

Scott Nelson: Personally speaking, my routine is... as I mentioned earlier, is I stand in front of a full body Jooovv device on the vibe plate for seven or eight minutes on the front side of my body, turn around and do the same thing on the back side of my body. And at the same time I'm doing breath work and listening to the podcast. In my opinion, the more therapies you can kind of stack in that routine is... You'll get more bang for your buck.

Announcer: Bulletproof Radio- a State of High Performance.

Dave Asprey: You're listening to Bulletproof Radio with Dave Asprey. Today's cool fact of the day actually has nothing to do with what we're going to talk about today, but it's cool, so I'm sharing it with you. We are at a point where we're learning new cool things about stuff that we just took for granted. Prime example here that you probably would never think of is that we have new high-speed videos that show that the plume of carbon dioxide that comes out from a popped bottle of champagne contains something called a Mack disk, which is a kind of visible shockwave that you've probably seen in supersonic exhaust streams from jets and rockets, that sort of cool circle that happens. We just never knew that was there, but it was there the entire time.

And it turns out in champagne stored at room temperature, that CO<sub>2</sub> in the neck is seven times as pressurized as ambient air. And so when you uncork the bottle, the gas rushes out at twice the speed of sound, and you get the same thing that a supersonic jet does. Within about a millisecond, the pressure inside the bottle's throat is closer to the surrounding air, and that shockwave goes away. And of course, this research did have to come from France because hey, that's where champagne is from.

But what does that mean for everything else we're doing? Do you have any idea what the bubbles of CO<sub>2</sub> gas inside cells do? You probably don't, because actually, we haven't figured much of that out yet. So when you deal with some arrogant person who says, "That can't work because it doesn't..." We're at a point in the evolution of humans where we're learning more about the stuff around us all the time than we ever even imagined 20 or a hundred years ago.

Today's interview is going to be a lot of fun. And we're going to talk about something that I do discuss in detail in my new book, Superhuman. In fact, we have this amazing subtitle called the Bulletproof Plan to Age Backward and Maybe Even Live Forever. The new book is out in the world. And for 20 years, I've been working on this anti-aging thing, talking about how I think we're going to live a lot longer than you think we're going to live right now. And this book says, here's what you can do that doesn't cost anything, here's what you can do that's pretty cheap and here's what you can do that's pretty darn expensive now, but we'll be cheap coming up.

So check out [DaveAsprey.com](http://DaveAsprey.com), and you can get Superhuman there or anywhere books are sold online. And if you have Superhuman and you like the show, I would really appreciate it if you took about two seconds to leave a review on

Amazon, because it really matters for me as an author. Tell me how I'm doing. If you like the book, if it's useful, that's cool. And if it's not useful, you should leave a review as well. But seriously, this book is awesome.

Now, what did I write about in the book that has to do with champagne? Oh, nothing. That's right. It turns out I did write a substantial amount around aging and light and what it does for you. And not just circadian rhythm, but how you can actually use light therapeutically. So this is an in-person podcast recorded at the Beverly Hilton in Beverly Hills with my friend Scott Nelson, who is the founder of Joovv, which is one of the world's trusted manufacturers of red light therapy devices. If you're a longtime listener to the show, you remember when I interviewed Scott and Justin on episode 516. And there we talked about how Joovv got started, but there's some amazing new research that you are totally going to love that Joovv has pioneered around what light does for different systems in the body that we just didn't know about. So speaking of all sorts of cool new things, welcome to the show Scott.

Scott Nelson: Dave, thanks for having me back. It's been maybe just a little bit over a year, so excited for another conversation around light.

Dave Asprey: It's amazing. We use Joovv at Upgrade Labs, which is here at the Beverly Hilton. And I've seen how you guys are evolving the company, but what I really wanted to do is just dig in on the cool new things that aren't in the world out there. I think I did a reasonable job of saying, "Look, this light therapy stuff matters for biohacking." I've talked about on our last show how I used this intense infrared light on my brain almost 20 years ago after the first study came out, and now it's becoming a real deal. And you guys are actually looking at placebo controlled, double blind trial sort of things now. Tell me about bones and lights. And this isn't a vitamin D conversation.

Scott Nelson: Yeah. So there's really some compelling research in certain categories, bone health being one of maybe three or four that we'll talk about throughout the course of this discussion, which I think most people are going to find really interesting. But with respect to bone health in general, there's probably been, gosh, three to four really solid research papers that have been published over the past, gosh, two to three years that showcase some really unique things when it comes to helping people recover from bone related fractures, injuries, et cetera. And I think there's probably a couple things that really stand out when you look at that research.

One is a study that comes to mind, which examined, I believe, about 40 or 50 participants that had suffered from some type of facial fracture or facial injury. And it was a placebo controlled study, so meaning half the participants received a sham treatment, so a fake treatment in essence, if you're not familiar with how studies are structured-

Dave Asprey: If I had a broken face and someone gave me a fake treatment, I would break their face.

Scott Nelson: You might, you might. But you really believe that that sham treatment was going to was going to work. But I think that's just important to call out, that this was a really well structured study. And the researchers actually used 3D imaging, so it wasn't just kind of qualitative type of feedback or conclusions that were based on qualitative feedback, it was the real deal. And after just a week of receiving near infrared light therapy, the participants that received the non-sham treatments, so the real treatment showed significantly less swelling in their face.

And I think that calls out kind of the first thing with respect to bone health, is that it's pretty clear that the research is showing these wavelengths of light, red and near infrared light therapy enhance immune function to reduce things like swelling, inflammation, et cetera. So that's certainly an aspect when it comes to recovering from bone unrelated injuries.

Dave Asprey: If they're using 3D imaging, they're not looking at bones. That's more cosmetic, right?

Scott Nelson: There's a certain amount of cosmetic or aesthetic aspect to it, but I think the cool thing about it is they were using pretty high end imaging to quantify the results when it comes to using near infrared light therapy.

Dave Asprey: How much faster were they healing with light versus the sham treatments?

Scott Nelson: After just one week.

Dave Asprey: Were they 50% better, 100% better? Do you have a good sense? My recovery was going to be eight weeks; if I use light, is it likely to be four weeks, six weeks?

Scott Nelson: Those results, I don't think the researchers parsed those out, but they were definitely statistically significantly reduced versus the sham treatment.

Dave Asprey: I've definitely noticed that anytime you have an injury, whether it's bruise or just a scratch or something, the light therapy really does seem to make it heal ridiculously fast.

Scott Nelson: Right.

Dave Asprey: All right. And on bone health specifically, usually people say, "Oh, I need sunlight so I can get vitamin D, which is going to help me have strong bones. Maybe I'll take some vitamin K2 along with that." Et cetera, et cetera. But how is it that red, and in this case, I think it was... Actually, was this red light or near infrared light or both in the study?

