

1103: How Light & Mitochondria Shape Our Biology With Dr. Alexis Cowan

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Child: Welcome to my Mommy’s podcast.

This episode is brought to you by Hiya Health, which I have a now extended and renewed interest in, especially with having a baby around who will be starting solid foods pretty soon. Because here's something that's kept me up at night as a parent, and I've talked about before. Our kids are the first generation growing up on not just ultra-processed foods, but foods that don't have the same nutrient content that they used to due to soil changes and so many other factors.

In fact, we're just beginning to understand the extent of this problem. And this is why Hiya exists and why I'm glad that they do, which is to give parents a real solution in a market that is flooded with kids' vitamins that are actually contributing to the ultra-processed foods. They have candy-like appeal, but not actual nutrition.

In fact, some children's vitamins on the market contain up to seven grams of sugar per serving and are stuffed with additives and petroleum-based dyes that I go to great lengths to avoid in my kids' diet. So Hiya took the opposite approach with zero sugar, zero gummy additives, just clean nutrition. And the great part is kids actually love them.

My younger kids are a huge fan. I have tried them, and the flavor is actually great, although obviously I don't take them daily. But what makes them different is how thoughtfully they are designed, formulated to meet very specific nutritional gaps that modern kids face. And they worked alongside pediatrician and nutrition specialists to make a chewable multivitamin that packs a blend of twelve organic fruits and vegetables and fills the common nutrient gaps that kids face.

They're also non-GMO, vegan, dairy-free, allergy-free, gelatin-free, nut-free. They really have thought of everything to make these ideal for kids. And they are NSF certified and receive Clean Label Project's Highest Purity Award. So when it comes to something I feel safe giving my kids, they are definitely on the list.

It's designed for kids two and up. They ship straight to your door. And I love that they send you a reusable bottle and stickers with your first order. So this helps you keep up with the refills, and they send refills every month as well. I am a big fan of these as well. And Hiya just launched something new.

If your kids are active and growing, you can add a clean protein powder with minerals designed just for kids to be exactly what they need. Their new Kids Daily Growth Plus Protein is a game-changer. It's more than a protein shake. It's a purity awarded clean protein powder with added minerals and healthy fats that can mix right into water or smoothies and support muscle development and cognition and fuel everything else they've got going on.

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So, we worked out a special deal with Hiya. You can receive 50% off your first order on any of their products. To claim this deal, you must go to hiyahealth.com/wellnessmama. This deal is not available on their regular website. So again, that's H-I-Y-A-H-E-A-L-T-H.com/wellnessmama, and get your kids the full body support they deserve.

This podcast is brought to you by BIOptimizers and their Magnesium Breakthrough product. Our bodies need seven different types of magnesium. Each one has its own unique purpose. One form helps muscles recover, another supports heart rhythm. A third supports the nervous system and so on.

Most supplements, even the high quality, expensive ones only contain one to two forms at best, and that's like trying to build a house with just a hammer and a screwdriver. You need the complete toolkit, and that's why I started taking Magnesium Breakthrough from BIOptimizers, which contains all seven forms.

No other magnesium supplement on the market offers this complete approach. I have looked, and BIOptimizers is so confident in their formula that they offer a full year, 365 day money back guarantee. So you can try it for up to a year and still get a refund if you're not happy. So if you wanna try this, go to bioptimizers.com/wellnessmama. And use the code WELLNESSMAMA for 15% off your order.

Plus, when you subscribe, you'll enjoy exclusive discounts, free gifts, and a guaranteed monthly supply. All natural ingredients, no synthetic additives or preservatives and always vegan, gluten-free, soy-free, and lactose-free.

Katie: Dr. Alexis, welcome. Thank you so much for being here.

Alexis: Thanks for having me. I'm really excited to chat today. I think we're gonna have a, a nice conversation.

Katie: Me too. Even researching for this, I had so much fun listening to some of your past interviews and reading some of your work, and I feel like you have a fascinating history, and you have a background in molecular biology as well.

So I feel like we're gonna get to connect some really cool dots in this conversation as well. And you talk a lot about light as information, not just energy, and I feel like this perspective shift is really valuable for actually how we can apply this to our individual health. But I'd love to hear from you.

You were trained as a m- mo- molecular biologist, so, light wasn't probably originally the center of your work. I'm curious what along your journey shifted for you and you realized light might be one of the most important inputs for the body.

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Alexis: Yeah. So when I was in grad school, I did my PhD at Princeton. I was in a metabolism research lab, so I entered through the molecular biology department, but my lab was kind of an affiliated faculty in chemistry. So although my degree is technically in mol bio, I, don't really have much experience in that department, specifically outside of the coursework, of course.

And during my kind of tenure there, I was kind of familiar with, circadian biology and loosely the roles of light in controlling, our circadian rhythms, largely through the work of, like, Satchin Panda and others. And I actually did some circadian studies in the lab when I was there. And I always like to tell this story because it was so ironic, and it will become more clear why it was ironic as we continue the conversation.

But during these circadian studies, I had to take time points every four hours for 48 hours, and I was, like, barely sleeping. I was... I kind of, like, set up an air mattress in my boss's, like, spare office that he had in the, in the chemistry building and, was, like, lugging myself to, the mouse room to take blood sample time points, like, in the middle of the night and just, like, absolutely a zombie.

And when you wanna go into the mouse room at night, essentially the only lights you can put on are red lights because it's known that obviously if you put on a bright white light, maybe not so obvious, it disrupts the circadian rhythm, and this is very high upstream as it relates to metabolic regulation.

And so if we want clean data, we need to kind of eliminate as many of these variables as possible, and so you can only turn on these very dim red lights if you wanna go in at nighttime. And so I would go in, put the red lights on, then take my samples back to the lab to spin them down under these terrible, like, horrific fluorescent, fluorescent and LED lights.

And, like, the... I, I just very clearly identified there was a disconnect here between I'm having this consideration for the animals that I'm studying, but I'm not having con- this consideration for the animal that is me. And so that was kind of, like, the first little inconsistency that I noted, during my research before ultimately graduating.

I did a postdoc at UPenn for a year, and during that time in 2023 is when I found Dr. Cruz's work, who- obviously is very invested in light biology, circadian biology, et cetera. And that rabbit hole is really what opened my eyes to the fundamental roles that light plays in regulating every aspect of our biology and our perception of reality.

And so that kind of is what opened the door there. Like, during my PhD, like I said, I was only kind of tangentially familiar with these topics, and so many dots were connected after I

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found this research. And also noted that this was, you know, over a century's worth of research on this topic was in the corpus of literature.

It's not like it's some new fringe science. This is really hardcore, like, science that's gone back through history. So it made me very excited, because I'm always interested and looking to learn new things and incorporate new information into my worldview and, you know, guinea pig it on myself and implement all these things.

