#34 – Detox in a Toxic World, Part 5: Digital Detox and the New Age of Toxins Transcript

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Series Recap and Digital Detox Theme

[music] Welcome to the trip lab kitchen table conversations about integrative medicine and psychedelics. [music] I'm your host and attending physician, Dr. Mariela Wood.

Hi everyone, welcome back to the trip lab. Today we are doing the final part in our five-part series, Detox in a Toxic World, where we are taking a deeper, more evidence-based look at environmental toxins, how they affect health, and what we can realistically do about them. And today, our last part is actually going to be a little bit different than the other four. I'm actually very excited about it. It was really fun to put together and to dive into what the research actually shows about all of these topics. And the topic is digital detox and the new age of toxins. So, all about EMFs, blue light, red light, all the things in that kind of realm. But first, a little recap into all that we've covered in this series so far. So, in part one, we talked about what environmental toxins actually are. We looked at the major categories that we are exposed to in modern life like microplastics, organo phosphates, food additives, all things in that realm. And we also looked at how they actually impact the body and what the evidence shows and does not show. Then in part two, we shifted into what we can actually do about this. So practical ways to reduce exposures, especially in the home. And we looked at the home as a health ecosystem. In part three, we looked at the other half of that conversation and moved into how the body is already detoxing 24/7 and what we can actually do to support those natural detox and elimination pathways through things like nutrition, hydration, movement, sleep, stress reduction, sweating, and a whole lot more. Then last week in part four, we took an evidence-based deep dive into all things detox, supplements, protocols, cleanses, basically everything out there in the wellness world that's being sold in the name of detox. We covered what actually has evidence, what is supportive, what has emerging evidence, but probably not that effective, and which things can actually cause harm. And as a reminder, I have a companion guide for all of these episodes that you can find on my website at drm marielawwood.com/guides. That's d rm a r y l a w o d.com/guides.

So all of these guides for all of these episodes have all the information that we're covering on this podcast in a nice little summary. I also have brand recommendations, none of them sponsored, other resources, links to websites, and a lot more. So make sure to check those out if you are really interested in this topic. But back to today part five. So again we are widening the lens here. And the reason I included this topic is because when we really think about detoxing and reducing our exposure to toxins, we also have to think beyond just chemicals. So beyond those environmental toxins that we really focused on like microplastics, organo phosphates, micotoxins and things like that. What also is toxic and contributing to our total toxic burden is constant stimulation, poor lighting environments, attention capture, chronic stress signaling, and other emerging areas of research like EMFs or electromagnetic fields, blue light, and all those things. So, the body experiences all of those through cortisol, circadian rhythm disruption, autonomic imbalance, sleep disturbance, and actually inflammatory signaling as well. So, we're going to get into all of that because again, not everything toxic comes in a bottle or is a chemical. Some of it might actually come from the phone in your hand, the light in your bedroom, the information stream constantly hitting your nervous system all day long, and the way that modern life keeps the body in a state of subtle but constant activation. So, first, let's talk about how and talk about how the body actually responds to all of these incoming inputs in a lot of the same ways. So I think all in all it comes down to [clears throat] nervous system dysregulation.

So what do I mean by that? So when we think about our nervous system really our autonomic nervous system it's divided into two parts. So we have our sympathetic which is our fight and flight and then our parasympathetic which is rest and digest. And the reality is you're never just in parasympathetic or just in sympathetic. It's usually a percentage of one or the other. But in today's modern age, when we talk about nervous system dysregulation, we're talking about too much time that the nervous system is activated in that sympathetic state. So fight or flight and not enough time in that more regulated parasympathetic state where the body can rest, digest, repair and recover. So sympathetic or fight orflight is not actually bad and in the short term that stress response is adaptive and supportive. So when that happens, we see cortisol rise, adrenaline rises, blood sugar rises, heart rate

increases, attention narrows, and the body essentially mobilizes resources to help you survive. So sometimes that is good and we really want that dynamic ability to switch between sympathetic and parasympathetic.

