any idea. So biotin supplementation is that ingredient that is many in excess of what the, quote, recommended daily allowance is.

ELISA GALLO, MD, FAAD: So being that it is a water soluble and not fat soluble vitamin, we can anticipate that any excess would simply be excreted?

ZOE DRAELOS, MD, FAAD: Yes. That is a comment that's been frequently made and I'm glad you brought that point up, that buying expensive vitamins and taking a lot of them could make very expensive urine.

ELISA GALLO, MD, FAAD: Let's go on to discuss some of the trace minerals that are important for skin function.

ZOE DRAELOS, MD, FAAD: Yes, we know that metals are very important in the skin. The matrix metalloproteinases require zinc and calcium. And also within

the skin, there is an alternate antioxidant pathway that's independent of vitamin C and vitamin E that's dependent upon selenium. Much of the minerals that are consumed in the diet of a typical U.S. citizen comes from the bread that they eat. And the minerals are found in the Midwest in the wheat that is grown.—

--But new methods of farming have led to the removal of more of the wheat and less plowing back in of the stalk. So if you look at genetically modified wheat, the stalk is very large but the head of the wheat is even larger. So when you take the grain out, and they make the grain head so large, the stalk has to be thicker but shorter, otherwise the wheat would fall over and rot in the fields.—

--So proportionally more of the material is being removed from the growing area and so we're now seeing mineral depletion in the flower. So for that reason, trace minerals are something that you might consider taking. They are valuable and can be easily supplemented. They're found in most multivitamins with minerals. Or, if you choose not to take a supplement, Brazil nuts are very, very high in selenium. And one Brazil nut a day will provide all the antioxidant selenium you need for that antioxidant protection of the skin.—

--Avocado, believe it or not, is very rich in many trace minerals. Usually, the trace minerals contain copper, magnesium, molybdenum, manganese, iron, and chromium. However, you could also get these by taking a vitamin supplement with trace minerals.

ELISA GALLO, MD, FAAD:
avocado, we're in good shape.

Well, it sounds like as long as we eat an

ZOE DRAELOS, MD, FAAD:

Avocado provides vitamin E, it provides folic acid, it provides vitamin C, and it provides some biotin, as well. So it really is the perfect fruit. So if you eat two-thirds of a cup of carrots, if you eat one raw tomato daily, if you eat half a

raw avocado with a little olive oil on it, a handful of almonds, a Brazil nut, some chicken and fish, and then some antioxidants, you've got it covered.—

--But here is where the skin, hair, and nail supplements really differ is in the antioxidant realm. So the most important antioxidants are basically botanicals. And many of those are found in special proprietary blends and that's what gives distinction between the various skin, hair, and nail vitamins. However, you can get all the antioxidants you need from one cup of fresh blueberries and one unpeeled apple in the diet.—

--But ashwagandha root, saw palmetto, stinging nettle, and other botanicals are commonly found in these vitamins, in order to provide some unique distinction in the marketplace.

ELISA GALLO, MD, FAAD: Can you comment on resveratrols? That has been highly acclaimed in the market recently, as well.

ZOE DRAELOS, MD, FAAD: Resveratrol is a very potent antioxidant. It's felt to be the reason why drinking a glass of red wine every day is advantageous. So it is used by many people for antioxidant purposes. Other antioxidants that are commonly put in skin, hair, and nail supplements are things like organic horsetail leaf. Also very high in antioxidants, organic red clover.—

--Another root known as ashwagandha, which is used in the Ayurvedic medicine quite a lot, and this root is found to decrease circulating cortisol levels and has been felt to reduce skin, hair, and nail problems related to stress. So you'll see a lot of people recommending ashwagandha root in skin, hair, and nail supplements to alleviate stress-induced hair loss. It also is supposed to contain botanical antioxidants that have been touted to delay hair graying.—

--And so that's sort of the literature behind ashwagandha but there are no double-blind medical studies to date confirming its value in hair health.

ELISA GALLO, MD, FAAD:

Can you comment on the serums that are available versus oral supplementation for such things as vitamin C?

