



Episode 301: How to Use Light to Drastically Improve Health With Matt Maruca

Child: Welcome to my Mommy's podcast.

This episode is brought to you by Joovv red light therapy. I've used red light therapy to support my skin, hair and health for years. Also called photobiomodulation, it works by using very specific wavelengths of red light that support cellular function in various ways. I personally noticed the effects on my thyroid function, on skin elasticity and how clear my skin was, and on hair growth, which was a huge benefit after losing hair in the early stages of thyroid disease and after pregnancy. Joovv has a variety of sizes from a small handheld unit that is great for face, joints and on the go all the way up to full size wall units that can even be used in doctor and chiropractor offices. Go to joovv.com/wellnessmama to learn more and check out all the options.

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Hello and welcome to "The Wellness Mama Podcast." I'm Katie from wellnessmama.com, and I'm here today with Matt Maruca who is a researcher, a teacher, an entrepreneur in the field of photobiology, or the study of how light affects human health. He is the founder of Ra Optics, R-A Optics, which focuses on developing the world's highest-quality blue light protection glasses. He began his journey after having suffered from poor health and chronic fatigue since 14 years old and he chose to skip the beaten path of higher education, start his own business, and pursue his passion of self-education and building optimal health to experience life to the fullest extent. He is only 20 years old and he travels the world studying and teaching about the relevance of light in human health, which is what we're going to go into in depth on this episode, the role of light in health, how artificial light can be beneficial or harmful, why we need sunlight and so many other topics. Matt, welcome. Thanks for being here.

Matt: Thank you for having me.

Katie: I love this topic of light and how it influences our biology. And to start, I know that this is a huge research topic for you and I would love to know what your story is.

Matt: Yeah. So when I was about 14 years old, I was going into high school naturally and I was starting to have all kinds of health issues surrounding my gut, allergies, my energy levels, headaches, and so on. And I was told by all these doctors that I would see that they were just normal things that you would face genetically and that I really couldn't do much about them except take Tums, take Advil and that kind of thing. You know, it was really, really an allergy medication. So I was disheartened, to say the least. And honestly, what happened was I sort of like most people just didn't really look any further, but I also started having acne breakouts. And that was where I said, "Nope. No thank you. I'm gonna start researching how I can fix this." And, of course, I came across diet. I came across the paleo diet. I came across your website and your work and Ben Greenfield and Mark Sisson and all these folks. And I just felt so much better when I cut out grains, dairy, and legumes. And naturally, as a 14-year-old, I just started thinking, "Well, a huge pillar of my worldview has been proved wrong. So what else that I truly believed and thought was true is also wrong?"

And so I started diving deeper and eventually I learned about how light influences these engines in ourselves, the mitochondria, and how that could sort of help me to go to a new level of optimizing my health and performance by looking at really the most underlying factors of what is happening in these disease states and so on because there's some great research showing that the modern diseases are, as you probably know, they're not just genetic. They're actually epigenetic and caused by our environment, our diet, our lifestyle, our circadian rhythm, our sleep. And one of the main mechanisms by which that's happening is mitochondrial dysfunction. Our cellular engines are falling apart. So when I learned that I just got fascinated in what drives the mitochondria and their function and it turns out it's primarily light and our circadian rhythm and our sleep.

Katie: I love it. Yeah, that was part of my own research journey as well. And I think that that's one of the... Like people start to understand how food can impact us because you can immediately feel a difference when you eat something that maybe your body doesn't agree with or we obviously can tell really drastically how important sleep is for health if we miss one night of sleep. And I feel like light's one that takes a little bit more research and understanding but can be equally powerful. So let's start there. Explain what role natural light plays in health and what role artificial light plays in health.

Matt: Yeah, so natural light is the driving energy force for all complex life on Earth, which it sounds like a broad statement in some way and but it is, but it's very true. So life began at the hydrothermal vents at the bottom of the oceans that actually they weren't exposed to sunlight in the beginning. And the primary energy driving the reactions where life began was infrared light energy, whose source still ultimately came from the sun where all of the Earth's molecules and atoms were formed. But it was indirectly coming to life via the Earth's mantle or the molten layer inside of the Earth. And that heat was coming up, heat in the form of heated water that was moving a bunch of chemicals around in these hydrothermal vents. And so all of life sort of, even the spark that began life and the reactions that we call life was driven by light energy.

So as life eventually evolved, came to the surfaces, we continued to develop all sorts of, how can I say, processes and functions that are ultimately driven by the energy of light. And, for example, even something we take for granted is that we consume food. Food is matter, but the difference between food and, for example, dirt is that, you know, food is something that we can actually get energy from. And a great question to ask is where is that energy ultimately coming from? And if we look at food, we look at the electrons in food,

for example, the electrons on the hydrogens that we burn in our mitochondria with oxygen. The same way that a car engine burns hydrogen from a combustible fuel source, like petrol with oxygen from the air, we do the same thing with the hydrogen we consume from our food. That all the food we're consuming, you know, it's hydrogen or whether it's fat or carbohydrates, we're ripping the hydrogens off, racking them with the oxygen from the air through our breath in our mitochondria, and all of the energy for those reactions is light energy. Those electrons, the reason they have energy, is because they were excited by sunlight.

So truly, light keeps us alive. And so it's really important that we get light that's beneficial. And, for example, plants that are grown outside, you know, not indoors, for example, that's one piece of this. But directly, natural light affects the body in a number of ways. One that is very tangible is by affecting our circadian rhythm. So, for example, when we're exposed to light in the morning, it's that inclining blue light after the sunrise because the blue is filtered by the atmosphere. And that's why as the sun's lower on the horizon, it appears more orange because more blue is filtered. But as it rises, there's an increase in blue and in the ultraviolet as it has less filtration going on. And so that stimulates the production of all kinds of key hormones by stimulating our hypothalamus directly via our eyes. And that essentially controls what is called the circadian rhythm, which again, is those hormone secretions are a piece of circadian rhythm. Our metabolic function is a piece of the circadian rhythm, so our metabolism is most active in the middle of the day as the sun is strongest, whereas it's less active in the later hours or the early hours.