Nervous System Dysregulation and Screen Overstimulation

So when something actually stressful happens, that sympathetic state is helpful. It helps us focus and divert our attention towards that problem. However, it is not helpful if your body is always reacting that way to emails, doom scrolling, notifications, poor sleep, and just over stimulation all day, all night for years on end. So, when that happens for years on end, that state becomes more chronic. And it actually starts to shape health in really deep ways. It causes cortisol dysregulation, more inflammation, more oxidative stress, insulin resistance, worse digestion, impaired gut motility, poor sleep, circadian rhythm disruptions, lower heart rate variability, and essentially all in all a body that never really gets the signal that it is safe enough to fully repair. So that is toxic in and of itself. It may not look like a chemical toxin in the classic toxicology sense, but it's creating a toxic internal environment physiologically. I always explain it this way to my patients. The body responds to a stressor or a toxin in all the same ways. So whether that's a chemical stressor like environmental toxins that we've been talking about, physical stressor from overworking yourself or overexerting yourself or mental stressors, the body responds the same. So let's get into the research a little bit. What does the research say about over stimulation, that stress response, all the things we're going to talk about today? So it's actually become pretty clear in the literature that constant digital stimulation can affect stress physiology. We have research on technology related interruptions that shows that frequent notificationdriven task switching aka our phones and our emails and our computers increases strain and worsens performance. And we have work from Gloria Mark and others that has linked faster attention switching with greater stress. So essentially the body is not just responding to quote unquote danger in the traditional sense. It is responding to all of those things. Chronic interruption, unpredictability, novelty and attention fragmentation. All those things are pushing the nervous system into a more activated state constantly. One of the clearest places that this actually shows up and then perpetuates that stress response is its impact on sleep. So, a 2024 consensus review in sleep health concluded that screen use can negatively affect sleep health across the lifespan and a 2022 review on blue light found that evening exposure from electronic media suppresses melatonin, which we've talked about in earlier episodes, delays circadian rhythm timing, and increases alertness in times when the body should be winding down. A 2025 GMA open network study also found that screen use before beds in adults was associated with later sleep timing and shorter sleep duration.

So it's not just about spending too much time on the phone. It's the timing that you use the phone that also matters. So a lot of my patients tell me that watching TV or being on their phone helps them fall asleep. But what they don't realize is that even though you may fall asleep quicker when you're doing those things, it really impacts the structural architecture of your sleep. So you're not getting into those deeper sleep stages as effectively as if you didn't have that blue light stimulation right before bed. So aside from timing, I think it's also worth really talking about the whole idea of attention capture, novelty, social comparison, and quote unquote doom scrolling. So social media platforms are designed to keep feeding the brain novelty, reward, emotional salience, and social information. And we actually have research that is increasingly linking doom scrolling specifically and also problematic social media use in general with fear of missing out, anxiety, poor sleep quality, and worse mental health outcomes. A 2025 study that actually looked at FOMO showed direct effects on poor sleep quality. And Harvard actually put out a 2024 writeup about how doom scrolling has direct associations with existential anxiety and lower work engagement.

So I think it's pretty clear that over stimulation from screens, social media, work, emails, all of the above directly impacts our health. So the antidote to that would be a digital detox of sorts. So what could that actually look like?

And there's a lot of different ways to do it. I think the first and probably highest yield and easiest step is to just remove your phone from the bedroom.

Maybe not easiest, maybe that's a little bit harder than it seems. And this is aside from the whole idea and concern about EMFs, which we will get into in this podcast. But aside from that, we know for sure that having your phone next to your bed increases the chance that you're going to scroll before sleep, wake up in the middle of the night and check the time, check notifications, or even just start your day with stimulation instead of regulation. So, if you try just one thing, maybe just try putting your phone outside the bedroom or at least in a place where you can't just

pick it up while you're in bed. Kind of stepping it up a little from there, consider trying at least a no scrolling in bed rule. So, one of the core sleep hygiene things is that your bed should only be associated with sleep, sex, rest, and recovery. So, not news, emails, Instagram, doom scrolling, all those things. So subconsciously your mind will start to connect the bed with those things rather than rest repair and recovery. So just try it. That one habit alone really can make a huge difference for sleep quality and subsequently nervous system regulation. Okay. So phones away from the bedroom if possible. At the very least no scrolling in bed. Then I think next level would be to actually get more intentional about when you scroll instead of letting scrolling just happen to you all day long. And that can look a couple different ways. For some people, you may actually want to consider scheduling time for scrolling. So maybe you schedule that social media scroll for about 15 to 20 minutes once or twice a day and that is it. For those of you on social media a lot more than that, maybe you'll have to schedule protected time for not scrolling. So for example, no social media before 9:00 a.m. or no news after dinner or maybe no phone at least for the first hour after waking up. So pick one of those options that work best for you. Think about it in this lens. Our goal is to stop letting your nervous system be constantly hijacked by random inputs all day long.