And when I did that, I felt such a profound difference in my own life that I immediately knew that there was something here, and that was kind of like the beginning of me jumping down this rabbit hole, and it's been, you know, a few years since then and, I'm still just as excited today about it as I was back then.

Katie: I love that. I also found Jack Kruse's work years ago, and I'll admit at the beginning some of his stuff was over my head. And now that I have come around to light so much, I really value his work and now your work as well. And I think you're right, this is not new science, but what does seem new is that we have a lot more new light exposures and more of them than we used to have.

So perhaps we're the first generation or our kids are that are growing up with quite the same number of LED lights and artificial light spectrums, as they have kind of ubiquitous in their entire lives looking at screens at any time of day. So I do wanna get really into kind of the nuance there. But before we do, I'd love to kind of establish the mechanism pretty simply and foundationally.

I think my listeners have a pretty good understanding of some of these components of light, but I love the way you explain this and discuss this, of kind of what is happening when we interact with light. And then we'll get into the distinctions of artificial light and natural light. But I know in some cases it's oversimplified into just the vitamin D mechanism, for instance.

And it certainly goes far beyond that. So can you walk us through the mechanism of what's going on in the human body when we interact with light?

Alexis: Yeah, totally. So there's different aspects of light that has, that have differential effects on the body. Typically, a couple of the top ones that we're looking at are lux or brightness of the light source, as well as the color temperature, which is kind of an indirect way of saying the spectrum of the light.

And so when we see light that looks white, let's say, you know, whether it's an incandescent bulb or sunlight or even an LED, it looks white because it contains all of the visible

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spectrum in it. And so that's the reason why you can see any sort of colored items in your room. Let's say you have, like, a red apple or, I don't know, a, a, or a green apple.

The reason you can see the green and the red is because that is a quality of the light source in your environment that is reflecting off of that item and showing you that color. And so there's a little bit of a distinction to be made here though, because just because an LED bulb or fluorescent bulb looks white, we're not really seeing the same or experiencing the same spectrum as we would from something like an incandescent bulb or moreover sunlight, because there's a huge non-visible component to the light, that obviously we can't see optically, but our bodies are experiencing very profoundly.

And so outside of the visible spectrthe visible being like Roy G. Biv, red through violet, we have on the long wavelength and, are near-infrared and far infrared. And on the short wavelength end, we have the UV, so UVA, UVB, UVC. So these fall outside of the visible range, but have very, you know, important effects biologically speaking for not only humans, but all animals, plants, et cetera, organisms really.

And so on the infrared end, we have our near-infrared component, which is very, very penetrative into the body. So it's able to penetrate through clothing, hair, and when it does, it basically can stimulate these organelles within our cells called mitochondria. So the mitochondria being like the powerhouses of cells, if you learned in like high school biology class.

But they're much more than that, so they're not only responsible for making energy in the form of ATP, but also metabolic water, which we'll talk about maybe a bit later when we deep dive into mitochondria, as well as biophotons, which we'll definitely touch on during that segment as well. So the mitochondria are really what controls health and life and your ability to, sense your environment and also kind of live in an effective manner. And what I mean by that is our mitochondria are, are essentially controlling the aging process, what diseases we have. And when we're born, our mitochondria are in a certain state.

We inherit those mitochondria from mom's egg. When mom was in your grandma's womb, the egg that would become you was already developed, so grandma's lifestyle, stressors, behaviors were already impacting you biologically before your mother was even born. So there's a huge kind of aspect of lineage here and, like, generational trauma you could even say, through these kind of, through mitochondrial biology, let's say.

So the mitochondria are being directly stimulated by near-infrared light. Far-infrared light is really important as well because that is what's helping to structure the water in our body into more of this fourth phase gel state water that's essentially holding energy as, like, a battery and helping to power our metabolism.

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On the short wavelength end, we have UVA, which is extremely important for nitric oxide production, helping the blood vessels to vasodilate, deliver nutrients and oxygen to tissues, facilitating waste removal from tissues, supporting lymphatic flow, all these kinds of things. We also have our UVB light, which is the shortest wavelength of light that we receive on the surface of the Earth from the sun.

And UVB, as you alluded to, does make vitamin D in the skin or pre-vitamin D in the skin from 7-dehydrocholesterol. But in addition to that, it does a whole range of other things. May- maybe most notably, the, it stimulates the production of a prohormone called proopiomelanocortin or POMC. So POMC is this complex prohormone that is produced in response to UVB light in the skin and in the hypothalamus via exposure into the eyes.

And of course, what do we do? Most people when they go outside, they're wearing clothing or sunscreen or sunglasses or UV-blocking contacts, prescription lenses. So we're blocking this signal, and why does that matter? Well, POMC gets cleaved into 10 different hormonal products, two of the most important ones being beta-endorphin and alpha-MSH or melanocyte-stimulating hormone. So let's talk a little bit about what those do.

So beta-endorphin is one of our body's most powerful endogenous opioid molecules, and it not only gives that kind of analgesic, anxiety-reducing, depression-alleviating effect, but it also improves learning and memory. It's immunomodulatory. It improves critical thinking and overall dopamine status because what the opioids do, and this is the reason that people gravitate towards these kinds of drugs as well, and we see the opioid epidemic, is because we're constantly as modern humans living in this low dopamine state where we're chasing these dopamine rushes, and it's kind of like this rollercoaster.

And instead of having this kind of cruising at altitude dopamine level, which you would naturally get if you were spending your days outdoors exposed to sufficient UVB light to make natural endorphins, instead we go chasing these quick dopamine hits in the form of, you know, processed foods, social media, pornography, drugs, alcohol, et cetera, and that puts us on this rollercoaster.

So essentially our biology is telling us that one way or another, you're going to get this dopamine. You can do it the way that nature kind of has instructed us and is consistent ancestrally or, you know, you can do it the modern human way, and that ultimately ends up typically leading to things like burnout, lack of fulfillment, a lot of relational strain, life strain in general.

And so I think it's just very powerful to kind of note that, you know, we're, we're, we're meant to make, our bodies are built to make their own drugs essentially when you're in the sun.

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And when you make them in that way, it's in the right balance and the right ratios, and we end up feeling energized, satisfied.

We kind of get off of this rollercoaster of materialism as well because what is materialism but chasing dopamine? That's essentially what it boils down to, and so our society kind of runs off of the backs of humans that are dopamine depleted. So whenever we can do our part to inform ourselves and to live more consistent with the rules of nature, we get to opt out of that system that is exploiting our planet, exploiting so many humans on the planet as well, and other life forms too.

The other cleavage product of POMC that I wanna highlight really quick is alpha-MSH, or melanocyte-stimulating hormone. So as the name implies, this hormone is in part responsible for helping to stimulate the production of new melanin from melanocytes, which are the cells that make melanin. And this is like when you go in the sun and you get a tan, that melanin is what is being produced and that's what gives you that kind of tan appearance.