And, for example, protein synthesis in the muscles is optimized in the late afternoon. And then after the sun goes down, we have, what we're supposed to have, is darkness and so then we begin secreting melatonin. And melatonin is this amazing molecule that is repairing our mitochondria and the mitochondrial DNA, keeping our levels of mitochondrial oxidative damage down. It's the greatest antioxidant ever created, which life innovated when oxygen became extremely prominent on Earth. And so light is driving that. And so when we're exposed to artificial light, conversely, that's preventing the secretion of melatonin in the evening, this key amazing antioxidant that basically keeps us closer to the young side of the line of life and further from the old side of that. If we imagine life as a linear line, you know, and each day we go a little closer towards death and then when we sleep we go a little bit closer back towards life and birth and melatonin is really important for that. So natural sunlight stimulates its production via exposure in the morning and artificial light damages or prevents its natural secretion in the evening, which is a huge deal for our body.

And then during the daytime, even if we're exposed to artificial light, it's also not totally harmless because even though we are designed to be getting blue light and artificial light or I should say yeah, blue light wavelengths and light from the sun during the day, artificial light contains a very unbalanced spectrum of light. And it also contains this thing called the flicker effect because it's plugged into our alternating current power grid. So artificial light basically creates a chronic stress response in our brain and chronic increased secretion of cortisol throughout the day if we're sitting in an office or on a screen. And that's not something that occurs if we're out in the full spectrum of sunlight because artificial light is also not balanced in the way that the sun is.

So, for example, many people are familiar with Joovv Red Light Therapy. I've seen that or I believe you also are a fan of their products and so on. And the reason red light therapy is so great is because our cells or

mitochondria are designed to be constantly getting bathed in natural, full-spectrum sunlight, which includes red and infrared wavelengths. Now that we've moved to this indoor lifestyle, we're behind glass and windows, which filter out a lot of the infrared wavelengths, in fact, most of them, usually, we think that the red light panel, for example, is adding a benefit. But I like to tell people that it's actually just giving us what we're designed to be exposed to all the time, which is optimizing our mitochondrial function.

So artificial lights are also deficient in those red and infrared wavelengths and higher and blue, which leads to more cortisol secretion and less healing and so on. So that's sort of the skim of the surface how, you know, natural light's affecting our biology and our circadian rhythm and our sleep and our hormones and many other processes like bone development and so on, Vitamin D, immunity, cancer prevention. But then artificial light is totally uncoupling these, what we could say, tightly-coupled cycles that are designed to be, you know, we get just the right amount of blue light to stimulate growth and so on. But we have red light to stimulate healing and so on as well. And then we don't have blue light into the evening and get that period of rest for ourselves to heal. But now today with artificial light, we don't.

Katie: Yeah, exactly. I feel like we actually do it completely backwards. We don't get enough natural light in general, but especially in the morning, and then we are looking at artificial light until literally the second we go to bed most of the time. And people really underestimate, I think it's hard to understand until you do blood tests and actually see the results, just how drastically this changes your biology. In fact, one of the biggest changes I've made for my health that I love telling people because it's totally free is to make sure I go outside every morning as close as possible to waking up and spend time in the natural light. Because even if it's a cloudy day, like you mentioned, you're getting such a more broad-spectrum light outside and so much more than you could from any indoor light, even from one of those 10,000 lux lights, which is an alternative. But the sun does so much more than any artificial light can do.

And then on the other side of that trying to avoid any blue light after sunset. And I think obviously in an ideal situation we would just be getting all of that outdoor, natural light all the time. And I think that's another important point to start and really cover at the beginning of this topic, which is the importance of sunlight for health. And you touched on it a little bit, but the sun has gotten such a bad rap because of sunburn and the potential link to cancer. And I know that you've done research on this as well and I wanna kind of tackle this elephant in the room of the importance of sunlight. And do we really need to be as afraid of it as we're often told?

Matt: Yeah, that's a really great question. So no is the answer, of course. And we both know that, but it is, again, very scary, given the recommendations given out by sunscreen companies and dermatologists and so on that sun causes cancer. So I will say that the evidence has shown that sunlight increases the rates of squamous and basal cell carcinomas. And so this is generally attributable to people who are getting too much sunlight. In general, the best way for people to look or... I shouldn't say too much, but it is an absence of light throughout the working year, for example, when people are indoors or in school and then going out for very brief, extremely intense exposures relative to what the body is used to in the middle of the summer, and then being out of the sun again for pretty much the rest of the year. This is what those types of cancers are generally attributable to.

Our body actually has the greatest sunscreen ever, which is DNA. DNA is designed in the top levels of our skin to be scattered so that the top layers of the skin cells, one of the levels are called keratinocytes, and these cells basically die upon exposure to ultraviolet light and this is a very well-designed system within the body to control our solar exposure so these cells die. They scatter their DNA. And DNA, this is another interesting piece relating to your question of how sunlight is important for our biology. Our DNA has been shown in research on how biophotons, these life-created photons, are actually emitted by our DNA and used for cellular communication. So just right there, research indicating that, again, ourselves emit and use light and it's not just any kind of light. It's actually extreme low-frequency ultraviolet light. So research is clearly showing that our cells use light for communication. It's even more specifically one of the main functions is for mitosis, cellular division, which is occurring all the time. The stimulus for mitosis in eukaryotic cells is small pulse releases of extreme low-frequency ultraviolet light. So any of your listeners who are interested in the subject could pick up a really great textbook called "Light Shaping Life Biophotons in Biology and Medicine."