Then we can actually level it up a little bit further. And I think a really powerful practice is doing a more formal digital detox. So again, that could look a lot of different ways to a lot of different people. You could go completely off social media and news for one week. So no Instagram, no Tik Tok, no doom scrolling, no checking headlines. So for one week, just give your brain and your nervous system a real break from that constant feed of stimulation, comparison, fear, and attention capture. And then the more complete version of this would be something like a full digital detox weekend or a full week depending on what your work is like. So either a retreat in your own home where you're not just off social media news, but also not checking emails unless it's absolutely necessary. So trying that is where people often realize how much background stress and cognitive load they were carrying without even noticing it because it's not just social media here.

It's really about the constant sense of being reachable, available, and always on. Okay, so that's digital detox. So removing the problem. But of course, the other side of this conversation is not just about removing toxic inputs. We can also actively do things every day that help regulate the nervous system. So yes, we may have inputs that are inevitable, but we can start doing things that can move the body back towards safety, regulation, and parasympathetic tone that rest and digest. So this would be things like daily breath work, mindfulness, meditation, a yoga ninja practice at nighttime, and other mindbody practices. So I talked about these a little bit in part three, but they really do directly influence your physiology.

For example, slow breathing, especially with those longer exhales, actively in real time, reduces sympathetic tone and supports veagal tone or parasympathetic tone. Mindfulness is another personal favorite of mine that has lots of studies about it. And if you do it regularly, even 2 minutes or 5 minutes a day done consistently, you can lower your stress reactivity and improve emotional regulation over time. Yoga nidra, which is a specific style of meditation done at nighttime to help you sleep. And other guided relaxations can also help shift the body out of that hyperarousal state and into a more restorative state. And there are some really great apps actually that can help you do these nervous system regulating practices. And I do understand how ironic that is to recommend an app in a digital detox episode, but I think it's also realistic. We are involved with phones and technology all day long. So, if we're going to use that technology, let's at least also incorporate ways that it can support us, too. So, some of my favorites are the Waking Up App by Sam Harris. So, this one is great if you like more neuroscience-based and an intellectually grounded approach. So, he has new 10-minute mindfulness meditations every day, and he does focus on mindfulness meditation. He also has other meditation courses, longer form lectures that go deeper into consciousness, attention, and the mind, which I personally love because I love neuroscience, psychedelics, everything in that realm. A newer app that I'm actually really loving right now is called Open. So, this one offers meditations, soundscapes, yoga, nidra, and breath work. And I'm personally enjoying it because it has a more philosophical and reflective undertone.

So taps a little bit more into spirituality, but I would say more philosophical than spiritual. And it's just a really beautiful and aesthetic app as well. There's also Insight Timer, which I think probably has the largest amount of content out of all of them. So it has everything from short 2-minute meditations to breath work, sleep tracks, talks. The only downside, in my opinion, for this one is that there might be too much on there.

Digital Detox Habits and Nervous System Support

So, you do have to do some digging and some scrolling and trying things out to find the style and the person that works best for you, but it's a great resource if you want a lot of options and you want a free app. They also do have a paid version, but the free version gives you a lot of meditations.

Then, of course, there are apps like Headspace and Calm that I also think are great. These ones, I would say, are easier to use, approachable, and can be really helpful if you're just getting started with meditation. Okay, so that's more digital detox screen stimulations. Besides actual digital stimulation detox, there's also the idea of toxic relationships and toxic people as health exposures as well. Or maybe even more broadly, I would say that boundaries themselves are a form of detox. So, I'm not trying to say that every person in your life has to be a quote unquote toxic input in a dramatic sense, but sometimes partners, family members, even friends, bosses, co-workers can unintentionally keep your nervous system in a state of anticipation, vigilance, guilt, over functioning, or emotional exhaustion. And there's actually research on social strain and stressful relationships that show higher inflammatory markers in the body. And there's also some emerging stuff showing its impact on the endocrine system, cardiovascular system, and immune function as well. So these toxic relationships or at least partially toxic relationships are not just emotionally draining, they can actually change the body. So the antidote to that, you do not need to remove everyone from your life. If your partner is creating a toxic input for you, it does not mean that you need to divorce them or break up with them. But I think boundaries, even in a loving and good relationship, can be really helpful in a work setting or social setting. This might mean just less contact with a certain person, clearer expectations at work, or just stopping yourself from being available to everyone all the time, which we are all prone to doing in this day and age. So, I encourage you to just simply notice which people, which situations leave your body feeling stressed and dysregulated versus those people that make you feel uplifted and rejuvenated when you spend time with them. Okay, had to mention that very briefly in this new age of detox episode. But now, let's shift a little bit. So, we're going to get all into the world of light pollution, artificial light, electromagnetic fields, and more subtle technological inputs. And a lot of these we're learning about. So we're going to go over what we do know, what we don't know, and what we can actually do about it. So first, let's start with light pollution and specifically artificial light pollution. So that could mean fluorescent lighting at work or in office spaces, LED bulbs in our houses, overhead lighting at night or light during wrong times of the day, TVs, laptops, tablets, phones, all of those. So before we get into why that can be harmful, let's first briefly just talk about what light actually is. So light has wavelengths and the visible spectrum is roughly 380 to 700 nm and the shorter wavelengths are in the blue range. And these ones get talked about a lot because they actually do have a strong effect on our brain circadian rhythm system. So blue light alone is not actually bad. It's part of the sunlight.