But melanin has a lot of other functions that I will highlight as well, but for now let's just leave it there. But in addition to melanin production, alpha-MSH also plays really important roles in other areas too. In particular, when it binds to receptors in the hypothalamus, it increases energy expenditure and decreases appetite.

And it turns out that this pathway is also leveraged by the GLP-1 drugs like Ozempic, which activate POMC production in the hypothalamus similar to UVB light. But the on- the, the biggest difference here, and the most important distinction to make, is that these drugs are hijacking these pathways and tricking the body into thinking it has a surplus of energy.

That's how they're working. And that's dangerous in the context of actually poor energy availability because what we're doing is we're telling the body that there's plenty of energy when on the back end there's actually a deficiency in energy, and bioenergetic ultimately can lead to bioenergetic collapse essentially.

So when we're in UVB light and making POMC and stimulating alpha-MSH production, we're actually providing the body with energy while signaling that there's an abundance of energy so there's a, there's a coherence in the signals between the in signal input and the signal output essentially. And so UV light is one of the primary signals that is, is indicating that we're somewhere between like spring and fall if we're at more northern or higher latitudes, let's say.

And during these times of year, there's an abundance of food available, not only animal foods, but also plant foods, carbohydrate-containing foods, which all signal that it's, you

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know, the season for, not only being more active, expending more energy because there's more energy available, but also mating, fertility, libido, being lean, being healthy, energized.

All of these things are kind of related to summertime biology. Versus wintertime biology is a time where we kind of go inward, libido's lower, fertility's lower. We're kind of physiologically depressed, which is a mechanism our bodies can use to save energy. And this is what we see in the extreme with animals like bears.

There's an example of this one bear that I, I found some images of online which were really cool, named Holly. And Holly is an Alaskan brown bear, and there's a picture of her in June and she's like lean, she's super brown, she's like very energized, her eyes are wide open, she's like ready to mate, all these things.

And then you see her at the end of October and she's super fat, pale, lethargic, ready to hibernate. And this is because of the shift ultimately in the light that's available because the light is what dictates what grows and what is available for you to consume. And so I would like to posit that most modern humans are living in some sort of weird alien, forever winter where we're never exposed to UV light.

And so all of these pathways for energy conservation and kind of scarcity get activated because our bodies are not sensing energy in the environment. And turns out light is, you know, one of the most important inputs that is giving our, our biology a sense of, energy availability. So those are some of like the main highlights about how our body responds to different wavelengths of light.

I also definitely wanna highlight blue light at some point too. Actually, maybe I'll just get into it really, really quick now. So blue light is part of the visible wavelengths of light, of course. And blue light is the primary signal that is being sensed by our bodies to set our master clock in our brains.

So in the hypothalamus, there's a group of about 10,000 neurons called the SCN or the suprachiasmatic nucleus. This is the master clock for the body, and it's directly connected to the back of the eye via the retinohypothalamic tract, the RHT. So when light comes into your eye, and in particular blue light is the one, the, the one frequency that we're really looking for in our environments, it stimulates that back of the eye, the r- the retina, then thereby relays to the RHT and then sends a signal to the master clock in the brain that it's the daytime.

Because blue light is abundant during the day and it peaks around midday, around noon. And that is sending a signal for daytime biology to be activated, which includes, cognition, digestion, movement, are all kind of activities or pathways within the body that are gonna be activated during this time.

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In contrast to the evening time when total light, so brightness of light is low and blueness of light is also low. During that time of day we get our nighttime biology activated which allows melatonin to rise, which facilitates sleep, recovery, getting sleepy and kind of getting into that nighttime mode.

Of course, as modern humans we're kind of doing everything wrong, so during the day we're not exposed to enough bright light, ideally from the sun, because we're gonna get that full spectrum and all the benefits therein. And we're simultaneously exposed to far too much blue light and bright light in the evening after the sun has gone down.

And so our circadian biology, which again is controlled by this master clock in the brain, it's setting all of the other clocks throughout the body to make sure everything is ticking at the same rate. And timing is really everything in life and in health, so if that timing mechanism is not working appropriately, each organ is kind of left to fend for itself.

And when we get this kind of situation is when we set the stage for a whole host of different chronic diseases that are associated with circadian disruption. Two of the biggest ones are probably cancer and cardiovascular disease, and obesity as well, and diabetes. So these are all kind of things that we see running rampant in our population, and it's no surprise when we're, you know, vitamin D deficient, POMC deficient, blue light at night, not enough sunlight during the day or bright light during the day.

We're kind of doing everything inverse to what nature has intended for us and we're paying the consequences as a result.

Katie: That was such a beautiful explanation, and you make such a strong case for what I said before about light, I think, being the primary lever by which all the other ones come after.

Like, if we're not getting our light environment right, if we're not attuned to the circadian biology piece, even our, our nutrition could be perfectly dialed in. We could be taking the perfect stack of supplements. We're still not getting the maximal benefit because our body can't read that information correctly.

And I think this is really important to highlight because there is no pill we can take that does all of the things that you just mentioned. This is something very specific to that whole cascade, that symphony that comes from light that you just explained so beautifully. But I really wanna double-click on something you just said, because I think a lot of people still maybe have this association in their head that the sun is related to aging in a negative way.

And I know a lot of people who wear sunscreen constantly, who cover up, who don't get a lot of natural light because they're afraid of aging from the effects of the sun. And you

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touched on this a little bit, but I would love to really go deeper, because when we bring in the aging piece, a lot of the things you just said indicate the sun might be profoundly anti-aging, especially on a cellular level.

So I wanted to kind of do some myth-busting around this idea that the sun is going to just age us, and that's the whole story.

Alexis: Ah, yeah. So it's another example of kind of getting the answer exactly inverse or wrong. So I guess to unpack this, we need to define what aging is. And in my estimation, the best way to kind of assess aging, is to zoom in on our mitochondria.

So the mitochondria, as far as we know scientifically, are derived from bacteria because they share the same double membrane system. They both have circular DNA. They both emit a ton of biophotons. They have this... A lot of structurally, they, they have in common. And so to look at that circular DNA for a moment, the DNA within the mitochondria encodes 13 proteins, all of which are involved in the electron transport chain.

So in the mitochondria, in that energy-producing pathway, we have something called the ETC, electron transport chain, or the respiratory chain, depending on what you wanna call it. And this is the set of protein complexes that are responsible for, turning the mitochondria into the batteries that they are to power ATP production, metabolic water production, biophoton production.

And essentially, there's something called heteroplasmy. So the genes within that mitochondrial DNA can be mutated, and the more mutated they become, the higher the heteroplasmy rate is said to be. So it's essentially a readout for, how similar, the DNA across a sample of mitochondria are. Because if we look at any one cell type, there could be anywhere from 50 to 500,000 mitochondria in a single cell.