Scott Nelson: It was near infrared.

Dave Asprey: It was near infrared?

Scott Nelson: Mm-hmm (affirmative).

Dave Asprey: So what is near infrared actually doing in the cells in body? Do we understand?

Scott Nelson: And I think we're beginning to learn a lot more about the mechanisms of action, some of which are fairly well understood, but... And I think we'll probably get into this a little bit more when you talk about some of the other sort of emerging benefit areas when it comes to light therapy. But with near infrared light, some of these bone unrelated studies are showing that this type of light can penetrate, actually, much deeper than initially expected to stimulate those osteoblasts or osteocytes, which are the cells that are in the matrix of our bones, helping to reform it, to heal these bones, et cetera.

So I think that's really a cool aspect of light therapy, that these... Not only are we seeing near infrared light, specifically being able to penetrate much deeper than previously thought, but the systemic benefits of exposure to this type of light on a consistent basis is showcasing some pretty interesting results, which is pretty cool. You wouldn't necessarily intuitively think that this type of therapy could help reform bone, but the data is pretty clear that it does.

Dave Asprey: There's tons of studies out there that talk about collagen formation. Bulletproof is a company that made collagen cool. It was not something that, I think, most of us used, at least other than injecting in our lips maybe, but as a food and performance supplement. So I've been reading about collagen for almost 20 years. And we know that red light stimulates collagen production, but what a lot of people don't know is that the matrix of bone itself is made out of collagen. So do you think that when people are using these high-intensity red and infrared lights, like the ones you're using in Joovv, are they potentially affecting collagen in the bone as the mechanism of action, or is it just something else, or do we just not know?

Scott Nelson: No, I think it absolutely is. There's no doubt. In fact, those fibroblasts are being stimulated and are able to produce more ATP energy, which allows for the increased production of collagen. And a lot of people think of collagen for skin health, which is great for reducing fine lines, wrinkles, sort of the aesthetic benefits that come from collagen in your skin. But a lot of people forget that, as you mentioned, Dave, collagen is everywhere in our bodies, right? Tendons, ligaments, bone, et cetera. And by stimulating those cells that produce collagen by way of red and near infrared light, you can reap a wide range of benefits from that.

Dave Asprey: The whole fascia in the body is made out of collagen. And some of the more advanced healers that I've worked with, both physicians and otherwise are starting to look at fascia as a way of carrying information. It's essentially information carrier, and it even carries electrons differently in the body. So it's this distributed system. And if you have poorly formed fascia, you're not growing it correctly or you're not nourishing it correctly, it has systemic effects beyond what we think today. That's why things like Rolfing [inaudible 00:11:59].

Why does this deep tissue manipulation seem to do stuff for people? There's probably a reason that we've been doing that sort of stuff for over thousand years or something in different traditions.

So I'm going to stick with stimulating collagen using red and near infrared light and eating collagen and getting a massage. I think that's probably-

Scott Nelson: A good recipe for success.

Dave Asprey: Yeah. In these studies and in your experience... Your background is from Medtronic and you've gone deep on the research, how much time do people need to spend with light therapy to get benefits?

Scott Nelson: It really depends on what you're trying to treat. I think most listeners that tune into your show on a regular basis are biohackers or enthusiasts around overall health optimization. In that scenario, it's really hard to overdo light therapy. And so it depends on what you're using it for. But like with a full body system like our devices, with kind of the power that's delivered from those, generally speaking, we recommend about eight to 10 minutes at roughly six inches away from the device.

But to that point, that's one of the things that we're learning a little bit more about with specific treatments like cognitive function, as an example, that yeah, if you're using red and near infrared light for just enhanced overall cognitive function when it comes to like memory retention or faster reaction times, dosing may not be as important. But when it comes to healing from maybe chronic injuries like a TBI or chronic diseases like Parkinson's or Alzheimer's, et cetera, dosing does matter. And I think that's one of the interesting things.

In fact, Doctor [inaudible 00:13:46] Irani, who's the current president of WALT, which is one of the more well-known kind of societies within kind of the world of photomedicine just sent me a paper recently that suggested this very thing, that when it comes to patients that... dementia, patients that suffered from dementia, and using near infrared light to try to help with some of those symptoms, proper dosing was very apparent in some of the results that they saw.

Dave Asprey: This is light on the head specifically.

Scott Nelson: You got it. Yup.

Dave Asprey: I will just double down on that. And this is why I know light therapy is powerful. About 20 years ago when I had that crazy internet device that used an 880 nanometer light on the brain, I put it just for two minutes over the language processing center of the brain above the left ear, and I spoke in garbled words for a couple of hours. It actually scared the crap out of me. Maybe I overdosed.

So how do you... When someone's using Joovv, how do you know that they're not overdosing?

Scott Nelson: When it comes to specific health conditions like that, we generally point people in the direction of their health provider. And then when it comes to using light therapy, ideally they're having discussions with someone that's in the world of photomedicine that can speak to it at a much deeper level, understanding the full ramification of their health background.

Dave Asprey: And to be really clear, I was using a super high powered thing that was touching my skull and one little spot. And the same thing doesn't happen if you're following the six inches away or shining the lights on your face. It doesn't happen at all like that. So I would be less concerned about it. From talking with people using lasers and all, they've said if you overdo it, that you basically get benefits from more and more and more and then it plateaus. And then if you just, say strapped a Joovv yourself and wore it all day long every day, that your cells would probably start to not get any benefits from it.

Scott Nelson: I think that's the better way to think about dosing when it comes to general health optimization, is that one, it is hard to overdo, but eventually you will reach some sort of law of diminishing returns. And I think that really speaks to the concept... really, the mechanism of action when it comes to red and near infrared light therapy is that these wavelengths of light are stimulating your mitochondria in your cells. And that stimulus is great, but a chronic stimulus probably isn't, just like anything else.

Dave Asprey: It's like running a marathon every day.

Scott Nelson: You got it, you got it.

Dave Asprey: It might not be good for you.

Scott Nelson: Your cells need a break at some point. And that sounds kind of high level, but that's sort of the reality. [inaudible 00:16:29].

Dave Asprey: The same is true for ketosis. Read the Bulletproof diet, it's good for you, go out of it; go in, go out. It's the cyclical nature of things. And so I don't think it's necessary to walk around with red lights shining on your skin all the time. But having that intense stimulation followed by healings, it's like lifting weights; you don't want to do that all the time either.

Scott Nelson: Yup. You got it.

Dave Asprey: Okay. Now, we know from this new study that you talked about that healing of bones is faster. What about bone density in otherwise healthy people? Do people see increases in bone density if they didn't have a broken bone if they're regularly using red and near infrared?