Some of the other things that they found, these researchers, throughout the early and mid-1900s researching these things called biophotons was that stressed cells leak a lot more light and healthy cells retain light very well. And in healthy cells, the light is what we could call more coherent in its function and structure whereas in unhealthy cells the light is significantly less coherent. These are some of the things that were found by these researchers. Another just fascinating finding was that when an organism would die in the period between death and then rigor mortis when the corpse is just rock-solid stone-cold and lost completely of what we would call its life, the cells in that in-between period are actually leaking this extreme low-frequency ultraviolet light. So it really implies and shows that our cells are almost what we could call like a playroom for light energy to drive all sorts of biologic processes.

And then when we die, the sort of...what death really is, is when we lose our ability to retain and utilize light as beings of light and so we leak it out and that's the end. So light's super foundational to everything in our body. And it's no surprise that very, you know, spiritual and religious traditions throughout history always focus on the light, whether it's Christianity or Buddhism or Hinduism. Any of these focus on light. So anyhow, the notion that UV light causes cancer and is bad for us when it's so vital to our biology is absurd right off the bat. But, again, we are designed to get it periodically in the springtime as the winter goes away, building up naturally what we would call that solar callus via the mechanism I was sort of getting into.

If we don't get exposure to the morning light throughout the seasons and even some mid-daylight throughout the seasons, going from spring to stronger light in the early summer and so on, then we don't build up the solar callus and someone who goes outside in the sun, they're just absolutely frying their cells and creating a very huge amount of oxidative damage and stress. And this would absolutely lead to cancer. But someone who goes out in the sun and builds up that healthy solar callus, in other words, a tan naturally is gonna be able to go out in the sun and actually assimilate light, get the benefit of Vitamin D, get the benefit of lower blood pressure and an increased blood flow. The increased production of all of our key hormones, sex hormones, neurotransmitters and so on because these are all primarily catalyzed by light exposure and our circadian rhythm. So that's one thing.

Now, another really fascinating thing is with melanoma it hasn't even been clearly proven that sunlight causes or increases risk for melanoma. In fact, the exact opposite has been proven. So it's been shown that people who get sunlight and people who don't get sunlight have essentially similar rates of melanoma. However, at least in the studies that were done, I would wager that people who get sunlight... If there were more people who lived in a toxin-free world, you know, weren't getting exposed to the chemicals and so on in our food supply, I would say people who get sunlight probably have lower rates of melanoma.

But going with the studies as they are there, the research suggests that it has actually shown pretty clearly that the people who get melanoma but have been getting sunlight exposure actually have a significantly higher survival rate. And the primary evidence behind that or theory behind that is that people who get sunlight have higher levels of Vitamin D, which improves the function of our immune system and our ability to, let's say, fight off cancer or fend off cancer and so on. And other studies show that high Vitamin D completely almost eliminates the risk of cancer entirely or significantly reduces the occurrence of most cancers. So that's really what people need to know when they're getting concerned about sun. It's actually a significantly greater risk to avoid sun than it is to get healthy sun exposure starting in the springtime.

And in one more study, I'll just throw in there is one by a guy named Lindquist from Sweden that was done. It was completed in about 2017 and he studied about 20,000 Swedish women over their lifetime. So this went on for quite a long time, this study, and he found that... You know, he was looking for what are the factors that create health or create disease. And the number one factor that was the most prominent in preventing the generation of disease was to sort of, to his surprise and many surprise, was the amount of sunlight exposure that these people got and so much so that it was even not getting sun was a greater risk for health than smoking cigarettes in their findings. It's on that same magnitude.

Katie: Wow. Yeah, that's really dramatic. And I'm so glad that you brought all that up and brought up those studies because in my own research as well, like we know the sun obviously provides Vitamin D and in a different way than supplements even can and that that is really important. There's a correlation with low Vitamin D and risk of many types of cancer, ironically, including skin cancer. And a lot of people I think kind of throw the baby out with the bathwater and avoid the sun and avoid the benefits that come with it out of the fear of this one thing that, like you explained, is not even actually well-documented and necessarily causal to begin with. I also think it's important to understand the difference of the benefits when the sunlight hits our skin versus when sunlight reaches our eyes and why those are both important. So can you break down those differences?

Matt: Yeah, so sunlight hitting the eyes is very interesting. The research has shown that we have independent pathways for the way that light entering our eye affects our biology. So one pathway is the visual pathway. And that works via one portion of the optic nerve, which essentially transmits impulses on the nerves, which are initially stimulated by light breaking apart temporarily little photo pigments you could call them in our eye. And so that that creates this nerve stimulus, which carries along the nerves. And that goes back to our visual centers and sort of the lower rear section of our brain. And that is how we see and create images. But the really interesting thing is that before the brains, you know, that we're familiar with developed vision, there

were primitive eye structures or ocular structures that were used to, use light to interpret basically the circadian rhythm or the time of day.

And so we have another pathway that goes from the eye from the retina directly to the hypothalamus. And this would be considered the non-visual pathways of the optic nerve or the energetic pathways of the optic nerve, which go to specifically the suprachiasmatic nucleus in the hypothalamus, which sets our circadian rhythm. And because the hypothalamus is sort of a master controller of our metabolism, it again has huge impacts downstream on our metabolic activity, a huge impact on pretty much every system in the entire body because of this sort of really fundamental rule that it plays in managing and controlling our metabolism. So light via the eye has a pretty strong impact there on the circadian rhythm and so on.