The sun emits blue light and it's actually fine to have during the day in in normal doses. The problem is when we have a lot of blue light all day long and extending into the night. So we have human studies that show melatonin suppression is strongest with that blue light range particularly in the range of about 446 to 477 nm. The other problem is that natural light naturally changes throughout the day. So you're not getting only that specific wavelength all day long. If you're in the sun or you have natural light exposure, the wavelength change is going to change throughout the day. So in the morning, natural sunlight is brighter and richer in those blue wavelengths. And that's supposed to tell the brain that it's daytime. It's time to get up and be active. And then towards the end of the day, evening natural light gets dimmer and warmer. So artificial light does not do this. So all of those fluorescent lighting or cooler LED bulbs are very enriched in those blue wavelengths. And then on top of that, we have our screens and our tablets and our phones that we stare at for hours on end. Especially if we're working late into the night, we're getting that constant blue light stimulation. And that is actually sending wrong signals to the brain about what time it is. So we kind of already mentioned this, but that's going to directly impact our sleep and our circadian rhythm. And not only does it impact melatonin, which directly impacts our sleep, but we also have reviews that increasingly link artificial light at night with changes in glucose metabolism, insulin sensitivity, appetite regulation, mood, cardiovascular health, and hormonal signaling. And the studies around night shift work, I think, are pretty interesting and also pretty devastating. So, the International Agency for Cancer Research actually classifies night shift work as probably carcinogenic. So, what can we actually do about all this blue light exposure that we're getting in an unnatural way? So, I think first and probably most important is to try to get real outdoor light first thing in the morning when you can. So, morning [clears throat] sunlight is one of the strongest signals to the brain that it's daytime. It helps anchor that circadian rhythm, support our cortisol timing, and makes it easier for melatonin to rise appropriately later that night. The next step I would recommend is to dim your lights at night in your home. So try to use lamps instead of bright overhead lighting, especially after dinner.

During the day, you can do the opposite. So open the curtains, use windows, use natural light. Essentially, we're trying to mimic what the sun does for us, even if we're going to be indoors the majority of the day. So all that, you don't need to purchase anything. Just try to mimic natural light as much as you can. But if you want to take this a step deeper, we can actually get into which light bulbs you can swap out to make your home more circadian rhythm friendly. So, if you want to do this, I would switch out primarily the bedrooms, but also bathrooms and living spaces for warmer bulbs. So, that would mean around 2200 to 2700K. And if you don't want to switch out everything and you have those cooler or brighter bulbs, so I'm talking around 4,500K, you can keep those in places where you might need to be more alert, like an office or kitchen. But general rule of thumb, if you can avoid fluorescent lighting and very cool white LED lights, I would because they tend to be more blueenriched. Then moving on to screens, tablets, phones, a lot of them have night mode or night shift mode, so try to utilize those in the evenings if you aren't already. This definitely won't solve everything because even in night shift mode, the screen is still stimulating and still emitting light, but it can help reduce the intensity of that light exposure. So naturally from that we do have to talk about blue light blocking glasses because I do actually have a few thoughts here. So first I do want to state very clearly that the higher quality evidence so far suggests that they probably make little to no difference for eye strain and sleep quality for most people at least in the short-term duration that the studies were done. But I don't think that that necessarily answers a slightly different question which is do they actually block blue light? And the answer actually seems to be yes. At least to some degree, depending on the lens, they do actually block blue light. And some of these companies actually do publish data. And it seems to be that these glasses vary a lot depending on which company you go with, but a lot of them do meaningfully reduce short wavelength light transmission. So, the mechanism is real. They actually do block blue light. So, knowing that, I think there actually may be some utility to blue light blocking glasses, even though the studies show that there's no impact on sleep quality. And the reason being is that those studies were done over very short periods of time and they controlled for a lot of different variables as they should to make it a good study. But in real life, if you're trying to shift or support your circadian rhythm, that takes time and rarely is impacted by one tiny intervention alone. So we have to put everything together. Morning sunlight, reducing overall screen time, lowering brightness at night, changing light timing, dimming lights in the home. So, for doing all of those things, I could see if you really wanted to optimize your circadian rhythm that blue light glasses may be somewhat helpful as part of a larger circadian supportive practice. I think definitely what's more important is just reducing screen time in general, especially in the evening. But if that's not fully possible to do, I think there may be some utility to using blue light blocking glasses if you want to do that. Okay, so we talked a lot about blue light. I think next it makes sense to talk about red light and near infrared light. And I want to really dive into this one because I think there's a lot of exciting and emerging science in this area. And the first thing I'll say is just because a light is red does not necessarily mean it is red light in the therapeutic sense and definitely does not mean it's infrared or near infrared light which is really what we're studying. So first what are we studying about red light therapy or more broadly it's called photobiomodulation.