So in an egg cell, there's up to 500,000 mitochondria in there. That's because those mitochondria are serving as the founding colony to populate essentially the growing embryo, to allow that there to be enough mitochondria to partition into all the different tissues that need to be developed, et cetera, versus, you know, certain kind of peripheral cells. The skin, for example, may only have like 50 mitochondria.

So it depends on what we're looking at, but if we were to sample the mitochondria from any one given cell type or tissue sample and look at the sequences of the DNA in that colony, if we see a big difference between all of the DNA samples there, we would say that there's high heteroplasmy. And if we, if we see, very similar rates of mutation or low mutation burden across that sample, we would say there's low heteroplasmy.

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And the heteroplasmy that you're born with in any given tissue is the lowest it will ever be. These mutations accumulate over time, roughly 10% per decade. And depending on the cell type, we can tolerate different levels of mutational burden because you can imagine that as these genes mutate, they're creating different proteins and, like, changing the protein structure to make it suboptimal in energy production, water production, biophoton production.

And so essentially, this accumulation of mutations is the most direct readout that we have for aging. And the cool thing about this too is that the rates of heteroplasmy are not static. What I mean by that is there are ways that you live and behave that directly influence how well your body's able to maintain lower levels of heteroplasmy or even reverse heteroplasmy, which is in essence reverse aging.

And so there's two pathways of mitochondrial quality control that are involved in this. So one is mitophagy and the other one is mitochondrial biogenesis. So mitophagy is the pathway by which the damaged high heteroplasmy mitochondria are preferentially broken down and disposed of. And mitochondrial biogenesis is the pathway by which we can amplify the colonies of healthier mitochondria that are doing their jobs really well.

And so if you can optimize those quality control mechanisms, you can in essence age in reverse. And some of the most important inputs as it relates to these quality control mechanisms are the light environment that we're exposed to. So circadian biology, the proper light dark cycles, getting enough sun during the morning and daytime, and getting enough dark darkness at night.

And in addition to that, also the UV light we're exposed to in particular because UV light is really important for growth control, and the regulation of apoptosis, which is another really important, process that the body uses to eliminate cells that are kind of dragging down the collective, let's say.

And so in cancer in particular, you know, apoptosis is one of the pathways that kind of gets subverted. And that's why cancer's actually able to get a foothold because every moment of every day, you know, there could be cells that are cancerous being produced and, and kind of emerging, but between the immune system and apoptosis, they get taken out and they don't actually cause an issue.

So there's like multiple failures, multiple levels of failure that need to happen in order for a tumor to actually get a foothold in the body. So to circle back to kind of this aging conversation, obviously cancer is very much related to aging. It's mostly correlated with aging, though there are exceptions of course.

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But all of this goes back to heteroplasmy burden and mutational burden. And we know that getting enough of certain inputs is really important for optimizing mitochondrial function. And so the UV light story in particular is probably the most misunderstood because, it's kind of somewhat understudied just because there's a lot of propaganda around it, and I think it's mostly... Ugh, it's kind of a, a little complicated topic, but it's a lot of like this colonialist, imperialist mindset around sun equals bad or sun equals brown, and like brown skin equals bad. And it kind of has permeated our science unfortunately as well, and this goes back, you know, centuries and maybe even millennia, and it's very prominent still in like even modern-day cultures.

I have a friend from Colombia, and her grandmother was like, "No, don't go out in the sun. You know, you're gonna get a tan, and then you'll look poor." Like, it's very ingrained in the mindsets of people to think that the darker your skin is, the lower the class status you are, whatever it is. Obviously on top of that, if you have very fair skin and you go out in strong midday sun, you get burned, so it's like, okay, clearly burning isn't great.

It hurts, doesn't feel very good. And it's also l- you know, arguably very pro-aging when we're getting that very strong inflammation response in the skin. But then the, the flip side to that is, well, burning is not inevitable. We don't have to burn. Even if you have very fair skin, you can still make new melanin in your skin.

It just requires a bit more strategy. But moreover, the way that we're living our lives is also influencing our burn risk. So, for example, if we're exposed to a lot of blue light at night in particular, but also just artificial light in general on our skin, that inhibits mitochondrial function. Blue light in isolation is inhibitory to the mitochondria, and we need the mitochondria to be functioning in order to make new melanin.

So if we're constantly putting the brakes on our mitochondrial function on our surfaces that are directly exposed to the light in our environment, including non-native EMFs as well, which also inhibit mitochondrial function, then we're gonna be less able to make new melanin and actually get a tan in response to the sun.

in addition, if we're constantly blocking UV light into the eyes, then we're kind of missing part of that equation for stimulating melanin production. So ideally, we wanna coordinate our skin and eye exposure to UV light simultaneously in order to optimize that signal to the body to make new melanin.

Our diets also play a really important role here as it relates to our ability to burn or tan versus burning. And in particular, I mean, anecdotally, a lot of people will say, "You know, I cut out processed foods, I cut out seed oils, and I stopped burning." Mechanistically, it

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does make sense, at least to me, and I don't think anybody's done these studies yet, but they would be very kind of easy to do.

Because the skin is one of the highest turnover tissues, the fats that come in-- that are coming in through the diet are directly influencing the cell membrane lipid composition in this tissue. And we did some of these studies in my lab actually to look at, like, how fats coming in through the diet are influencing the ratios of different fats, in adipose tissue and, you know, ultimately in, in other tissues as well that are especially high turnover.

So if we're eating a lot of our polyunsaturated fats from processed foods and seed oils that are already coming into the body oxidized, and pro-inflammatory, and that's being incorporated into cell membranes, for example, those cell membranes are gonna be more fragile. Your skin may be more, prone to burning.

In addition, if we're just talking about inflammatory status in general, you know, this is going to be an issue as it relates to tanning versus burning. And so there's lots of different exposures that we can have to, like, pesticides, herbicides, environmental toxins, you know, poor sleep. All the things that you would associate with being more inflamed are also going to make it harder to tan versus burn.

So there are a lot of behaviors and kind of preconditions that a, a, a person might have that's setting them up to burn, and they're going to say, "Well, the sun burned me," but at the same time, you know, if we were to fix and kind of optimize these things on the back end, you may be able to tolerate a significantly higher amount of UV light in particular and actually reap the benefits of that versus being harmed or having photo aging from that.

I also will say I, I think culturally we have a, a lot of immaturity around the concept of aging in general. We're very kind of superficial in our, in our viewpoints where it's like if somebody looks old, like they must be old. But I think the aesthetics are not necessarily a good readout at all for somebody's internal health.

And so I would kind of just reject that, that kind of viewpoint in general. But having said that, you know, you don't need to photo age from the sun if you're not burning and inflaming your skin regularly and kind of frying yourself to a crisp. You know, in producing melanin you're actually helping your body.