Scott Nelson: I can't point to any studies off the top of my head, but there's a high likelihood that you'll find published data that speaks to bone density. In fact, kind of interesting anecdotal stories that we're seeing Osteostrong clinics, which I know you had one of the co-founders on your podcast and on not too long ago. And a lot of those clinics, which are... They have a unique kind of protocol and modalities around preventing osteoporosis-

Dave Asprey: Basically flexing the bones. We've got a machine at Upgrade Labs that does a similar thing. In fact, there's a machine designed by the same guy. So they're seeing it from stimulating bone morphogenic protein or BMP. I haven't seen a study that says that red lights do that. But I'm intrigued because anything that increases production of osteoblasts in the bone cells or osteocytes, which are basically the cells that get embedded in the bone matrix, is probably going to improve bone density. But I wouldn't go out there and say, "Oh, you're a postmenopausal woman and you're developing osteoporosis, all you need is light therapy."

But given that you probably care about your skin anyway, is light therapy likely to be helpful? Probably. But you might want to take your vitamin D and vitamin K2 and get some sunshine.

Scott Nelson: You got-

Dave Asprey: Do you agree with that?

Scott Nelson: No, 100%.

Dave Asprey: Okay.

Scott Nelson: We're never going to be... You'll never find us as a company promoting the concept that all is you need is light, as an example. What we will-

Dave Asprey: You're not a breatharian?

Scott Nelson: No. Far from it. But what we will say is that light is underappreciated as an aspect of health. And most people think of food and supplements and some type of training regimen of some type. But the overwhelming majority of people don't think of light as part of that kind of overall health equation. And so it is-

Dave Asprey: Junk light matters and high nutrient light matters.

Scott Nelson: You got it. You got it. It all matters, from preserving your natural circadian biology, to using it for therapeutic reasons to heal or to optimize hormone balances, et cetera.

Dave Asprey: Well, let's talk about the hormones, because you... One of the reasons I wanted to interview today, you've got some new info about hormones in men and

women using red and near infrared light. And were they using actually the Joovv devices in these studies?

Scott Nelson:

They were. We actually just... We just wrapped up the second wave of participants in one of several studies that are ongoing right now centered around the use of full body light therapy for overall hormone health. And you'll see us continue to fund and sponsor more and more of these studies, because our core thesis is that for overall health optimization, full body light therapy is ideal. But specific to this study, it's really interesting because we wanted to try to answer that question, is full body light therapy good for hormone health in both men and women? Because we have all these anecdotal reports, more so from men, that have done pre-blood work, pre and post some type of light therapy regimen and noticed some pretty dramatic results when it comes to testosterone production.

But it's all kind of like some relatively small number of participants, small case series, if you will. So we wanted to showcase that in an actual study and also involve women too. Because a common question with women is like, if men can increase their testosterone in a healthy way, can women increase their progesterone and keep their progesterone to estrogen ratios healthy. And although the results are still early, by the time this episode airs, we'll have a really nice FAQ piece up on our site from Dr. Kelly Gibas, who was the principal investigator in this particular study. She's the founder of Bristlecone Health in Minneapolis.

At a high level, the results were really staggering, especially when it comes to female hormone production. What we saw was... Really, two things that stood out when it comes to females with the use of daily, full body red and near infrared light therapy with our devices is that not only did they see really healthy progesterone increases, but they also saw balanced progesterone to estrogen ratios, which is really important, because you don't want estrogen dominance, which is really common as females age.

Dave Asprey:

Oh yeah. It's a major issue. And in fact, we had a whole podcast about progesterone. A guy who came on was saying, Pretty much progesterone cream fixes almost anything because of adrenaline dominance when people are more stressed. And your finding in these studies with women, was there any particular age range or-

Scott Nelson:

They were both premenopausal, perimenopausal and post-menopausal. So across the board.

Dave Asprey:

Across the board. And how long each day or each week, how much exposure to Joovv were they getting?

Scott Nelson:

They were using our recommended treatment guidelines, which is... They were using what we call the Joovv Solo, which is our entry level device into full body

light therapy. And they were just using that for 10 minutes on a daily basis on their front and their backside.

Dave Asprey: So 10 minutes, so five minutes front, five minutes back?

Scott Nelson: 10 minutes front, 10 minutes-

Dave Asprey: Okay. So 20 minutes of total exposure per day.

Scott Nelson: Yep.

Dave Asprey: All right. And you found that in women, that it changed the ratio of estrogen and progesterone. So it was it decreasing estrogen or increasing progesterone?

Scott Nelson: It was increasing both, but what's interesting is the ratios stayed balanced. So even though... The ideal goal would be, to your point, David, as you just mentioned, would be to increase progesterone, right? Healthy levels of progesterone. But you're normally going to see a rise in estrogen as well. But the rise in estrogen was a healthy ratio in relation to the progesterone increases.

Dave Asprey: So estrogen went up a little bit, progesterone went up much, much more.

Scott Nelson: You got it.

Dave Asprey: Okay. Interesting, just from light exposure. That's new data. That's something that I have not heard of or seen before, and that's a study that you funded. That's cool.

Scott Nelson: Yeah. And we want to do more of that. And what's interesting is that when you think about the mechanisms at play and.... I'd be cool to kind of resurface that interview that you did with... that went deep on progesterone. But progesterone is kind of like the testosterone for guys. Most guys think of, I want more T, when women, progesterone is kind of the same thing. And what happens is as women age, is that the HPA axis can be chronically stimulated, which leads to stress all the time. Your body sort... It's a signal to your body that you should always be in flight mode.

And so that prevents DHEA production, leads to estrogen dominance, et cetera, like this whole downstream ramifications that happen. And by using or exposing your body to consistent red and near infrared light therapy on a daily basis, it's.... At least the early results showcase that not only do you have healthy DHEA increases, which convert to progesterone increases, but also that HPA axis is also regulated in a healthy way as well. So really interesting stuff. And I think just more homeowner related studies, I think, are very interesting to us, and we're excited to do more of those.

Dave Asprey: Okay. What is the benefit to raising DHEA with light, versus just taking some DHEA in a capsule?

Scott Nelson: That's a great question. I'd love to be able to point to that a study. And maybe we'll do something like that at some point down the road. But I think anytime that you can stimulate your body to naturally produce more of something, that's probably, generally speaking, better than supplementing alone, if at all possible.

Dave Asprey: It seems to me that there's all these feedback loops inside the body, most of which we don't even understand. So if you take something externally, then the body may down-regulate its own production, but if it upregulates its production so you get more, it probably won't down-regulate it. But I would say we don't have a study for that yet. Just if you look at how life works and you were to make a bet, which of these is going to be a better choice? Probably getting your body to just do it naturally. It's kind of the same with vitamin D. And my opinion on that over the past 25 years has shifted, where it used to be...