So the idea is that specific wavelengths of light may interact with the body in ways that support mitochondrial function which is one of the biggest mechanisms cellular signaling repair and recovery. And most of this is with near infrared and some of that red light. And what some of the studies are showing is that these specific wavelengths interact specifically with cytochrome C oxidase which is in the mitochondria which in turn improves cellular energy production, reduces oxidative stress and supports all repair processes.

So that's why people are using them and studying them for a wide variety of things from skin health, wound healing, pain, inflammation, hair growth, retina and eyes are a big one, and just general systemic mitochondrial support. And we actually do have a 2025 evidence-based consensus that describes all of these core biological ration plausible. And a lot of the research actually in this area is for the retina or the eye. And the reason being is the retina is one of the most mitochondrial dense tissues in the body.

Light Pollution, Blue Light, and Circadian Health

So it makes it a really useful place to study mitochondrial aging and repair. And we actually have human studies where researchers used 670 nm red lights. And they did actually show improvements in color contrast sensitivity and age related visual decline. There's also studies showing reduced retinal inflammation and improved mitochondrial membrane potential. But what I think is even more interesting than this is that red light exposed to the retina may not actually be limited to just improving the retina itself. So near infrared light penetrates much more deeply than visible red light. And we have studies suggesting that long wavelength light can influence things like

blood glucose regulation, inflammatory signaling, and actually possibly more distant tissues that are not directly exposed to that near infrared light through mitochondrial and immune related pathways because the immune system goes all over the body. There's a really interesting paper in nature that showed that longer wavelengths in sunlight may actually have a systemic impact that improves vision even when not directly exposed to the eye. So those are all very interesting. I think the data around near infrared light and mitochondrial support is actually very plausible. But what actually does have a lot more evidence here is using red light therapy for skin related issues.

So we actually have multiple human trials showing benefits in quote unquote skin rejuvenation, collagen production, wound healing, inflammation and visible signs of aging. So most of the studies used wavelengths around 630 nm so red light. And they sometimes also combine this with the near infrared which is around 850 nmters. And the studies actually do show improvements in crow's feet, skin texture, elasticity, and overall photo aging. So if you're looking for red light for skin, there actually is evidence behind it. So red light, visible red light generally around 630 to 680 nm. Near infrared is just beyond what we can see, usually in the range of 800 to 850 nm. and that's the one that penetrates deeper and has those mitochondrial effects. So the sun actually emits both. It gives a full spectrum of light including that visible red and near infrared wavelengths. So knowing that if you are actually wanting to purchase a red light or near infrared light device, what should you look for?