Now, light via the skin has a different type of impact, but it's also fairly significant. The latest research, well, again around 2017, it was shown that this photopigment that is present in our retina for basically receiving blue light signals and telling that suprachiasmatic nucleus of our hypothalamus, whether it's daytime or whether it's nighttime, it's called melanopsin. And it was this really obscure discovery or obscure idea for a long time because researchers had found that if they nucleated animals... This is a separate book I think some of your listeners who like the science would really like. It's called "The Influence of Ocular Light Perception on Metabolism in Man and in Animal."

And some of the most interesting... And this is getting back to the ocular side of things actually, but it's worth touching on. What this researcher and his co-researchers, Fritz Hollwich which his name is, he's German, found when researching how, again, ocular so light perception through the eye affected metabolism was that it truly did affect every single system. The kidneys were affected. The liver was affected. The brain was affected. Our sex hormones are affected. For example, some things that just come to the top of the head are that it is well-known and natural that animals are most fertile in the spring and summer seasons and much less fertile going into the winter. And this is clearly because of the availability of sun and its importance in driving a huge number of these biological processes and so many of which we don't even know, but it is so foundational to fertility.

And again, light alone via its action on cholesterol and then the subsequent molecules on the path from cholesterol to our sex steroid hormones such as progesterone, estrogen, testosterone, and so on is very significant because when these molecules are excited by ultraviolet light, the rate of reaction... And, by the way, it's fascinating, but these molecules do all... So, for example, the precursors for these sex hormones, also tyrosine and tryptophan, these molecules that are converted into, for example, dopamine, melatonin, serotonin, and respectively, all of these molecules exhibit these things called the benzene ring, which is a type of molecular structure that absorbs ultraviolet light lengths.

So what that implies is that, again, that wouldn't be there for no reason. It implies that these molecules are designed to be absorbing ultraviolet light, which comes from the sun. And then that increases the rate of reaction for us to be able to make the molecules that we need to make such as our sex hormones. So when the light's around, we make more of our sex steroid hormones to drive all of these processes. The same thing

with light coming from the eye stimulates, again, the creation of hormones like dopamine, serotonin, ultimately, melatonin. So there is misconception that melatonin is only created with darkness at night. In fact, to really have optimal levels of melatonin, we do need to have that morning stimulus of light to get, let's say, get everything going in the body. And then we also need the darkness at night to allow for the secretion of melatonin properly.

So those are some of the things and some of the ways that light via the eye affects our metabolism. I definitely recommend to those who wanna learn more to check out that book to get the really in-depth research. One other thing that sticks out is they had blind patients who had developed cataracts over their lifetime. And what they would do is they would remove the cataracts, Fritz Hollwich would, and these people's hormones and metabolites in their urine were often destroyed, these blind folks. But when he would remove the cataracts and thereby restore the transmission of ultraviolet light and the full spectrum of light intensity through the eye alone, all of the metabolites in their urine would completely normalize or nearly normalized with no other change. So just the light passing through the eye and stimulating these metabolic control centers, if you will, had such a tremendous impact downstream on every single system in the body. It's almost unbelievable.

So that's huge via the eye. And that's why I highly recommend people avoid the use of sunglasses and contact lenses, in particular. But also, if one is wearing optical glasses that they minimize the use when they're outdoors or at least try to get some time where the light is allowed to shine on the eyes, not directly, but indirectly. And that's very important. So then via the skin, there's still tons of effects, for example, the creation of our solar callus when we get light on our skin. Another really amazing factor is that when we get this red and infrared wavelengths in our skin, on our skin and actually they penetrate deep, more deep, into our blood vessels and so on... Red and infrared wavelengths, in particular, penetrate this deeply. They're not blocked out like the other wavelengths are by our skin.

And so they increase basically just by the physics of how water interacts with infrared light. There's a great researcher named Dr. Gerald Pollack who a lot of these podcasters and health people have been talking about and so on. But he's shown that red and infrared light basically turns water into this...what they call the fourth phase of water this liquid crystalline form of water. And when that occurs within our blood, essentially it creates more flow of our blood throughout the vessels and the flow of blood in the vessels because blood carries iron, blood cells carry iron, and iron is magnetic. When there's more blood flow in the vessels, it releases this molecule called nitric oxide, which is trapped or it is contained in the lining of our blood vessels. And this release of nitric oxide, which again is just stimulated by the magnetism in the red blood cells from the iron, which is alone stimulated by light hitting our skin, causing the flow of that blood and the movement of those red blood cells. That nitric oxide further causes vasodilation, so, again, dilation of our blood vessels, which naturally just by virtue of expanding the blood vessels, reduces blood pressure.

So so many people have high blood pressure. It's really just a deficiency in sunlight largely. But that is reduced and then more blood is able to come to the surface of our skin with this so-called vasodilation because of nitric oxide and sunlight. And then the blood cells and the proteins on blood cells such as hemoglobin have been observed to have very specific absorption spectrums of light in the red and infrared range. And, also, in

ultraviolet, different proteins, porphyrins they're called, have these absorption spectra in the ultraviolet range. So via our skin, sunlight is able to charge up our blood and our blood cells essentially with more light, which is able to... Just like our blood cells carry oxygen from our lungs to our mitochondria, these blood cells are actually carrying all of this light to our mitochondria as well with oxygen. And this light kind of like red light therapy is able to increase the function of our mitochondria because when we have more energy, we can basically carry out our functions better.