20 years ago, everyone's deficient and pretty much everyone is deficient, but we didn't understand that if you can get vitamin D from a supplement and then go into the sunshine, that the sunshine's activating the vitamin D. So there may even be a case... In fact, I would bet it's the case, where if a woman is low in progesterone and is estrogen dominant, she might want to take progesterone and use light therapy and then suddenly see really profound shifts that wouldn't happen if you used either one alone. But no one's tested it yet. But that's what I would do if I was hacking my own perimenopause, which fortunately I don't think I'll have to deal with.

Scott Nelson: I think you touched on some really interesting points that.... At the end of the day, everyone wants to point to some really well structured study. But that example that you brought up with respect to vitamin D, I think, is a perfect one. And I think the overarching sort of narrative to me is that it's probably just... it's healthy maybe to start with both, but the important point is the need for ongoing results, right? Just like you... Everyone listening to this that drives a car is going to understand the concept that they need an oil change once, twice, three, four times a year, maybe depending on what you drive. You sort of need to do the same thing when it comes to your body. Right? You need those annual, semi-annual checks in the form of a saliva or blood based testing.

Dave Asprey: I thought you were going to say in the form of massive STEM cell injections.

Scott Nelson: I won't be there though. That might be a thing you want to look at as well.

Dave Asprey: I did. Now, let's talk about guys though. Years ago, I said, "Hey, here's this study that shows if you get sunlight or red light on your, technical term, balls, it raises testosterone." So there's a whole generation of people in jail now for public indecency for trying to get sun where the sun doesn't shine. You also have

found testosterone shifts in men from using... This was another Joovv study that you funded using [inaudible 00:27:28]?

Scott Nelson: Yeah. Exactly.

Dave Asprey: Okay. And what did you find in men and where did they have to put the light?

Scott Nelson: So in this scenario, it was the same study, and we enrolled just both men and women and the men followed the same exact protocol that I mentioned earlier, 10 minutes on the front side of their body, 10 minutes on the backside using our Joovv cellular device. So not necessarily shining the light directly on their nether regions, but just this systemic, nearly full body exposure to these wavelengths of light. And again, the early results showcase that men experienced a statistically significant increase in both free and total testosterone.

Dave Asprey: Were these deficient men or men who had normal testosterone levels?

Scott Nelson: So the men were... they weren't necessarily deficient per se when you look at the-

Dave Asprey: The standard ranges for deficient men, right?

Scott Nelson: Right, right. But I think what's interesting is that the two diets that were followed in this particular study were kind of a standard American diet. So basically-

Dave Asprey: Garbage.

Scott Nelson: Garbage, exactly, and a ketogenic diet. And the results, both groups saw a significant increases in their testosterone, but the group that followed a ketogenic diet saw even greater increases.

Dave Asprey: That's shocking, given that testosterone is made out of cholesterol. And if you eat enough fat, you can make hormones. Who would have thought. Oh, and if you're stimulating your cells to grow using red light and cell membranes are made out of fat, 45% of which is saturated fat, it's shocking that people eat fat and can metabolize it had better results. I can't imagine. That's pretty cool that you mixed that in.

Scott Nelson: It's sort of funny when... When you take a step back and think about it, it all makes sense, right?

Dave Asprey: Yeah.

Scott Nelson: It's very intuitive. It's cool to actually showcase that in an actual study.

Dave Asprey: It's super cool. Can you talk about percentage of improvement in testosterone? Are we talking 20%, 10%?

Scott Nelson: So the results that we saw, both in men and women... So with women, again, we studied progesterone and estrogen. In men, it was total versus free testosterone. We're talking anywhere from percentage increases of 20% all the way up to 60 and 70% increases. So-

Dave Asprey: That's pretty substantial.

Scott Nelson: Yeah. And I want to... The major caveat is here is that our devices aren't cleared for any sort of hormone replacement type of therapy. These are early results, but they're so staggering, the results are so compelling, we're excited just to do more of this work.

Dave Asprey: Here's the deal, the risk of shining red light on your body is pretty damn low. Right? And it's not very expensive to get a testosterone test. So these are the sorts of things that are perfect for biohacking, because you're saying, "Well, wait a minute, could I see if this effect works for me?" And if it does, great. And if it doesn't, then you tried something. Like, it's okay. It's not like you're saying, "The studies show that if you just open yourself up with a pocket knife from abdomen to forehead..." Like okay, the risk reward isn't going to be there.

So this is the kind of thing where... Definitely, it's not cleared for this. But if a physician is listening to this and has a patient who's interested in stuff and... You know what, Hey, let's order a lab test and see if it works. And you could do the same thing with a ketogenic diet, you can do the same thing with meditation, you can do the same thing with not ejaculating a lot. All of those will probably move your testosterone levels, and they might move them differently for you versus me. Right? I love the idea that we can self-experiment with affordable gear and just see what happens.

Scott Nelson: And that's one of the cool things about light therapy, is exactly that. Not only is it supported by a lot of published science, but it is... Nowadays, it's really accessible and pretty affordable for the most part. A shameless plug for our own devices, but they even come with a 60 day trial. So theoretically, you could do a-

Dave Asprey: A testosterone experiment and send it back if it doesn't-

Scott Nelson: You got it, you got it. It's really lightweight stuff that can have some pretty profound benefits.

Dave Asprey: I'm definitely intrigued at that one for sure, especially because you don't have to put it in your pants. Another question though, these were on the abdominal cavity?

Scott Nelson: Correct. Yeah. So like that device I mentioned that was involved in this particular study, the way that we instructed the participants to use it was hanging it from a door, as it's intended to do, and it treats from about the top of your head to maybe mid-thigh on most people.

Dave Asprey: Okay. So it was a bigger one?

Scott Nelson: Yep.

Dave Asprey: Because I'm thinking, I would want to actually get red light on my face while I'm raising my testosterone, because then I'd have less wrinkles and more testosterone. And then it's like, "Hey, I'm looking good." I'm married, it doesn't really matter.

Scott Nelson: You know what's interesting about that is like, we have a fair number of customers that purchase our devices for a specific thing, like testosterone or hormone health, or maybe reducing pain and inflammation. But they report back on all of these ancillary benefits, like all of these people are commenting that they think I'm doing Botox injections or like, "I just feel better," or "My mental alertness is that much faster." And so it's just really cool when you take a pause and look at light therapy from a holistic standpoint, it's beneficial in so many different categories, which speaks to the underlying concept that we mentioned earlier. It's an important aspect to health, just being aware of light and making sure it's not disrupting something in your lifestyle, but also using it therapeutically too can lead to a lot of wide ranging benefits.

Dave Asprey: I'm still wondering if there's going to be like Joovv underwear.