So, I think a lot of products on the market make very broad claims about skin, which we do have evidence for if you get the right wavelength, hair recovery, inflammation, mitochondria, full body wellness, but a lot of them don't actually publish the wavelengths or the radiance. So, if your goal is mainly skin, you actually don't need some massive ultra powerful panel. So if you're getting one of those red light face masks devices, I would recommend making sure that the wavelength is between 630 to 660 and you don't need a huge radiance here. So about 20 to 30 at the treatment distance is all you need for skin. But if you are interested in those deeper mitochondria full body and that includes hair actually. So hair is much deeper than just the skin. If you want muscle support, joint support or broader mitochondrial claims then you really need near infrared. So that would be a wavelength between 810 to 850 nm. And this one you actually do need a much higher radiance, so around 100. And some brands actually do publish these specs very clearly on their websites. So check out the companion guide to this episode to find all the brand recommendations that I've looked up. And you can find that at dr mielawwood.com/guides. But as you're looking to purchase one of these devices, I urge you to keep in mind that the data supporting mitochondrial health with that near infrared light is very interesting and plausible, but it's not robust yet. So, a lot of these devices that actually meet the wavelength and radiance requirements for this are very expensive, like thousands of dollars minimum. So, just keep that in mind before you spend thousands of dollars on a product. It may actually help the mitochondria, but we don't know for certain yet. for red light, for the skin, there is evidence. Okay, great. Now, I want to move on to EMFs or electromagnetic fields, which I've mentioned a couple times here, and I'm really excited to dive into because this topic is usually where I see the conversation go in one of two extremes. So, either people act like it is totally fake and not worth thinking about, or I see people that act like every router, cell phone is a guaranteed disaster. And as usual on this podcast, I think the truth is probably somewhere in the middle, but I will say not totally parsed out yet in the literature, which is pretty interesting. So, EMFs, what are electromagnetic fields? So, essentially, they are invisible energy that exists across a very broad spectrum. So, light itself is actually part of the electromagnetic spectrum. So, our radio waves, infrared radiation, x-rays. So, all of those things are all on this spectrum. And the reason that this topic is getting more attention lately is because modern life has dramatically increased our exposure to certain kinds of man-made nonionizing radio frequency EMFs. So things like cell phones, Wi-Fi routers, Bluetooth devices, cell towers, even cordless phones, and other types of wireless technology. So, even though the research is not fully parsed out yet, which we will get into, these are considered one of the fastest growing environmental exposures in modern life, and we're still figuring out exactly how they impact health. But we do have some evidence on the topic. So, before we get into that evidence, I do want to also mention that everything has an electromagnetic component. So, the Earth has electromagnetic fields. Our bodies actually do, too. And this is not woo woo fake science. We literally measure electrical activity in the heart with EKGs and the brain with EEGs.

And that is partially why some energy healing modalities like Reiki may actually have plausible scientific ground behind them. And there actually are small I will say, but studies nonetheless suggesting that one person's physiologic rhythms and electromagnetic signals may actually be detectable in another person even without direct touch and in some cases even when those people are not even in the same room. And an interesting personal clinical observation, when I was working overnight in the ICU, I will say that it was a little eerie how many times I

would be watching all of the monitors for all of the patients in the ICU. And when one person's heart rate shot up or went into an arrhythmia, many other peoples did as well at the same exact time. So definitely an anecdotal story, not evidence for this mechanism, but it repeatedly happened enough times for me to notice and think about it. little detour, but I do want to mention that electromagnetic fields, electromagnetic waves are actually present in the human body. So, back to the environmental exposures. What we really want to know is what kinds of external electromagnetic exposures actually impact our health and I think more importantly, like everything we've been talking about on this podcast series, at what dose, for what duration, and what specific issues. So thinking about radio frequency electromagnetic fields like those from cell phones or Wi-Fi wireless sources, the mechanism that scientists are looking into is the impact of nonionizing radiation. So ionizing radiation comes from things like X-rays that actually break chemical bonds. For the nonionizing radiation, scientists are looking at long-term exposure and the impact that it has on oxidative stress, calcium channel signaling, membrane effects, and autonomic or nervous system changes. So, there's some mechanistic reviews out there that propose pathways involving voltage gated calcium channels and reactive oxygen species specifically. And it's really that oxidative stress, which we got into a lot in the first part of the series that's really where we're thinking there may be possible biological effect in humans. So check out that episode. I talked about how oxidative stress really is a driver for a lot of chronic diseases from heart disease, cancer, and cancer. I actually do want to specifically talk about with this whole EMF discussion. And the reason being in 2011, the International Agency for Research on Cancer actually classified radio frequency electromagnetic fields as quote unquote possibly carcinogenic to humans. So group 2B. So group 2B does not mean that it's a known carcinogen as in we are sure that it causes cancer. But it means that there was enough evidence to warrant concern in further study and that classification was largely based on I will say limited evidence around gloma and acoustic nuromomas specifically associated with wireless phone use. So follow-up studies were done and specifically the interphone case control study ultimately did conclude no overall increased risk of gloma or menioma but at the same time it did actually report suggestion of increased gloma risk in a small group of the heaviest users. So the National Cancer Institute overall summarizes this as a possible signal that high users may have a slight increased risk of brain cancer, but overall it's still pretty much inconclusive. So researchers kept going, kept studying these things and some other Swedish work and later metaanalysis data has reported that the higher risk is particularly for ipssolateral use. So meaning tumors occurring on the same side of the head where the phone is usually held. Then in 2017 and also again in 2020, there was more systematic reviews that also showed mixed evidence. So there were some higher quality studies that tended to show a slight trend towards higher brain tumor risk, but they did conclude that overall it's very mixed. Then we finally got a very large and new systematic review that is a lot more reassuring.

So, a major World Health Organization Commission systematic review published in 2024 concluded that exposure to radio frequency from mobile phone use likely does not increase the risk of brain cancer.