That melanin is able to detox heavy metals. That melanin serves as a free radical scavenger, so it's a powerful antioxidant. Melanin is also playing critical roles in our perception of reality. It's actually at the barrier of every sense organ that we have. It's deep in the brain. It's in the oral mucosa, the nasal mucosa, in the skin, in the inner ear, where it serves actually critical roles in actually allowing a, an electrical signal to be produced from a sensory experience that is sent back to our brain, relayed there, and allowing our brain to

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kind of integrate that information into a, a sense of, you know, what's going on in our environment.

So melanin plays a lot of really, really important roles, in, you know, our day-to-day life in a, in a deep way, and also in a more superficial way as well. Also, generally, people just think they look better when they're tan, and that's why, you know, the self-tanning industry and, like, the spray tans and all that is popular.

But it's mimicking what the real thing can give you for free, and it actually provides you with a multitude of benefits outside of just the facade. I feel like societally we're so focused on facades in everything and, in, in lieu of essentially having the real deal. And, you know, I think, personally, I feel like that's a big mistake, 'cause we're missing out on a lot, and there's so much more to health than just how you look.

It's how you feel at the end of the day. There's a lot of people who may look good on the outside that are falling apart on the inside. And so I think we just need to kind of reflect on who we look to as role models and where we're getting our information. And being more like scientists in our own lives where we experiment and we see how we feel and how we respond to certain changes in our routines and our environments, et cetera. And using that as the proof that you need to actually curate your, a life for yourself that you actually feel good about versus just, you know, taking in information and, and kind of dogma from people that have perverse incentives and agendas and then, like, regurgitating that as truth, which I think is most of what science has kind of become today, which obviously is unfortunate.

it's just part of the propaganda machine and supporting kind of like the pharmaceutical industrial complex. There's not a lot of real science going on anymore, so we kind of have to use judgment when we're assessing whether information is actually true. Especially as it relates to something as fundamental as sun exposure, which we were, we've been exposed to as a species for the entirety of our species, and it actually helped to sculpt humanity and, like, our brains and all of these things.

So anyway, end rant. I could go on on that forever.

Katie: I, I probably could too, and I love that. I think it's important to remember is, like, yes, scientific data could be very helpful and important, but I always say, like, the most important study we shall ever do is the N of 1 of ourselves. And so if you haven't tried these things, like, I hear from so many people who are like, "I've tried everything to fix my health."

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I'm like, "Have you tried watching the sunrise? Have you tried going outside every hour throughout the day?" I know that seems like a lot, but I know when I started doing that, I was euphoric. Like, that, all the natural endorphins you talked about. Like, I was shocked how my mindset went from kind of more dark to more light, simply mirroring my actual movement in my human life into a more light environment and getting those cues in my body.

And I think it's important to highlight, you explained it so well, but there really is no shortcut for this. I've heard people say we're kind of infrared light deficient or we're operating at, like, 1% battery. We're, like, in low power mode because our cells are simply not getting the electrical charge, the light signals, the, the basic things they need to function their best.

And then we wonder why we're having this rise in chronic disease across the board. And I know that also different light at different times is interpreted in different ways, and you explained that with, like, blue light at night being a very confusing signal. I'd love to kind of switch gears and talk about the seasonality of light and also throughout the day the different spectrums of light and what they do kind of independently in the body and why we need all of them.

It's not just a check one little light box at one time of day and you're good, but, like, it's this symphony. So how do we best listen to and play the symphony in our own bodies?

Alexis: Yeah, I really like thinking about light as akin to Morse code, but instead of dots and dashes, we have every frequency from short wavelength UVB out through far wave- long wavelength far-infrared.

And so there's way more options, right, than just dots and dashes. But the combinatorial facts af- the combinatorial effects encode a message that can be decoded, decrypted by our bodies. So when you go out at sunrise, the color temperature is very low. There's way more of that long wavelength red light.

That's why the sun looks more of, like, those oranges and reds and yellows in the morning. And as the sun rises up on the horizon, it becomes more of a, a high color temperature with more blue and UV incorporated, so it gets more of that whitish color. And then of course, as it approaches the horizon again at sunset, we get again that red shift, that long wavelength light shift.

The reason that's happening is because the atmosphere is thickest at the horizons. So basically sunlight has to pass through more atmosphere in order to reach your eyeballs, on the surface of the planet. And so for that reason, more light gets scattered, and so the long wavelength light is more able to reach through, and that's why it has that redshift.

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Versus midday, there's the shortest path through the atmosphere, so more of that short wavelength light, blue and UV, gets through. Seasonality-wise, depending on your latitude, you may retain UVB light year-round or you may lose it for a period of time. So where I'm at, in Princeton, there's like a period of maybe six weeks roughly where we lose UVB light, in the dead of winter.

And so this kind of goes back to that conversation about wintertime versus summertime biology that I was mentioning earlier. That UV light exposure and intensity is really one of the primary signals that is telling our biology and nature in general what time of year it is. And the time of year is what also tells, you know, our bodies about energy availability in general and what kind of behaviors or, how much energy we should allocate to certain behaviors and certain processes in our bodies as a result of that, because, you know, everything requires energy.

So if there's a perceived energy deficit, the biology's gonna clamp down and make sure that only the things that require energy are going to receive it. And so during the wintertime, we're at like that nadir of UV light, and during the summertime, we have peak UV, and, you know, everybody's behaviors mirror this as well.

Even with Americans spending 90% or more of their days indoors, people are more sluggish and depressed in the winter, and they feel better, brighter, happier during the summer. And everybody kind of knows this intuitively, that when you go outside on a bright, sunny day, you just feel good. And that's not just a construct.

That's biological at very, very foundational levels, not only from the spectrum but from the brightness too. So during a bright, sunny day, we're talking sunlight brightness between, you know, 75 and 200,000 lux of light, versus on a cloudy day, we're between, like, 10 and 20,000 lux of light if it's, like, very overcast, versus an indoor environment.

Most light- lighting sources on indoor environments that you're experiencing would be, between 1,000 and 5,000 lux of light max. So we're talking, you know, multiple orders of magnitude here in difference of brightness, and that brightness really helps to make us alert, to kickstart our metabolisms, to produce serotonin, which can later be converted into melatonin.

So getting enough bright, full-spectrum light during the day is absolutely critical for improving sleep quality and recovery in the evening time because of that conversion process. And just for feeling good and energized, et cetera, during the day. That serotonin plays really important roles. And so I really like to think about, like, taking light breaks, like you mentioned.

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Even if it's just, like, two to five minutes every hour is going to be majorly beneficial relative to just sitting in an indoor environment constantly with artificial lights. Another thing you can do is crack windows, especially if there's, like, good light coming through windows. Window glass does prevent UV, most UVA, or sorry, not most UVA. Like, about 30% of UVA is blocked, almost all UVB is blocked, and almost all near infrared light is blocked from modern window glass. So we really need to be opening windows and doors if you wanna get the full spectrum through. I know it's ki- it's kind of a misnomer when people walk into a space and they say, like, "Oh, it has great natural light."