Scott Nelson: That's to be determined. I think maybe some of those ideas have some-

Dave Asprey: I'm just trying to get you to feel awkward. I think I pulled that off. Now, there's so much interesting stuff going on around nitric oxide as well, where red light, in some studies I've read, stimulates nitric oxide. And for people listening, if you're like, "Why do I care about that?" Nitric oxide increases blood flow throughout the body. In fact, some of the medications and things that increase erectile function manipulate the nitric oxide system. So getting red light could potentially... In fact, I'm very certain of it, if it increases nitric oxide, that you're going to see it when you wake up in the morning if you're a guy. It's called a kickstand.

Scott Nelson: That very point, right, that increased circulation, I think that speaks to the benefit of full body exposure. Right? Getting that systemic-

Dave Asprey: Yeah. Like wound healing? Oh my God. I got more blood into my wound so it could get nutrients in. Who would've thought that I healed faster? It's not that hard. The body actually makes sense. You just have to not believe false information and then it makes sense.

Scott Nelson: Yep. No doubt.

Dave Asprey: Talk about the gut microbiome and light, because we know, and I've been one of those people saying, "You can see that mitochondria make photons and read photons, and we know your gut bacteria makes a lot more light." [inaudible 00:34:51] people saying, "What? It makes light?" You've seen photo luminescent stuff in the ocean probably. There's a version of that going on in your gut, but not quite as bright. So we know light's doing something in there, otherwise mother nature wouldn't waste energy making light if it didn't do something. What have you seen using your technology and effects on the gut bacteria?

Scott Nelson: This is a really compelling area that I think you'll find us looking to study more and more is knowing that healthy gut microbiome is foundational for overall health. But the research here is... it's very early, but I think what really stands out is... I think probably within the past six months there was a paper published by a group of researchers in Australia that studied broad applications of light therapy. So not targeted treatment, but broad applications of light therapy. And they showed that across the board, consistent exposure to red light actually led to a more healthy gut microbiome in these participants.

And what really stood out to me looking at the conclusion that these researchers had is that they proposed kind of a different mechanism altogether because red light really can't penetrate into the gut, it really shouldn't. Near infrared light, maybe, but red light shouldn't. So you wouldn't intuitively think that red light could actually lead to those types of benefits. But I think that speaks to kind of full body systemic exposure to these healthy wavelengths of light seeing increased nitric oxide, increased circulation can lead to some really interesting health benefits as deep as the gut.

Dave Asprey: That sounded like we don't really know, but it's probably doing something.

Scott Nelson: That would be the ten second answer. It is.

Dave Asprey: All right. All right, got it.

Scott Nelson: Very early, but the results seem pretty positive.

Dave Asprey: And there are people listening to the show who work in university labs, actually quite a lot of them. And I think everyone who's worked with bacterial cultures or fungal cultures knows that the light environment they're in sort of matters. One of my companies, Homebiotic, we make a spray that eats toxic molds and mildew and things like that. So you spray these soil bacteria around so the mold can't grow in your house. And light matters. So if you spray it under the sink where it's dark, it lasts a lot longer. And if you spray it on a window sill, it doesn't as long because the light breaks down bacteria. And if you're doing it in

a petri dish and you put it in the dark, one thing happens, you put it in the light, another thing happens.

So we know that there's some interactions here, but I wouldn't feel comfortable right now saying, "Oh, if you have X amount of red light on the gut, it's going to increase the number of species the way a prebiotic might." But does it have an effect that we haven't studied yet? I think it probably does. All right. Let's talk about something that no one wants to talk about, the big C word, cauliflower. Oh no, I mean cancer. So, the reason no one wants to talk about cancer is that there's a lot of money being made in cancer right now. Some of these treatments are hundred plus thousand dollars. So anytime someone says something about cancer, even if there's really clear data, for instance, eating burned meat causes cancer, there's no one selling a burned meat reduction drug.

So, we have issues around that. So I understand you might not be able to say some things you might want to say about cancer, but what do the studies show about exposure to red and near infrared light and cancer?

Scott Nelson: We're kind of joking, right? But to most people, cancer can be a pretty serious topic.

Dave Asprey: Oh yeah.

Scott Nelson: Especially from our perspective, it's kind of one of those hot button, touchy subjects that... At surface level, it's sensitive. But at the end of the day, most people want a healthy, natural way to fight cancer right across the board.

Dave Asprey: In Superhuman, my new book... By the way [inaudible 00:39:00] my shameless plug. If you haven't ordered this book, it's probably because you're a bad person. Anyway. In Superhuman I write about these things called the four killers. And if you and I just sit down, and if we were average people, which means we weren't exposed to a red light and lots of other things, because we're both biohackers, but if we were average people, what's going to kill us? Cardiovascular disease, cancer, diabetes or Alzheimer's. That's the vast majority of them. That's if you take opiate stuff out, because a lot of people are dying from fentanyl and things like that. So we're going to ditch that and car accidents and things.

But okay, cancer is a big deal. And what a lot of people don't know, your odds of dying from cancer are still substantial, but if you get cancer, the odds of not dying are 50% better than they used to be. In other words, we're actually making progress. Of course, it's incredibly painful progress, with lots of chemicals and radiation and you might not like it, but you can probably survive cancer more than you could. But I think the right anti-aging strategy would be, do everything you can to reduce the likelihood of getting cancer, and to increase immune function so your natural killer cells will kill cancer before it really gets

started. So what do we know about red light therapy and natural killer cells and about basically reducing risk of cancer versus treating cancer?

Scott Nelson: Yeah, and I think you hit on the two aspects of cancer when it comes to using light therapy to both prevent it and really treat sort of the downstream ramifications that come with treatments like chemo and radiation. And starting with the latter, the data is overwhelmingly clear that if... Especially with head and neck cancer patients, that there's a lot of negative consequences that come with chemo and radiation, oral mucositis being one of the big ones, lymphedema, et cetera. And across the board, red and near infrared light is very healing to treat some of those negative consequences that come with those traditional treatments.

But I think the data is like... It's so, so clear that like... In fact, two oncology societies, medical societies, recently changed their guidelines and are now advising all oncologists... Like, it's within their core guidelines that light therapy should use for both treatment and prevention of cancer with head and neck cancer patients.

Dave Asprey: So this is skin cancer or even inside like glioblastoma stuff inside the brain?

Scott Nelson: No.

Dave Asprey: Wow.

Scott Nelson: Yeah. The latter. And the reason that stands out is to see a society change their guidelines and now advice for not just the treatment but also the prevention, that's a really big deal in a traditional health healthcare setting. So I think that's really cool. And that actually is a nice transition to talk about prevention of cancer. And I mentioned one of the leading researchers in the field, Doctor Praveen [inaudible 00:41:49], he's the president of WALT. Some of his recent work is actually looking at the mechanism of like, how is this actually happening?

And historically, there's been kind of this fear that red and near infrared light, because of the stimulating nature of these wavelengths, may induce tumor growth. And actually, what he's finding, and it's not just him, more and more researchers are finding this, that because of the ability of these wavelengths to stimulate transforming growth factor beta, that actually you get the opposite response with tumor cells. So you actually get apoptosis and a autophagy with tumor cells.