So it's really amazing that just being in the sun with our skin exposed can improve the function of our mitochondria and basically reduce blood flow or I should say reduce high blood pressure, reduce blood pressure and so on. And that's another...that's a really big deal for our health. The only other thing I would mention of huge significance is that it has been shown that melanopsin is in our skin, this photosensitive pigment that I had discussed earlier a bit. It is, in other words, blue light wavelengths at the wrong time of day, blue light being the most active for controlling our sleep and our circadian rhythms just because that's what these melanopsin receptors are sensitive to because of the change of blue throughout the day, they can affect our circadian rhythm via our skin. So wearing blue light blocking glasses at night is great to improve melatonin levels and improve the circadian rhythm, prevent disruption. But if we're getting a lot of light on our skin, it actually can also affect these systems.

Katie: Interesting. That makes so much sense, that it totally reframes I think how people think of things like sunglasses and things like sunscreen and avoiding the sun when you realize just how much goes into that.

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Katie: And I think the flip side, you talked about this in several different ways. But I'd love to go through kind of a checklist of if we think of light as important of a nutrient is anything we would get from food, how do we optimize our light diet for our best health?

Matt: Yeah. Well, you know, I'll just throw in one more thing that I did spend reading into a little bit more deeply. And this does tie right into your question. So there's a really important molecule called leptin that's not as well-known about as it should be. And leptin essentially controls our appetite and even more specifically energy balance and energy accounting. So fat stores in our body actually create leptin and leptin flows through our blood and eventually reaches the leptin receptor in the hypothalamus, that same region that we've been discussing for controlling our metabolism. And so, essentially, what can happen with leptin is that if we're not getting enough sun, leptin and doesn't work as well. So leptin's another molecule that has specific absorption spectra in the ultraviolet range of light. And so if we're not getting the proper weight, full spectrum of sunlight as... Let's call it a vitamin because it really is. It really is like nature's greatest multivitamin that controls so many different processes.

But in each wavelength of light, each color essentially acts on different reactions and different molecules in the body. So like your analogy couldn't be any better. It truly is like a multivitamin with each wavelength being a different vitamin. So that affects a different process. So when leptin doesn't get the ultraviolet range of light, it isn't going to be as effective in binding to the hypothalamus leptin receptors and basically signaling energy accounting. That's one issue we can have with leptin. Other issues we can have with leptin would include, for example, too much blue light at night actually leads to the desensitization or even destruction of leptin receptor sites. So this is another really big issue that is just caused by either lack of sunlight or too much artificial light disrupting this very delicate leptin system.

And so what happens when we have either a destruction in leptin receptor sites or lowering of their receptivity to leptin or lowering of leptin's effectiveness to communicate with those receptor sites and so on is that we're gonna have essentially chronic increased appetite. And ultimately... There's a neurosurgeon named Dr. Jack Cruz who's really gone into huge depth on how light affects the body and specifically leptin and created this whole leptin protocol for resetting the leptin hormone. And it involves just basically getting light in the morning, eating a big breakfast to set the circadian rhythm, and stimulates satiety with protein and then to avoid artificial light at night. And it's very simple and people have huge benefits because this is the ultimate circadian rhythm reset.

But the other interesting thing is that leptin controls these neurons in the brain called the orexin neurons, which are ultimately collectively responsible for wakefulness and us being awake. And so when... There's several others. There's actually several systems. I can't even keep all the names in my head. There's so many different glands and I should say areas of the brain responsible for wakefulness. But ultimately, leptin does control the overarching function of these. So if we have issues with leptin, we're also gonna have issues with chronic fatigue. Leptin also controls our proper secretion of antidiuretic hormone to keep us from wanting to urinate in the middle of the night. So oftentimes people will have issues staying asleep, that's the leptin issue. If people have issues with having to urinate throughout the night, that's also an issue with leptin. And so it's

amazing how such an important master hormone is truly directly governed by circadian rhythms. And, in other words, just exposure to light throughout the day, morning sunlight, avoidance of artificial light and so on.

So anyhow, to kind of get more into the question, really the simplest way to make our light diet healthier is to avoid artificial light to the extent possible. And if not, if we can't avoid it, it is to mitigate it properly. So, for example, for software, for computers, there's great software called Iris developed by a friend of mine who's a Bulgarian programmer, a very, very amazing genius, and it's very affordable. There's even a free type called f.lux that's very well known, but Iris has a bit more functionality and therefore I would recommend that. So that's a great start for software. People can get that for computers and so on. For Android phones, there's Iris mini, and for iPhones and iPads and Apple devices, there is a hidden feature that people can get in the settings. It's called color filters. But essentially, I would say anyone with an iPhone should go on YouTube and look up how to make your iPhone red and there's a hidden setting. And then you just set it so that you have a triple-click on your...access it basically on your phone, triple-click of the home button. And it sets this accessibility shortcut where you just triple-click and then your screen goes red and it filters out all the blue light. And that's really an amazing way to reduce artificial light exposure.

And then the best way is to wear blue light blocking glasses. And so essentially blue light blocking glasses are great because not only do they eliminate the huge amount of exposure we get from looking directly at screens, which are looking directly into light-emitting sources, which are hitting directly into our inner retina, which is exactly where the most of these light-sensitive melanopsin pigments and cells are found. And so screens are really a huge issue for disrupting tons of our hormones, leptin, sleep, melatonin and so on and neurotransmitters as well. So that's a really great thing to do, blue light blocking glasses.

But one of the key things to note is that people will go on Amazon and look up blue light blocking glasses and buy a really cheap clear lens pair. And the key thing to know is that clear lens blue blockers do not really block light. Unless they have a minor yellowish or grayish hue, they aren't reducing blue. Sometimes they'll have a shiny blue coating, but the buyer has to really beware on this. What they'll do with blue light blocking glasses today is they'll send out a little bit...especially clear lens blue blockers. They'll send out a little blue LED that you can shine through the lens and it will block that LED light so it won't pass through the other side. And people are like, "Oh my gosh, that's amazing. It's blocking the blue light." Now, the issue is that that LED that they're sending out to for people to test with is 405-nanometer emission and all the screens that we work with and LEDs, cool LEDs, which are now very a common source of lighting on car headlights and screens, the peak emission is around 455 nanometers and there is almost no emission at 405 nanometers.