It's actually not natural. It just... You know, you're getting the brightness for sure, and you're getting parts of that visible spectrbut in the non-visible range, we're really kind of messing it up. So whenever you can allow that to come through, you're going to benefit. I also like to use, reptile bulbs.

So, like, in my lamp back here and overhead, I have reptile bulbs going. So those are higher wattage, full-spectrum incandescent bulbs that incorporate more UV light, and infrared light than even just a standard incandescent bulb. And so if you're going to have an indoor workspace, I ideally like to work outside when I can.

I just, I used to record podcasts outside, and then I felt like it was always a lawnmower or a siren or whatever it is, and I'm like, "It's not worth it." Most of the time, depending on how long the podcast is. But if you can have an outdoor workspace, great, especially during, you know, spring through fall, that would be optimal.

Outside of that, if you have an indoor workspace, incorporating a lamp or two in your space that uses an incandescent bulb or even better, a reptile bulb, to help round out the light environment inside would be great. What I also really like to do, for my workspace in here is I have a grounding mat set up that I have the cable running out my window and it's plugged literally into the, my backyard.

And so whenever I'm inside, I, in my living room or my office, I can sit and I can be grounded as well, which is essentially your body's outlet for excess positive charge. When positive charge builds up in the body, it creates a static in the same way like if you rub a balloon on your hair, it makes the hair kind of poof out.

Well, at the cellular level or the subcellular level, this results in essentially inefficiency of charge transfer. And so by discharging excess positive charge, we're actually helping our mitochondria to work better and we have, you know, solid data showing that even just 20 minutes of grounding daily can dramatically reduce inflammatory burden within the body and that's another kind of quick, easy thing that you can incorporate.

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When you go outside, you know, go out barefoot or have a grounding mat set up in your home that's ideally plugged into the earth directly, not into an outlet just because there's some potential for like jump conduction or dirty electricity with using an outlet, so I, I try to avoid that. but those are just some easy things that you can do to kind of help round out your indoor office space.

And then of course putting filters on your device screen. So even during the day like right now, I have an amber filter on my computer. I keep an amber filter on my phone all day long to limit some of that isolated blue that we get, from these device screens inherently. TV-wise, certain models you can put it on RGB mode if you're going to watch at night.

You can make the whole screen red tinted or you can at the very least turn the backlight down on any TV and if you can't do any of those things, you can at least pop on a pair of blue blocking glasses. If it's nighttime, they should have an orange or a red tint. That is how you know they're going to block a sufficient amount of blue light to actually protect your melatonin and your eyes.

Any of the blue blocking glasses, quote unquote, that have a clear like colorless lens, they're only blocking like five to 10% of a very specific wavelength of blue light. They don't have any sort of broad spectrum coverage and we wanna make sure that we're blocking between 400 and 550 nanometer light, so that's blue through blue-green, after sundown because those are the wavelengths that are going to impair our ability to release melatonin, which not only supports our sleep, but serves as a very important antioxidant throughout the body.

And so we wanna protect that at all costs. So those are kind of some tips that people can use to help optimize their indoor spaces when they are inside.

Katie: Well, it, I love that the majority of the things you're talking about are free, and of course there's some variance different times of year depending on where you live, of course.

But a lot of these tips just require a little bit of your time, but they don't require big expense to go stand barefoot on the ground, to go outside and get natural light, to breathe fresh air. And, I have now reversed my Hashimoto's, but I've said before if I were suddenly diagnosed with some kind of either chronic disease, cardiovascular disease, cancer, any of these big ones we've talked about, one of the first things I would do would be to live almost entirely outside.

Like, even to the extreme point of sleeping outside, no artificial light, touching the ground all the time, being in the ocean as much as possible, because of how powerful those

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signals are. And I personally feel like getting those things in doses as much as possible actually is very protective against risk of all that.

And when we live in a world where over 90% of Americans have some marker of metabolic disease, I think these are free tools within all of our ability to really make use of that we're just not optimizing. And I think if more people did, we would see some really dramatic shifts, especially with our kids as well and how well they sleep.

And you explained so beautifully the different times of day and how really we would be getting little chunks of natural light throughout the day to keep reinforcing those circadian cues. I've also been fascinated lately with the difference of summer and winter. I used to like love summer and then dread winter and take vitamin D and get all this like bright artificial light in my eyes, trying to do all these things to like feel that good in the winter too.

And lately I've been kind of going down a research rabbit hole and getting a deeper appreciation for winter and understanding like it's not actually that we're meant to live... You mentioned many people live in perpetual winter, but we're also not maybe meant to live in perpetual summer either. And so I'm learning and this year plan to like, as much as possible, really live in alignment with the winter part of the light cues as well.

So I'd love to talk about that if you're willing. Like what shifts in our biology and how can we actually optimize when there's less light, when there's more cold? like how do we work with that symphony of nature as well?

Alexis: Yeah, so we didn't talk about temperature. It's one of the other major cues that our bodies are using in order to sense what's going on in our environments.

And so the summertime is associated with high UV and higher temperatures, and the winter, of course, low UV and lower temperatures, and both of those things are important cues for stimulating, you know, the, seasonal, the, like the differential seasonal pathways that are activated within our systems.

And so there- I would say there is a l- maybe some nuance here with regards to somebody's ethnic or racial background as well, because there's a lot of people that have black and brown skin living at northern latitudes that are kind of already living in a mismatch. And so depending on the situation, you know, obviously, if somebody can be a snowbird and travel somewhere tropical for the summertime, or the wintertime rather, that's great.

If that's not feasible, typically people that have more, what we call coupled mitochondria. So there are two broad classifications of mitochondrial type, depending on where your heritage is from, essentially. The uncoupled mitochondria come from northern latitudes, and the coupled mitochondria come from equatorial latitudes.

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So the coupled mitochondria are very, very, efficient, but they require a higher UV environment year-round that's basically kind of like, you know, there may be a wet/dry season, but there's not a seasonal change in UV to any meaningful extent relative to the northern latitudes. The uncoupled mitochondria are called that because they essentially uncouple the flow of electrons, from the production of energy through the upregulation of, Well, in the wintertime you get the upregulation of the uncoupling proteins, the UCPs, which essentially allow these mitochondria to make heat from protons flowing through the electron transport chain or electrons and protons flowing in the mitochondria essentially.

And so the uncoupled mitochondria are well-equipped to handle cold and use it productively to generate heat internally. We also have a specialized type of adipose tissue called brown adipose tissue or brown fat. Brown fat is very mitochondrially dense, and it helps to generate heat in response to cold.