So it's really cool. It kind of speaks to kind of like, you get the best of both worlds when it comes to red and near infrared light. Your healthy cells respond very favorably, by producing more ATP energy, by functioning normal, and then those cells that aren't functioning normal, those dysfunctional ones, those cancer cells die. Right? So it's really cool when you think about some of this

emerging research, especially when it comes to like the mechanism of action, because when it comes to a touchy issue or subject like cancer, man light therapy is... We're learning a lot of really profound things when it comes to that.

Dave Asprey:

Going back like five, six years before he was as well-known as he is today, Dominic D'Agostino came on the show. Because of the anti-aging nonprofit stuff, I've had a chance to talk with other people. And if I was dealing with one of these head and neck cancers or any other cancer, I would pretty much be, "Whoa, I'm going on a ketogenic diet with low inflammatory toxins and the right proteins. Let's see if I can think of a diet like... Oh yeah, the Bulletproof diet." I would do that and I would go into a hyperbaric chamber, and I would bring a red light device with me. Right?

And so now all of a sudden, you're getting this flood of oxygen... Oh, and I'd do some fasting as well. That's pretty important. And if you were to do that every now and then when you didn't have cancer, is it going to lower your risk of getting cancer? Probably. But most of us don't have hyperbaric oxygen at home. Okay. You can skip that. Right? So then fast sometimes and do ketosis sometimes, but not all the time, because you won't like that either, and use some red light therapy. Are you measurably reducing your risk? You'll never know, because you can't AB-test yourself.

Here's the version of me, where I did the opposite path, and that version of me died. So since we don't have this multi-verse time travel thing to compare notes, you just have to say, "Does it make sense that I'm reducing my risk? And if so, do I think it's meaningful and do I get other benefits?" Because you could spend all day, every day reducing risk. One thing I like about red light therapy is you can do it while you're doing other things. So if it's trending on the back of you, you can watch Netflix if that's what you want to do. You can listen to an audio book, you can be on the phone with somebody. So it's not like it's a big of a deal unless you're doing a video conference. And have done those with red light therapy too, and people think I'm weird, but whatever.

Scott Nelson:

I was going to say just turn off the video.

Dave Asprey:

[crosstalk 00:44:44] for fun. Like, sorry guys, just don't look at the video. It's too bright.

Scott Nelson:

No, but speaking of stacking therapies, you hit that on the nose. In fact, that's one of my go-to protocols every morning, is I've got our big Joovv Elite full body system, and I do about six to seven minutes on the front and the back, but I'm standing on the Bulletproof vibration plate-

Dave Asprey:

[crosstalk 00:45:05]. Nice.

Scott Nelson:

... at the same time, so I get some stimulation with my lymphatic system, but also I'm proactively helping my cells function better. And I think it's interesting

when you look at like kind of really... especially in a lot of our conversations with these photomedicine researchers who are brilliant people, this can be really a complex topic to try to understand and really peel back like, what's really going on, why you get stimulation here and what's happening with hormone production, et cetera. But when you really start asking the why, why does that happen, and why does that happen? At the end of the day, most of it kind of circles back to like the mitochondria and the healthy cell is functioning in the right way.

So much goes back to just healthy mitochondrial function. And by following ketogenic diets, the Bulletproof diet, et cetera, you're reducing that stress and allowing your cells or giving them more opportunity to function in the-

Dave Asprey: Yeah, to do what they're supposed to do when they get all this stuff they need.

Scott Nelson: Right.

Dave Asprey: It's funny, we talked about red light therapy and the microbiome. A new study came out just in the last few months around whole body vibration. And it's funny, because I've been doing this for a long time. Bulletproof, I think, has had the Bulletproof vibe for eight years. And a study came out a couple of years ago saying... It was from a... I'm forgetting, but something like British Medical Journal, some sort of a big journal saying, "Wow, this stuff really is effective like exercise." But very recently, one came out that said that whole body vibration had a beneficial effect on the gut microbiome. So there you are using red light, and we believe, based on our earlier conversation, it's probably doing something beneficial to gut bacteria and you're vibrating.

So all of a sudden, who would have thought maybe the mechanism of action there is that it changed your gut bacteria in a positive way that then effected your biology? It's kind of cool. We don't know, but it's... There's something going on there that's important. Something else that I'm really interested in that you may have more knowledge about is unusual water chemistry. So I funded a couple of years ago... Actually, it was at the Bulletproof... The biohacking Conference, now it's going into its seventh year. We had Gerald Pollack come in and we actually got donations, and then I paid the rest of it for research on exclusions on water. And this is for healthy mitochondria, for healthy cells, you need to be able to modify water. The first thing mitochondria do is they change bulk water into exclusions on water, which allows ATP to form. And it looks like light has an effect on that.

And the research that Bulletproof funded was around, what do droplets of fat suspended in water do? It turns out the type of fat really makes a difference. Newsflash, saturated fat works better. Anyway. What do we know about red light, near infrared light and the formation of water on cell membranes?

Scott Nelson: This is a really interesting topic. And I think probably over the next few years, we'll really begin to learn a lot more. In fact, there is a researcher, and his name is completely escaping me, that recently published a paper, literally within the past, gosh, three or four months, something like that, that suggests the core mechanism of action when it comes to red and near infrared light therapy may not necessarily be stimulating cytochrome C oxidase. I don't know if there's general consensus around that, but instead, actually changing the viscosity of metabolic water, the water inside your mitochondria, which is different than water as we think.

And by changing the viscosity, making it thinner, so to speak, you're actually able to... Electrons are actually able to pass across the electron transport chain a lot faster, a lot easier. And so in essence, your mitochondria are becoming like well-oiled machines simply by changing the viscosity of water. And so he suggested in this paper, and in my opinion, called out some really interesting compelling findings. But at the end of the day, whether you're stimulating cytochrome C oxidase, which is kind of like a traffic control cop for metabolic function-

Dave Asprey: For electrons in your cells.

Scott Nelson: Yeah. Or you're changing the metabolic water in and of itself. At the end of the day, you're basically allowing, your mitochondria, giving your mitochondria the ability to function more efficiently, which leads to so many other... So it's still foundational, and leads to so many other health benefits that we discussed.

Dave Asprey: It's funny, it reminds me of a woman named Candace Pert, who discovered the opiate receptor going back a while. And I'm sad I didn't get to interview her before she passed. But in her autobiography, she writes about her whole story. And she's trying to... As her career progressed, she became way more open to meditation and things like that, versus everything's mechanistic. And she describes meeting with a group of shamans and describing opiate receptors and they looked at each other and said something in Spanish or whatever and the translators... What did they say? And they said, "Oh, they're talking to each other saying, 'This lady thinks that all those opiate receptors actually exist.'"