So in other words, what these glasses are doing, they block blue light up to 420 nanometers because you can do that without affecting the color of the lens because there's almost no blue light up to 420 nanometers present in our lighting and devices. And, therefore, the lens appears clear. And then they end up blocking very little by the time the lens gets to 455 nanometers, which is what's emitted by our screens. So they're blocking one part of the blue spectrum but not the part of the blue spectrum that is emitted by our devices and, therefore, are quite literally completely worthless. So that's just a really important thing for people to know before they go out on Amazon and just, you know, waste their money and think they're getting a benefit.

Now, I did make a company to make blue blockers and it's just, you know, there's a couple that are making them genuinely honestly blocking the right wavelengths. But another key thing for people to know is that there's daytime blue blockers, which reduce blue light and are good for day. And then there's nighttime blue blockers, which block a much larger range of blue light wavelengths. And nighttime blue blockers should either be orange or red, which means that they're blocking quite a large amount of the spectrum, but they should also be tested and verified and reputable and so on. So you don't wanna wear daytime blue blockers at night because you're not gonna be blocking enough of the blue light to truly have the biggest benefit on melatonin. So as far as optimizing the circadian rhythm goes, you would wanna put on a pair of night blue blockers about the time the sun goes down.

So as soon as it gets dark, essentially as soon as the sun goes over the horizon and then maybe 20, 30 minutes later if you're not exposed to bright artificial light in that period, then one can put on the blue blockers and that's just gonna totally optimize our circadian rhythm. But the more important piece of the equation than just avoiding artificial light, significantly more important I would say, is to make sure we're getting, like you said, Katie, very healthy morning light exposure. It is truly life-changing just what getting out in the morning can do.

I've spoken with... I remember very particularly one guy who I met and I had told him... It was for an event I was gonna be speaking at and he was the organizer. And so I just told him, you know, what I would talk about. And he just went ahead and started applying some of it anyhow because he was just excited and it made a lot of sense to him. So he went out and started opening his window every morning in LA and letting the sunshine in. He's lucky he had an east-facing window so he could see the sunrise. And he said that his life completely changed. And he was an African-American guy who... So just to touch on that as well, anyone whose ancestry comes from a place that is equatorial or subtropical or I should say tropical and even subtropical has a much greater concentration of melanin in the skin to protect from the huge amounts of light that are there. So now that many people have migrated across continents to places where that huge amount of light is no longer present, people with darker skin tones actually need to get more sunlight to make Vitamin D and to get the same amount of benefits as, for example, if someone is from Northern Europe or so on, they have been living in a totally sun-deficient area so the skin adjusted in order to let that light in.

So the difference between the palest white Irish person and the Somalian, very dark-skinned African person is about 10 times the time to make Vitamin D from one to the other. So that's a very important thing for people to note. But, in general, it's absolutely critical that we're getting that exposure, you know, in timely fashion throughout the day, in the morning at sunrise, and then also midday sun to drive our Vitamin D levels. So and then, of course, eating a good hefty breakfast, high-end protein, can really help to stimulate our circadian rhythm. And people, for example, often say, "I don't feel like eating breakfast. I don't have an appetite in the morning." That is also a sign of some level of circadian disruption. It doesn't mean that we need to be starving when we wake up. That also wouldn't be good evolutionarily.

But yeah, that's just something to keep in mind, especially if someone has cravings late in the evening or if one is eating meals late. This has been shown to be tremendously disruptive for our circadian rhythm because it

activates our digestion and metabolism going into the evening and so we really lose sleep quality. So just to sort of close that kind of question, it was shown by a researcher in San Diego named Satchin Panda, who's now been on a lot of podcasts as well, and he has a TED talk and so on, and a book called "The Circadian Code." They showed that in their studies researching animals, the animals that were fed unhealthy food during the time that their metabolisms were most active and ready to digest were actually healthier and had less rate of metabolic damage than animals that were fed healthy food at the time that their metabolism was supposed to be inactive and not ready to digest.

In other words, if I eat, for example, drink a can of Coca-Cola in the middle of the day when my metabolism is active, his research is indicating that that is less bad for me than eating a big healthy salad or steak or something like that at 10 in the evening when I'm supposed to be sleeping and repairing because then the body has to digest and sleep's disrupted. And then circadian rhythm is phase-shifted because sleep's delayed into the later hours of the following morning. And then we don't get the morning sunlight exposure because we're still sleeping. The rhythm is again, phase-shifted onward. So that's really important for people to keep in mind, just those two things. More sunlight and mitigation of artificial light alone are the most important things. There's others like drinking clean spring water and eating more healthy sources of seafood and so on. But those are really the keys.

Katie: That was awesome. That was one of the most comprehensive explanations I've ever heard. And you do such a good job of teaching this. I'm curious. Are there any specific additional recommendations for the winter months or for places that don't get a lot of sunlight where people can't just use natural light to do this? Like, for instance, earlier this year I visited Finland where there was only a couple of hours of sunlight the entire day for the time that we were there. Are there things people can do in those situations to still get the benefits?