Red Light Therapy and Mitochondrial Support

And then a large Cosmos cohort paper also published in 2024 found no association between cumulative mobile phone use and risk of gloma, menioma or acoustic nuroma. So, you see here the data is still pretty mixed. I will say though, I think it is worth noting that some of the older quote unquote reassuring studies, so the ones that showed no increased risk in gloma were actually funded by the phone industry and the government. So I don't think that necessarily dismisses the findings of course, but it is something to point out and something to think about. So I would conclude that overall the answer is truly still a mystery. The stronger and better designed studies do seem to be more reassuring around EMFs and cancer risk. But of course, that data is not perfect. There is funding bias to consider and I think there are still enough mechanistic questions and exposures that are increasing over time to continue to look into this deeper and that actually is being done. This is an active and ongoing field of research. So what about risks beside cancer? There actually is some data coming out around other effects as well. So, we have metaanalysis data suggesting possible effects on things like thyroid signaling, mood and burnout symptoms, you know, maybe related to general technology like we talked about in the beginning, but still plausible. There's also studies looking at increased oxidative stress, poorer cardiovascular function, and neurodeenerative risk, at least in some populations. [sighs] And for all of these studies, the data is not perfect, I will admit. But I do think it's interesting and of course we are doing more studies actively as we speak. One specific study that I found particularly interesting that I wanted to talk about though was a 2023 observational study I will add that looked at 30 healthy young adults. So you know small population and they exposed the chest area to frequencies commonly used for Wi-Fi and 4G transmission for about 5 minutes. And during the exposure, heart rate variability, which is a

measure that we use to look at autonomic tone, shifted towards more sympathetic activation, so that's that fight orflight, and less parasympathetic activity. So, it does suggest a temporary move towards a more stressed autonomic state. Again, small study and that does not necessarily prove long-term harm. But I think it does start to show us that EMFs may actually have measurable biological effects, specifically over short periods of time. And of course, we'll need further studies to look at long-term effects. But beyond that, there's also data suggesting changes in brain glucose metabolism, which was actually published in JAMAMA, so very credible journal article. Changes in sleep structure, increased migraine risk, and memory changes. Again, none of those are perfect data either, but interesting nonetheless.

So, I would say the bottom line is we just don't know. I think there is enough data to warrant at least a little bit of caution and definitely we need further studies, but my personal opinion is there is no clear answer today. So with that, I think it is reasonable to use some lowcost common sense precautions, but I don't think it's worth the time, mental energy, or money to go down a paranoid rabbit hole and purchase all these products to block EMF exposures.

So what can you do to reduce your risk to something that may or may not be impacting you, but probably still good practices to do? I think the first thing to think about is that distance matters. So exposure drops off dramatically as the device gets further from the body. So in that case, I think it is very reasonable to one, keep your phone out of the bedroom or at least away from the bed, which we already talked about for its importance on reducing the risk of blue light exposure, doom scrolling, notifications, all those things. Two, if you have a choice, put your Wi-Fi router away from the bedroom so it's not close to you when you're sleeping. Three, think about using speaker phone instead of holding the phone directly to your head when you can. Four, just avoid carrying your phone pressed against your body all day if you don't need to. Put it on your desk, put it in your purse. You don't need to have it pressed against your body for possible EMF reasons, but also for nervous system regulation reasons. And five, just in general, take some time away from devices. Distance yourself when and if possible. So all those things I think are not just helpful to reduce possible EMF exposures which again may or may not be impacting the body but I think all those practices are also helpful to live a healthy lifestyle and just lower your overall stimulation burden. And thinking about microwaves which I do want to mention briefly here again distance matters. So microwaves are actually very safe. They're designed and actually regulated so that the radiation is meant to stay inside the unit with only very minimal leakage allowed to exit but just very close to the surface. So within an inch or so and thinking about microwaves for food is that bad are you getting exposures from radioactive food? I would say no. So the way they work is by exciting water molecules in the food which creates heat. They do not make your food radioactive.