Because from their perspective, it was like, "Well, of course it works." But whether you want to tell yourself a story that it's because of these receptors or some other story, it doesn't matter because it works. So we know in this case, an opiate based plant, medicine does these specific things. You put it in the system, it comes out. It's a black box. You tell yourself a story about the black box in the middle of the system, you don't really know.

So, I'm going to say that our story is much more likely to be true, but it's still a black box because we can't watch one electron move through the system yet. And when we can, then it's no longer black box. Till then, if you can reliably say, "I'm going to do these things and these things come out," and we think it's why, I'm just okay with that. Because I don't want to wait 180 years to figure out,

"Oh, now we know for sure what's in the black box, so it's okay to use it." And that's the difference between biohacking and this sort of rigid, slow moving.

Well yeah, we know that might save your life, but we're not really sure, so you can't use it. And you're like, "Screw you. That's not okay." So that's why you got to do the things that are likely to be beneficial, because we know what happens if you do the standard American diet; you pretty much spend less 20 years of your life suffering and then you die poor. It's like, I don't want to do that anymore.

Scott Nelson: Right. I think that's a super interesting topic. I, personally, I tend to lean towards more... I tend to be more mechanistic in general. Like why is something working, right? I want to understand it. And I'm always amazed at people that just... like the shamans, as you pointed out, that just... Of course, it works. We know it works. Why do you need to understand what's inside the black box? You know what I mean?

Dave Asprey: And it's good to be curious about the black box. And I'm the biggest fan of cracking that thing open, but in the meantime, I'll use it, is what I'm saying here, like around the gut microbiome.

Scott Nelson: Especially when there's hardly any downside. It's hard to find any downside to using something, but intuitively, it kind of makes sense. And I think that is one more point that kind of serves as this example, that if we can help induce healthy mitochondrial function, regardless of how it works or what's inside the black box, it's apparent that that really drives a lot of really positive health benefits across the board.

Dave Asprey: So at the end of the day, whether the red light is affecting cytochrome C oxidase or it's a nitric oxide thing, so there's more oxygen availability, or it's changing the viscosity of water... It might be one of the three, it might be all three and one of them may have a bigger effect. I'm curious, but in the meantime, I'll use it while we figured it out. I feel so good about that. I would ask you some rapid fire questions as we're coming up on the end of the show, stuff that I know that I've seen on social media and people are saying, "Dave, what do you think about this, what do you think about that?" I want to know what you think about this. So, red versus near infrared light, pros, cons?

Scott Nelson: I'll try to be rapid fire here. So, I don't know if there's a lot of pros or cons or really cons to either one of them per se. They work very similarly, they have, generally speaking, the same mechanisms of action. But the unique thing about near infrared light is it does penetrate deeper within our body. Whereas the red light is primarily absorbed by the dermis and epidermis in our skin, near infrared light has the unique ability to penetrate deeper, even into bone, which we talked about earlier, which is why those types of wavelengths are studied when it comes to bone formation or bone health. That's the primary difference between the two.

Dave Asprey: What about the best ways to use photo biomodulation or light therapy?

Scott Nelson: I don't want to sound vague, it depends on what you're using it for. But if you're just looking to proactively have better health, I think yeah, full body or any sort of device that will allow you to treat a large area of your body is ideal. And personally speaking, my routine, as I mentioned earlier, is I stand in front of a full body Joovv device on the vibe plate for seven or eight minutes on the front side of my body, turn around and do the same thing on the back side of my body. And at the same time, I'm doing breath work and listening to a podcast. In my opinion, the more therapies you can kind of stack in that routine is... You'll get more bang for your buck.

Dave Asprey: You've been to my house in Victoria at Bulletproof Labs Alpha. And yeah, there's a Bulletproof vibe standing there, and I've got the Joovv light on one side, I've got a sunlight panel on the other side, because it's Canada and it's dark in winter. And bottom line is, well, hold on, you're getting your exercise because you're vibrating and you're getting your light therapy. So the ROI on that time is pretty strong. And if you didn't have the lights and you did it, you'd still have a good return. You just got more return in the same minutes of beneficial things. And sometimes that's all the movement I'm really going to get in a day, and that's all right.

Scott Nelson: Yep. Yep. One other sub question that often comes up on that note is morning, evening, when is the best time to use this? And I'd say whenever... generally speaking, whenever you can fit it into your schedule is probably ideal. And if you're using a high quality device, all you really need is about 10 minutes. Most people have to have that amount of time. But if you really want to kind of get into like biohacking and really start trying to optimize the type of therapy, I'd think about timing it with the morning sunrise and sunset really and trying to line this type of therapy with your natural circadian biology. So, whether you use it in the morning or the evening, those are probably the ideal times.

Dave Asprey: Yeah. Sunset and sunrise is when we have the most red. But I don't know, do you have any inexperience on shining the Joovv on the face right before bed? Have you seen any impact on that?

Scott Nelson: Anecdotally, Dr. Michael Hamlin, who's another highly regarded field of medicine researcher, that's one of his best biohacks for sleeping, is not using red light, but actually near infrared light on his forehead at night.

Dave Asprey: Oh, near infrared, I could see that, to get-

Scott Nelson: Yeah. Because it's invisible to the naked eye.

Dave Asprey: And you'd get the blood flow and the brain for sleep. I could totally buy that.

Scott Nelson: You got it.

Dave Asprey: Okay. How about this light therapy photo biomodulation versus infrared saunas? A lot of people seem to confuse the two. What are the differences?

Scott Nelson: I think the short answer is they're both good, but they're different therapies. And the best analogy is kind of like comparing a marathon to a kettlebell workout, both can be good, you're just going to get a different... there's a different physiological response that's happening. And to go a little bit deeper on that, most of our discussions has been centered around red and near infrared light. The reality is that the infrared spectrum near, mid and far is actually really broad, ranges anywhere from around 800 nanometers to 20,000 nanometers. So it's actually really, really quite broad.

And mid and far infrared wavelengths actually induce heat, and so that's why most saunas, most infrared saunas are going to primarily use mid and far infrared, because they're great at generating heat. And so that can be good, generating heat stress. There's plenty of data that showcases that there's a number of health benefits that come from sauna based therapy. But photobiomodulation using red and near infrared light, it's different. You get a different biological response. So both are good, but just different.

Dave Asprey: I would totally agree with that. What about eye protection? Full disclosure, I don't put anything over my eyes, because I feel like my eyes would like to have cytochrome C and like... I don't know that there's harm from it if I was using high powered infrared lasers or something. But in terms of LEDs, I don't worry. But what's the best practice there?