ZOE DRAELOS, MD, FAAD:

There are a number of serums, especially for skin health, where people apply vitamin C and claim it has antioxidant effects on the skin. The challenge with vitamin C topically is that remember, vitamin C is a light and oxygen-sensitive vitamin. And so when the vitamin C gets put on the skin, it's directly exposed to light and oxygen. So it's rather controversial as to how much vitamin C actually reaches the dermal compartment, where oxidation occurs.—

--So vitamin C has to penetrate quite a long way in order to become biologically active. Then it really has to stay in the viable layers of the skin long enough to exert an antioxidant effect. So probably if you're looking for oxidative protection, you really should consume the vitamin C orally. And cosmeceutical vitamin C sources should be used more as agents to improve skin moisturization, instead of actually vitamin C supplementation.—

--And also I should mention, vitamin C is used a lot of times to adjust the pH for products, because it's also known as ascorbic acid. And vitamin C can also be used as an antioxidant preservative for other oxidative substances that are present in the solution that need to be protected from oxidative damage. So it may not be a vitamin protection for the skin, it might be a preservative for the product or it might be inactive altogether in the bottle.

ELISA GALLO, MD, FAAD:

Wow, very interesting. I know that there is quite a market for these serums and they happen to be very expensive. Are there any in particular that you recommend that patients consider, any serums? Or is a moisturizer sufficient? Or do you feel that there's a particular moisturizer that would be good for certain age groups? Do you distinguish between a younger person versus someone who, for example, is postmenopausal?

ZOE DRAELOS, MD, FAAD:

Yes, there are definitely different needs for postmenopausal skin, because most women experience dry skin postmenopausally. Cosmeceutical serums are usually applied prior to use of a moisturizer. And the serum is designed to be a very simple formulation, to bring vitamins and other actives that are put into the cosmeceutical to the skin. They're usually a very thin liquid.—

--So you can make a very potent antioxidant blend. One example that's commonly used is vitamin C, vitamin E, and ferulic acid. And that is a very commonly used serum that's applied to the skin first. It provides basically a vehicle to deliver vitamins to the skin surface and the moisturizer is then put on top. Serums can also be used for exfoliant purposes. For example, you might have a serum that contains lactobionic acid, glycolic acid, and lactic acid. You then put a moisturizer on top of it, so what you basically get is sloughing of the skin surface, exfoliation without irritation.—

--Another common serum that's used is retinol serum. So here what you're trying to do is to activate the retinoid receptors with retinol. And retinol can be converted in the skin into retinaldehyde and from retinaldehyde to retinoic acid, better known as tretinoin. So retinol serums can provide weak benefits as compared to tretinoin but can activate the retinoid receptors, thus inducing some of the anti-aging benefits that we associate with topical retinoids.

ELISA GALLO, MD, FAAD:

Very interesting. So given all of this, are there any particular favorites that you have in terms of moisturizers?

ZOE DRAELOS, MD, FAAD:

I think a moisturizer is basically a way of creating an environment for barrier repair. And people who, for example, are using acne medications may have barrier damage due to benzoyl peroxide, due to the use of retinoids. So in this person, you're basically looking for an oil-free moisturizer, to just basically smooth down the skin scale that has been irritated by benzoyl peroxide or retinoids.—

--So an oil-free moisturizer would work very well in that case. And those are usually dimethicone-based. They're non-comedogenic, non-acnegenic, and can smooth down skin scale related to retinoid irritation. Another example would be an individual, for example, that has atopic dermatitis, has defective filaggrin breakdown. And this person might benefit from a moisturizer based on something known as the natural moisturizer factor.—

--The natural moisturizer factor is that collection of ingredients that is the body's own moisturizer. And it includes urea, lactic acid, vitamins, some proteins, PCA, sodium pyrrolidone carboxylic acid. And so those ingredients together give a therapeutic moisturizer, in addition to urea and lactic acid. So that would be a therapeutic moisturizer that might be useful for someone who has filaggrin breakdown products, dry skin because of that.—

--Then you have your people who are in the more mature, postmenopausal realm that have dry skin, but may also have further skin irritation from the use of anti-aging products. That type of person might benefit from a ceramide-containing moisturizer. Probably a cream would work better at night, creams have a higher concentration of moisturizing ingredients. Glycerin is a very potent ingredient to use in the postmenopausal woman, because glycerin actually modulates aquaporin channels.—