EMFs, Exposure Risks, and Practical Precautions

And you could actually argue that because microwave cooking is faster and uses less water, it may actually preserve certain nutrients better than cooking for longer methods. Not a blanket statement, but just something to think about. So I think best practice, don't touch the microwave when it's heating food, but I'm really less worried about microwaving food itself. So in addition to reducing exposures, the counterbalance, as we've been going all throughout this series, is what can you do for active protection against these possible EMFs? So first there's this idea of grounding or physically putting your feet on the earth. So the theory behind it is because the earth has its own electrical field, direct contact may allow the body to discharge excess electrical charge and then take on the earth's more stable charge. So the evidence here is still emerging and definitely definitely not definitive. But there actually are a few small studies and reviews suggesting possible positive effects on sleep, cortisol rhythm, autonomic balance, pain, and inflammation. So we don't really have evidence that it is an antidote to EMF exposure. But if we do have evidence that it supports autonomic balance and inflammation, I think there's plausible mechanism here. And I think more importantly, even though the evidence for grounding as it relates to EMF release and detox is very very emerging, grounding requires you to get out in nature at least to some extent. And there is a lot of robust data supporting that time in nature and nature as medicine has real therapeutic value. I think one of the biggest papers in this space was a 2018 systematic review and meta analysis that looked at 143 studies and it found that greater green space exposure was associated with lower salivary cortisol, lower heart rate, lower diastolic blood pressure, lower risk of type 2 diabetes, lower a cause mortality and lower cardiovascular mortality. So that's huge. This is not just nature's nice, nature feels good.

We actually have broad health literature suggesting that time in greener environments has measurable effects on

stress physiology, cardioabolic health, and long-term health outcomes. My personal favorite aspect of nature therapy is this idea called forest bathing or really just more importantly being around trees specifically. And the research truly is fascinating. So trees release biologically active compounds into the air called phenides.

So these are essentially plant derived volatile compounds and studies on forest bathing specifically suggest that they help lower stress hormones like cortisol, support autonomic balance, and actually even enhance certain aspects of immune function, including specifically they looked at natural killer cell activity. There's also more recent data showing that forest exposure directly lowers inflammatory markers like CRP, IL6, fibbrronogen, and alpha 1 antitrien. So, we have actual evidence that being in nature truly impacts health in positive ways. So, overall, I think the biggest antidote to all of the toxins, environmental exposures, I guess we could say man-made environmental exposures like pesticides, plastics, electromagnetic fields, all of the things. Getting back into nature can do so much to help bring your body back to where it's supposed to be. So, as we close out this episode and actually really close out this whole series, I do want to zoom out for just a second. So, to recap across these five episodes, we looked at what environmental toxins are, how they actually affect the body, how to reduce exposures in the home, how the body is already detoxing every single day, and what we can do to support that process, what supplements and protocols may actually help. And finally, in today's episode, how modern life itself has become toxic through overstimulation, poor light environments, digital overload, relational stress, and potentially some forms of technological exposure as well. And my goal throughout this whole series has been to really parse out what has real data, what does not, what is still uncertain, but worth paying attention to. And I think one of my favorite ways to describe this is absence of evidence does not mean evidence of absence. And again, that's where we live in integrative medicine. So yes, we take all these ancient healing systems like Aruveda and traditional Chinese medicine and study them. But we're also really involved with looking at emerging data and how might that support health or how might that be harming us. At the end of the day, I think it's really important to have these conversations, but also to really parse out what the evidence does and does not show and then go from there. And really truly why I created this series was to be a sort of detox antidote what I think is two of the biggest toxic forces shaping health right now. And that is big pharma and big wellness.

Nature, Grounding, and Closing Reflections

So big pharma, yes, may be distorting health in some ways through profit-driven reductionism, overt treatment, or over reliance on drugs as the answer to everything. But big wellness is distorting health too through fear-mongering, pseudocience, overesting, over supplementing, and turning wellness into chronic self-s surveillance. So yes, one side big pharma can make us forget that the body is so much more than just a prescription pad. But the other side, big wellness, makes us forget that biology matters, evidence matters, and just because something is quote unquote natural or beautifully branded does not mean that it's actually natural and good for you. So my goal with this podcast and I guess my career in general is to really create a space where we can be curious, where we really can explore emerging data, where we can take things like toxins and its impact on chronic disease and modern health and all those burdens seriously, but also to be honest about it, to stay grounded and truly state where the evidence is weak, mixed, or just not there yet. So, I really want you to remember that extremes sell and you don't need to pick a side. You don't need to do all natural or all medications. You can do both. And that is actually where integrative medicine lives. So, I think my final takeaway is this. Your body is not broken. And your health is not something that you have to chase through fear. The world, yes, may be full of toxic inputs, but the body is also full of intelligence, resilience, and built-in systems working every day to protect, adapt, and heal. So, all in all, I just encourage you to live with more intention, awareness, discernment, and honestly, respect for both your body and the environment that it lives in. So, if you've listened to all of the episodes in this series, thank you for taking this journey with me.

Thanks for listening to the trip lab. If you liked this episode, please subscribe and share so we can get the conversation started about integrative medicine and psychedelics to destigmatize it and fully explore what this could mean in the >> [music]