It gets activated by cold. You can also make beige fat from white fat by exposing yourself to cold, for example, like cold water immersion or, winter walks, things like this. Whenever you stimulate your white fat with cold, it can help to beige it, so it increases the mitochondrial density, and then it begins to behave more like brown fat.

Brown fat's also a very important endocrine organ, so it can essentially take up T4 inactive thyroid hormone from the circulation and spit out T3, which is the active thyroid hormone. And it's kind of ironic because people that have hypothyroidism are typically quite cold avoidant, and doctors will tell them to bundle up and avoid the cold.

Meanwhile, by doing so, you're further depleting your brown fat depots because it's a kind of use it or lose it situation where if you don't get cold stimulation, the brown fat depots begin to shrink. And babies are born with about 5% of body fat, as brown fat. And that's because they have a very high surface area to volume ratio, so they can essentially dissipate heat more readily, so they need more brown fat to help maintain their core body temperatures.

But as we grow, if we're not getting cold stimulation, those brown fat depots tend to shrink, and most modern adults are walking around without much detectable brown fat at all, because we're kind of sitting at 70 degrees year-round indoors and never being exposed to temperature extremes or, you know, appropriate light environments either.

And so by actually getting cold, you can not only protect yourself from issues like hypothyroidism, but potentially even begin to reverse it depending on the etiology of your specific case of hypothyroidism. So I think that's pretty interesting. Other things to lean into is that in the winter, even though the days are shorter, you're still getting bright light during the day from the sunlight, far brighter than anything that you would get indoors.

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So it's just as important in the winter, if not more, to lean into that and to take your light breaks and to go on walks and to not be afraid to get cold either. Personally, for cold plunging, like, cold water immersion, I typically only do that during the summer. I have a, a Morasko forge outside that's in the sun, and so I'll do cold water immersion when it's warm out, and then I kind of couple that with, like laying in the sun afterwards.

In the winter, I mostly just, you know, go on walks maybe in like shorts and like a light sweater, and leverage cold that way. But really to leverage the wintertime and lean into that biology, you gotta lean into cold because that is the one thing that counteracts, the lack of UV in, in the environment because it turns out that when you get cold, it stimulates your mitochondria to make more UV light internally, in the form of bio photons, and so, and also infrared.

So the reason that we are endotherms and maintain a core body temperature is largely because our mitochondria are making a ton of heat in the form of infrared light. And so whenever you stimulate the mitochondria through cold exposure, which is a very potent stimulator, we're making more UV and IR internally.

So it's our body's way of counteracting the low light availability in the environment, in particular in the UV range, and also shorter days in general by getting cold. So those are the kind of the things that I would say to lean into if we're gonna embrace wintertime biology. And if somebody has more coupled mitochondria, the best thing probably to do would be to either travel somewhere tropical for a couple of weeks during the winter or even leverage tanning beds during the wintertime because it's gonna be a little more challenging for them to use cold, productively to kind of harness, wintertime biology.

Katie: And I feel like I wish I could talk to you for eight hours and keep learning from you or attend some of your workshops, because I find this so endlessly fascinating. And I hope we get to have follow-up conversations. But before we end this episode, I wanna really, like, kind of tie some of these things together in a practical sense.

So hopefully we've made a strong enough case for why a lot of these things are important. And you have a lot of focus as well on, like, mitochondrial research and optimizing mitochondria. So I would love if you could kind of give us a hierarchy or a ranking of if someone is wanting to optimize their mitochondria or their energy levels, if they recognize that they have some mismatches based on the things you've explained, kind of how would you rank these things in order and/or what would an ideal day/scenario look like for getting a lot of these factors in the right balance?

Alexis: Yeah, so I would say most of this will relate to just going back to the basics and trying to live in a way that our ancestors would have lived ultimately. So, you know, when

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you wake up in the morning, ideally for sunrise, you're going out first thing and getting that light into your eyes, and ideally barefoot as well.

So you're grounding, you're getting the sunrise. Those cues are helping to optimize the cortisol response. We actually want cortisol to be elevated in the morning. It's very important to get our energy systems online, turn our cognition on, our energy, our, our perception of having energy on, our metabolism, all these things.

So we want to optimize that cortisol response in the morning. And then, you know, midday, is when UV is at its peak, so that's the most efficient time to go outside if you want to make, you know, vitamin D, POMC. If you have any mood disorders or appetite dysregulation or you're trying to lose weight, UV light is gonna be your best friend because it's a way that your body can get access to energy independent of food, and so it's naturally going to inhibit your appetite and increase your energy expenditure.

And so that would be the second time of day that's, like, really important. Food-wise, 'cause, you know, ideally eating breakfast within an hour or an hour and a half of waking up would be warranted. Metabolically speaking, that's when your body's best able to clear and assimilate those nutrients and use them productively.

That's when glucose tolerance is also at its highest. Side note, there was a really cool study done by Glenn Jeffrey a couple of years ago and published, where he showed that just exposure to deep red light for 15 minutes was able to reduce the blood sugar response to an oral glucose tolerance test by 30%.

Now, when you're in the sun, you're getting far more than just deep red light. You're getting all the red light, all the near infrared light, and of course all the other wavelengths as well. And so the best thing you can do i- for, you know, metabolic health and, and glucose metabolism is to take your meals outside, or at the very least go outside after you're finished eating, as a way to help clear those nutrients and, in particular, glucose.

The other thing food-wise that I wanna mention here is that we really need to be thinking about food as a barcode for the light environment in which it was grown or raised. And so what I mean by that is that, you know, carbohydrate-containing foods, let's say at 40 north latitude where I am, are only available about, like, mid-spring through mid-fall, like mid to late fall.

And so I shouldn't be eating foods that are, let's say, let's say, I'm eating a mango in December. Well, a mango can never grow in New Jersey where I am. But moreover, it certainly can't grow here in the winter because there's no UV light at all, and tropical fruits require UV light year-round in order to actually grow and flourish.

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And so there's a mismatch between the nutrients coming in, the biophotons from the food coming in as well, and the environment that my body is actually experiencing. And what we wanna do in order to create health and to, like, you know, lead a life that actually feels good is to create as much coherence as we can between the inputs into our system. And so what that means is during the wintertime, eating a more animal-based diet, trying to shop from, you know, farms and butchers that are local so that your meats are coming from close by.

And this is not only just good practice from a biophysics standpoint, but also from, like, an, an economical standpoint too. And an ecological standpoint because you're supporting farms that are, like, ideally having, you know, better practices. The foods haven't had to travel halfway across the world to get to you, so there's way more...

There's way less that goes into the transportation and production of those foods relative to, you know, consuming, like, mass-produced factory farmed, plant and animal foods. And so shopping local, shopping farmers markets is probably the easiest thing. A lot of people think farmers markets are expensive, but when you actually go and shop produce from local farms, oftentimes it's even cheaper than if you went to Whole Foods or Wegmans or whatever it is.