Matt: Yeah, absolutely. First of all, your questions are fantastic. So this is really great. This is all the same questions people always ask. So because I wanna make sure, of course, and you wanna make sure that the guests get the right information or the listeners. So it's really great. So I would say, yeah, touching on the same note regarding the way that our skin evolutionarily adjusted for different regions of the world, people in Finland are somewhat optimized and the same like people from Northern Europe, in general, are optimized for those long cold winters with our white skin because in the summer we are able to make quite a large amount of Vitamin D, even though the sun in the summer in Europe still doesn't quite compare to the sun in the tropics or the equator for the majority of the year, except maybe in the middle of the summer. So we're able to store up Vitamin D in our fat. And that's actually what we're supposed to do is we make Vitamin D or we store it and then we're able to basically live off of that storage for quite a while throughout the winter.

However, that was when humans lived outside and wore loincloths. So we don't anymore. And so the best recommendation I would make is that people should aim to get as much time outdoors as possible during the summer months if you are confined to a wintery climate, a place that does have a strong winter. So that's one. Another huge one that's just tremendously beneficial right off the bat is to take vacations to tropical areas because, again, based on what we've discussed, sunlight is essentially a vitamin that is critical. And again, if we're healthy living in a time period before all the, for example, vaccinations and all kinds of other things that really negatively influence health and bad food, then we could definitely get away with getting the sun from,

you know, the end of the winter to the end of the fall. And that's two-thirds of the year we'd have a good amount of sun and vitamin D available. And so that was all right. But now we don't, so trips down to the tropics actually can make a lot of sense if people wanna invest in their health. That's really huge.

Another thing people can do is all the stuff they've done throughout history. For example, going skiing and going high up on mountains because the higher we go up on mountains, the more light is coming because of the elevation. And so that's another huge benefit and it's not gonna make more Vitamin D necessarily. But, especially if someone can take their goggles off at least while they're on the ski lift and maybe even while they're skiing down the hill for at least some period, we do get a huge amount of light so much so that people do need to wear their goggles to protect from blindness. And so getting a balance there is good, not too much so you get snow blindness, but getting some of it. Not having the goggles and glasses on the whole day long, that's really beneficial.

The general things that I tell people who live in wintery climates are also to use saunas. So a sauna is amazing. A sauna and I guess red light panels and infrared light panels are also quite similar in some way, but saunas are particularly powerful. And so sauna, cold exposure, as well as adequate seafood exposure because seafood contains tons of the Omega-three fatty acid DHA, which we incorporate into our cell membranes, into our nerves. They make up the myelin sheath thing that basically makes up our nerves. And just on a brief tangent, that... Of all the... There's very little knowledge about how humans specifically evolved from apes into humans. But the most compelling evidence indicates that... By the way, we didn't fish until significantly later on.

Fish hooks were not found in humans until quite a while later from our initial evolution. But the evidence does indicate that these sort of apelike ancestors or hominid ancestors of ours came across a huge source or food supply of shellfish and figured out how to take advantage of the shellfish, which is not only super high in DHA Omega-three, which builds the myelin sheathing around our nerves, which allow the nerves to conduct electricity efficiently. And if we have a huge dietary source of that, a logical explanation or the logical thing an organism would do would be to eventually, slowly over time to the extent possible, build a more and more complex nervous system and in particular the brain.

And so that consumption of DHA allowed human evolution of hominids I should say from apes. And that's shellfish. Oysters, mussels, clams and so on, particularly important, and so people living in wintery climates. And then from there, humans went on. We did conquer the globe from there and often times stopped eating as much shellfish and seafood and started eating cereal grains. And so we kind of stopped developing the Mediterranean... The Cro-Magnon who continued to eat seafood and shellfish did have even bigger brains than we do now apparently. So that was... That sounds pretty cool.

But anyway, people who are in these places should definitely, I recommend, consume more shellfish and seafood. Not high-level predator fish like tuna, swordfish, and shark and so on because these could have higher mercury levels, which many people can't detoxify properly anymore in the modern world because of all the many factors that are, you know, against us, you could say, and the indoor lifestyle and lower sleep

quality. But that's really important. So we got sauna, cold exposure, and eating more seafood. And, again, the biggest I would say is just to actually go outside.

There was a study in another great book called "The Healing Sun" that was actually focused on architecture was always built around getting natural light and more natural light into buildings. Even Florence Nightingale wrote about how she noticed that patients just often wouldn't heal when they were in darker wards that didn't have a lot of natural light for numerous reasons like those we've discussed. But so with this anecdote, it was that people with seasonal affective disorder who took just a one-hour walk outdoors, something like 29 out of 30 participants in the study had a significant reduction in their symptoms of seasonal affective disorder or entire elimination of their symptoms.

And so just actually making a point to go outside for an hour or two during the day, even if one is completely bundled up, it's okay because there's not tons of light and we're not gonna make Vitamin D on our skin. It would be ideal to do a little exercising so that you can warm up and get the skin exposed to that light. Even if it's a cloudy white sky, there's still plenty of light coming through. But just getting the light on the eyes for an hour or two is a huge benefit and particularly combined with a walk like exercise would be great. If someone can tolerate the cold, maybe putting on an overcoat, and being outside for a little while when they're working or being with family or whatever or just opening a window and letting that natural light in for an hour or two during the day is great. But the exercise outdoors in the winter I think is probably a particularly effective way to really keep people in good spirits and so on.

Combined with the other things, you know, again, sauna, seafood, cold exposure, and taking a vacation here and there and getting sunlight throughout the summer, it's huge, and lots of sleep. It's a time for rest in the winter. It's not a time to really be super active, you know, like in Julius Caesar's accounts, I love reading these kinds of historical things and to get a perspective, you know, with this perspective of how life has changed since we domesticated ourselves like cattle and dogs and so on. We've domesticated ourselves more than those animals we've domesticated. But anyhow, to look at these old historical anecdotes with this perspective is really fascinating.