--Aquaporin-3 is the most common aquaporin in the skin and it controls the osmotic balance between the intracellular environment and the extracellular milieu. So glycerin, along with water, is transported through aquaporin-3 channels, thus glycerin has abilities to moisturize the skin that extend beyond the time it's actually present on the skin, because it works through this aquaporin mechanism.—

--That, coupled with ceramides, because ceramides are the first substance that's produced when there's barrier damage. First thing that happens when the barrier is damaged when repair is initiated is a burst of ceramide production. And you actually can show that some of the

synthetic ceramides, especially ceramide 8, can actually be found in and amongst the stratum corneum. The message for barrier repair is increased transepidermal water loss.—

--You don't want to put Saran wrap or some type of occlusive mask over your face because, unless transepidermal water loss, is increased barrier repair does not occur. So many of the masks, the very occlusive masks, the gel masks, will moisturize quite nicely immediately when you take it off because the skin is over-hydrated, but in a matter of hours transepidermal water loss will return to its pre-mask state, and the wrinkles that had been over-hydrated will return.—

--So allowing a small amount of transepidermal water loss is key to allowing barrier repair to occur. And that's what a moisturizer is supposed to do: retard transepidermal water loss until barrier restoration through healing is accomplished.

ELISA GALLO, MD, FAAD:

I can't thank you enough for giving us a summary of the nutraceuticals, the vitamins, minerals, antioxidants, and potential ways to keep our skin healthy. In summary, is there anything that you would like to add?

ZOE DRAELOS, MD, FAAD:

I think what's key for the skin, hair, and nail supplements is to determine whether your patient wants to eat a healthy diet, a cup of carrots, a raw tomato, a handful of almonds, a Brazil nut, fresh blueberries, and unpeeled apple, that's it, it's simple. Or whether they want to purchase a vitamin supplement. And then vitamin supplements for skin, hair, and nails really are not that unique. They may have some unique antioxidants in them but the vitamins are all the same, a vitamin is a vitamin.—

--Nutraceuticals and cosmeceuticals are not recognized categories. Nutraceuticals are foods, there is no such thing as a nutraceutical in the FDA's eyes, and there's no such thing as a cosmeceutical either. Most cosmeceuticals are 80 percent moisturizers and they're purely cosmetics. But they are very popular terms around consumers and I hope I've given you some

ideas on how to share concepts with your patients that are medically founded, to help them have better skin, hair, and nails.

ELISA GALLO, MD, FAAD:

Thank you very much, Dr. Draelos. It was a pleasure talking with you today.

ZOE DRAELOS, MD, FAAD:

Thank you for having me.

TODD E. SCHLESINGER, MD, FAAD (*written by Jack Langford, University of South Carolina*):

The demand for almonds has increased dramatically in recent years, due to its growing popularity as a food, packed with nutritional value. The almond is a species of tree, native to Central Asia, but it is in the United States that has become one of the largest producers of this nutritious tree nut. The specific nutritional values vary, depending on both genetic and environmental factors. However, the fact that they provide a variety of health benefits remains consistent.—

--Specifically, almonds contain riboflavin, niacin, copper, linoleic acid, zinc, vitamin E, and polyphenols, all of which have been implicated in improving skin health. Riboflavin, or vitamin B2, possesses a regulatory role in the production of collagen, a protein vital for both skin and hair health. Niacin, also known as vitamin B3, is associated with promoting keratinocyte differentiation, and can even inhibit photocarcinogenesis.—

--Copper might possess the most diverse skin benefits. It has been shown to help maintain skin elasticity and promote melanin biosynthesis. In addition to zinc, vitamin E, and polyphenols, copper also functions to protect against reactive oxidative species that damage skin cells. More recently, research has indicated linoleic acid as a promising safe treatment approach to a variety of skin diseases, including but not limited to atopic dermatitis, psoriasis, and acne

vulgaris. Together, the nutrients obtained from almonds contribute to improvement, protection, and maintenance of one's skin.—

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