And so shopping at farmers markets, another easy thing about that is that typically what you're gonna find there is what is in season, and so it's going to help you to adhere to eating a more seasonal diet for your area relative to going to a normal supermarket. And so also the more shelf-stable something is, typically the more dead that food is.

There are exceptions when it comes to ferments, for example. But most packaged foods, all packaged foods really, if they're, like, sitting on a shelf at room temp are dead foods, and they don't really contain any useful information for your body. And so I would say, you know, avoid... Doesn't... You don't have to be neurotic about these things either.

I, I typically like what Dr. Cruz says about the Pareto principle, like the 80/20 rule. So, like, 80% of the time you're doing the right things, living in accordance with these principles or your own values. And 20% of the time is, like, wiggle room and, you know, just to have some flexibility in these things because, you know, we all are living life, and it doesn't have to be perfect in order to be good.

And so that's what I would say food-wise, in general, whether it's, you know, breakfast, lunch, dinner. During the wintertime you'll need to eat more food, especially if you're getting cold because during the winter there's less energy available from your environment. And so you're going to need to kind of compensate, and your appetite will probably be a bit higher during the winter as a result of that because there's no or little UV light to actually send those inhibitory cues to appetite.

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You'll also probably expect to feel like you don't necessarily have as much energy. When you are getting cold though, it is quite stimulating. So cold exposure actually stimulates the same neurochemicals that drugs like Adderall do, so norepinephrine and dopamine. And so one of the best things that people can do if they struggle with, you know- ADHD, which I honestly kind of resist as a true diagnosis.

I, I think it's just a, an intelligent response from a body that's overwhelmed by stimuli from a very young age. But if people struggle with attention, focus, mood, these kinds of things, cold is an incredible tool to add to the toolkit to really help, optimize neurochemistry and your ability to kind of drill down on the task afterwards or just feel, you know, good in your body.

And so that's kind of like a little bit of a seasonal distinction, depending on, what season it is, you may, you know, need to eat more or less. During the summertime, honestly, a lot of people will skip lunch because if you're getting that big UV bolus during the middle of the day, you're- you may not even be hungry for it.

And so I think following your appetite cues is always good. In general, I'm just a big fan of like tapping back into our own biology and like listening to what it's telling us. If you're thirsty, drink. If you're hungry, eat. Like, what kinds of foods are you in the mood for? Especially once you get all the processed stuff out of the diet and start eating more seasonally and reconnecting with nature, you'll probably find that you get these natural cravings for certain foods at certain times of year or certain times of day. And I think it's great to lean into that, and like consider that wisdom and not just like some fleeting, you know, random craving.

Once you get all of those kind of, dopamine-hijacking processed foods out of the diet, those signals become much more clear. And then later in the day, you know, we get a second chance to get those similar signals that we get at sunrise at sunset, but instead of it getting brighter, it's getting dimmer, so that's helping to tee up melatonin rise and helping us to get more wind down for the evening.

And then again, in the evening time, if you're gonna be on any screens, ideally put a filter on them. And if for whatever reason you can't do that or you're out in public somewhere where you can't control the lighting, that's when you would wanna pop on a pair of blue blocking glasses with orange or red tinted lenses, to at least protect the light that's coming in through your eyes since that is the major signal that is setting the circadian rhythm, and that master clock.

And during the daytime, if you're somewhere that has a lot of like LED or fluorescent lights, typically what I'll do is I'll wear, a pair of yellow tinted lenses to just help remove a little bit

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of that blue light. We don't wanna remove all blue light from our daytime environments because it is important signal for alertness, awakeness, metabolism, all these things.

So the yellow tinted lenses will remove about thirty percent of the blue light to just help reduce the eye strain, and like the intensity of that isolated frequency. So that's what I'd recommend for during the day if you're in some kind of, you know, environment where you can't control the lighting.

But otherwise, you know, candles at nighttime, dim incandescent bulbs, red or amber. During the daytime, I like reptile bulbs, higher wattage. Just make sure that your light fixtures, can tolerate the wattage of that bulb, otherwise... Bulb, rather. Otherwise, it's a fire risk. So for example, I have a, a lizard bulb out in my living room, and it's in a 100-watt lamp.

It's a 100-watt bulb. So the higher the wattage, the brighter the light, and the more light that's emitted. So I recommend that for daytime use. You know, grounding mats inside. You can put them in rooms, plug them outside a window. Just has to be connected to the ground in some way. And incandescent bulbs in general are better because we're making more of that, long wavelength light.

There's a little bit of UV light, but mostly what they're providing is adding back that near-infrared and far-infrared component. They're very similar to, like, what you would get from firelight. And then just, you know, making sure we're taking light breaks throughout the day to kind of allow our biology to sample the light spectrum at different times of day to help keep that clock entrained.

And then at nighttime, we, you know, if we're restricting blue light and we're using candlelight or dim bulbs and we're not blasting ourselves with screens, we're gonna naturally get sleepy, not that long, you know, within an hour or two after the sun going down. And we should follow that cue and allow ourselves to go to sleep.

And ultimately, if you do this, you'll naturally, you know, feel yourself waking up, typically with the sun or sometime around that time. And, you know, you won't even necessarily need to use an alarm clock or anything like that to make it happen. Your biology wants to sync up to these cues. It's what our biology was designed to do.

It's just a matter of kind of getting back to the basics and getting back to, getting back to nature ultimately.

Katie: I love it. You've got- given us so many practical tips and such beautiful explanation of why the body responds the way it does to these cues. For people who want to follow your work and keep learning from you, I know I love seeing your research and the work that you're doing, where can people follow what you're doing or keep learning from you online?

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Alexis: Yeah. So I'm almost only active on Instagram, @dralexisjazmyn, J-A-Z-M-Y-N. I have an X account, but I don't really use it. So mostly people can find me on Instagram. I post a lot in stories. I do post on my wall as well. I have a couple eBooks, a, a couple different course options as well. If people wanna learn, depending on how science-y or, like, protocol-based they want to go, there's different options there.

But yes, I'm quite responsive there, in the DMs. And then, you know, if people wanna learn more, I have a bunch of highlight reels and, like, a wall full of different posts a- around these topics, and I provide a lot of citations if people wanna look into the research and read some papers or, you know, learn about these things.

There's a lot of resources available there.

Katie: Amazing. I will make sure that's linked in the show notes, along with some links to all the things we've talked about. I am deeply grateful for the work that you do, for the time that you shared today with us, and I hope that we get to have more episodes in the future, 'cause I really love learning from you.So for today, thank you so much for being here.

Alexis: Thanks for having me. This was really fun. And yeah, we, we can do it again sometime.

Katie: Amazing, and thank all of you for listening and sharing your time with us. We're both so grateful that you did, and I hope that you will join me again on the next episode of the Wellness Mama podcast.

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