And so, for example, Caesar's armies when they conquered all of Gaul or modern-day France, you know, it was like a 10-year campaign they went on and they always camped for the winter. They didn't go out and fight. No one did. They weren't attacked in the winter either, except on rare occasions when the enemy was most desperate. But, in general, like it was a time to rest. Even the armies completely put everything down and stopped. Now, with World War I and II, we didn't quite stop. They didn't stop in the winter because technology is more advanced. But then it was like you stopped. You know, you just kind of hold everything. So that's sort of what I think we should really go for if we're in a wintry place, just not pushing ourselves to the extreme. And that's what the long summer days are for.

So you know, one other thing just to note is that every single place on Earth... I didn't know this till recently, but every single place on planet Earth receives the same number of hours of sunlight every single year. It's just the distribution that's different. So if you're on the equator, you get 6 hours or I should say 12 hours of day

and 12 hours of night every single day the entire year. If you're on the North Pole, you get 24 hours of light for a couple periods and then 12 hours of light for a period and then 6 hours of light for a period. And then zero hours of light for a period. And so it ends up actually all being the exact same amount of light. It's just distributed differently. So if you live in a place that's dark a ton in the winter, you also get significantly more light during the summer than anywhere else on Earth. And so you should be outside all day long and even awake until 10 or 11 with the light because it's still giving a benefit and you don't need to sleep as many hours at that time. So those would be, I would say, the general things people could do if they're living in a cold place that would be very beneficial.

Katie: Amazing. I love how well that you summed that up and there were some great tips in there no matter what climate you're in, I think things we can all certainly benefit from. And I know you mentioned your glasses. I'll make sure those are linked in the show notes and I believe there's also a discount code for those. Those will be also linked in the show notes as well as links to a lot of the resources you've mentioned and studies you've talked about. I also love to ask at the end of interviews and episodes if there's a book or number of books that have had a really dramatic impact on your life and if so what they are and why. I know you've mentioned a couple in the interview, but I'm curious if there's any others that stand out.

Matt: Yeah. Well, let's see. I'll say with the health books, as far as the health books go, there's one called "Going Somewhere: Truth about a Life in Science" and it's by a guy named Andrew Marino. And basically what he was, what he did, he was the protege of a researcher named Robert Becker, Dr. Robert O. Becker, who discovered that the way our bones regenerate is via electricity and semiconduction, specifically. His protege, Marino, this author of this book essentially started asking maybe could power lines, high voltage transmission lines affect these extremely delicate electrical systems in our body because of the strong, very strong fields that these lines and electrical appliances in general that people were beginning to use in the '60s and '70s emit. And the studies they did showed that they did, sure enough, have an effect. And he ended up going on "60 Minutes" and all these kinds of things to discuss the findings, going to testify to defend farm owners and so on who were having these lines built over their properties without their... You know, they couldn't say no. It was because of the, I think, eminent domain laws or something.

So anyhow, basically the lab that they worked for in the Veterans Administration was eventually shut down because of their interference in these things. And the Navy had a huge stake in this research being sort of not done or covered up because they were using radar. And that was also being shown to be very damaging, causing cataracts and cancer in the times in the Cold War, but they needed it. So that's a whole saga that he describes in that book. It's like a spy movie, but it's true. And that's what's laid the ground for things like 5G technology to be now rolled out in huge amounts when it's posing a tremendous threat. So people should, definitely, I think, read that book and understand like why all of the stuff about cell radiation today and all of the devices we now use the wireless headphones people put in their ears, why they were proven to be totally risky. But basically what were the political factors during the Cold War that led that from being swept under the rug and then eventually to, you know, 50 years later the complete insanity that we're creating today. I'd say that would be probably the biggest.

And honestly, yeah, Julius Caesar's book about his conquest of Gaul or anyone who likes a good story, it is just absolutely magnificent to read. And the description particularly that sticks out is the German people he described were... They would wear loincloths and basically nothing even throughout the winter. So just to give an idea of how much more robust and robust and strong humans were, I think just even 2,000 years ago, it is just amazing. You know, if someone could literally live through a German winter just wearing a loincloth. And the same thing with the Native Americans. When the settlers first reached Plymouth, Massachusetts, they were literally wearing loincloths in the snow and they were totally fine in Boston winters. So I think that's very fascinating. And maybe one other is there's a great book called "The Razor's Edge" by Somerset Maugham that I read recently and it's just an amazing quest of a young man to sort of find meaning and enlightenment in the world.

And I think it's really important that although there's all this cool stuff that I've talked about regarding health and how to improve our life, we really don't even, I guess, how can I say, really know what we are, what life is, what Earth is, and where we are in the universe in some regard. And that doesn't mean we shouldn't do everything we can to optimize our life. I think it does. It means that we should do what we can, given what we know, but at the same time, I think trying to maintain some level of perspective that, you know, this is really fleeting, temporary, and we don't even know what it is that we're experiencing every day totally. It's just, I think it definitely is worth keeping perspective on it. I'm doing, you know, trying my best to do so as well.

Katie: Amazing. I will make sure all of those are linked in the show notes. This has been an absolutely amazing fact-fact episode and I really appreciate all of your time and your research and everything that you've shared with us today.

Matt: Yeah, likewise. I've had a really great time. I think it's been one of the best interviews I've ever done, so thanks to you and your questions.

Katie: Amazing. Well, thank you again and thanks to all of you for listening and sharing one of your most valuable assets, your time, with both of us today. We're so grateful that you did and that you were here, and I hope that you will join me again on the next episode of the "Wellness Mama" podcast.

If you're enjoying these interviews, would you please take two minutes to leave a rating or review on iTunes for me? Doing this helps more people to find the podcast, which means even more moms and families could benefit from the information. I really appreciate your time, and thanks as always for listening.