Scott Nelson: I think it depends on what device you're using. So a legit, high quality devices is going to have... At some point, there's going to be IEC testing done on photo biological safety testing, which is, is this PBM device safe to use with your eyes? So like our devices specifically, they've gone through those and checked the box. It's actually safe to use without eyewear. But the deeper question is, is it good for your eyes? And our position is, yes, it is. It may be bright for people that are new to the therapy and you can certainly wear some true dark glasses or some sort of eyewear, but-

Dave Asprey: True dark glasses wouldn't even work for that because they're going to allow all of the red light through, because that's what they're meant to do. So don't even worry about that. They have the little ones for like suntanning, those dumb little caps. And plus, you don't want wrinkles around your eyes. So the smaller the coverage or your eyes... So I've not ever felt the need to use those. I do close my eyes when I'm in front of it, which seems like a good idea, but-

Scott Nelson: I do that as well.

Dave Asprey: Yeah.

Scott Nelson: And we've got a great article on our site that goes deep on the science for the health benefits with respect to your eyes when it comes to red and near infrared light therapy. And there's plenty of data that suggests these wavelengths of light are very healthy for your eyes, not just for proactive health when it comes to like maybe increasing vision, but also reducing diseases like macular degeneration. So that's our general stance is, is actually... If you don't mind the brightness of the light, why wear eyewear?

Dave Asprey: What about LED flicker?

Scott Nelson: This is an interesting topic. And I think generally speaking, there's probably a fair amount of misinformation around LED flicker and what it means and what it does in terms of the health consequences. And I think most of the data that you see, the science that you see with respect to the dangers of LED flicker is really centered around different wavelengths of light that are delivered from inefficient LEDs, the same ones that you can find in a Lowe's or Home Depot that deliver bright light that that noticeably flickers. That's very different than something like a light therapy device that is either intentionally or not intentionally fluctuating the wavelengths.

And what I mean by that is there's a fair amount of research now that suggests when it comes to light therapy or PBM, that flicker or fluctuation of those wavelengths can actually be very beneficial and actually lead to even better results. And so I think the big kind of moral of the story is that if you're intentionally trying to deliver fluctuation or flicker with wavelengths of light for therapeutic reasons, that can be good. If it's unintentional, unmitigated LED flicker, that may not be so good.

Dave Asprey: We definitely know there's pretty compelling research around 40 hertz flickering where they're seeing a reduction in amyloid plaques for Alzheimer's just from any color of light flickering 40 times a second. That's really interesting. But I am very skeptical about the ongoing and untested safety of spending all day, every day in an environment where the lights above your head are turning on and off 120 times a second. It's not a good thing as far as I could tell.

Scott Nelson: Well, that's... I think that you hit the nail on the head, it's that chronic overexposure to inefficient LED. I say inefficient because generally speaking, most LEDs are pretty efficient, but kind of subpar quality, nonmedical grade LEDs. And overexposure to those types of LEDs that are delivering artificial white light all day, yeah, probably not a great idea. In fact, there's a story behind that. Doctor John [Oat 01:01:35] who is kind of-

Dave Asprey: Oh yeah.

Scott Nelson: ... considered one of the-

Dave Asprey: Original light hacker guys.

Scott Nelson: Yeah, yeah, totally. In fact, his book was one of the first ones I read when I first started getting into this. But it's his work in time lapse photography that him into to light. And he studied, through time lapse photography, kids that were exposed to this type of lighting in schools through that early work. And this is when time lapse photography was brand new. He showcased visible fatigue symptoms in these kids that were in a classroom all day with that type of lighting.

So I think that... But that's very different than this unsupported fear of all LEDs are bad. They flicker all the time. Well, that's not really the case. You know what I mean? You have to understand what you're doing. Kind of that chronic exposure to bright white LEDs, yeah, probably not great, but that doesn't mean that all LEDs are bad per se.

Dave Asprey: I would go so far as to say that given the current state of LED technology, indoor illumination with LEDs is a really bad idea if you want to live a long time. That said, LEDs can be used therapeutically in a beneficial way. And magically, I don't know anyone who's sensitive to red light. It seems like it's really good for you. So you can take people who just tweak with most lights spectrums and you can put red glasses on them or you put them in a room with a Joovv and no other lights on it, they're like, "Ah. I feel good." So I look at red as sort of the safe color for light. And there's something to be said there.

Scott Nelson: Just to wrap that up, the parallel example is, it would be someone that's learning a little bit more about how fats can be used for health.

Dave Asprey: There you go.

Scott Nelson: And they're they may walk into that conversation thinking, "Well, all fats are bad." Well, no, not really, if you actually learn about the different kinds of fats. And no, actually some fats are really beneficial... And so that's kind of the same concept when it comes to light, it's like understanding what-

Dave Asprey: Really good explanation.

Scott Nelson: ... colors you're dealing with and your exposure and whether you're overexposed to those types of colors and... Yeah. So there's more to the story. And I think just having that kind of general, broad understanding is helpful to answer that flicker, the notorious flicker question.

Dave Asprey: Yeah. It's a tough one, because not all LEDs are bad, but having an LED above your desk at your office probably is... How do you explain that nuance in a single sentence?

Scott Nelson: Exactly. Yup.

Dave Asprey: All right. I've got one final question for you that might not be a rapid fire question, and this has to do with Superhuman, my new anti-aging book. And I've been asking people over the last a hundred or so episodes, how long are you going to live? What's your number?

Scott Nelson: I don't know if I've ever actually been asked that question.

Dave Asprey: Probably not.

Scott Nelson: I'm going to say... Well, this is going to pale in comparison to your answer, but I would say... I'm going to stick with a hundred.

Dave Asprey: Only a hundred?

Scott Nelson: Only a hundred.

Dave Asprey: Even with all of your light therapy exposure?

Scott Nelson: Maybe I'm selling myself short, but [inaudible 01:04:35]. I'm into the three digits.

Dave Asprey: Okay. How old are you now?

Scott Nelson: I'm 38.

Dave Asprey: 38, okay. So you think over the next 62 years of research and development, that we're only going to be able to get you to a hundred?

Scott Nelson: Maybe I'm selling-

Dave Asprey: Go back 62 years. What was the world like 62 years ago?

Scott Nelson: A lot different?

Dave Asprey: World War II.

Scott Nelson: It's actually-

Dave Asprey: Look at the cars-

Scott Nelson: .... an interesting thing to think about. Yeah.

Dave Asprey: Look at what we could do medically, look at antibiotics were just coming out.

Scott Nelson: What's your number, Dave?

Dave Asprey: 180.

Scott Nelson: 180? Okay.

Dave Asprey: You go back a hundred years, that's World War I, we're fighting it with horses.

Scott Nelson: Well, that's that many more Joovv devices you can buy or that period of time.

Dave Asprey: I'm counting on my Joovv underwear by then, right?

Scott Nelson: Exactly.

Dave Asprey: But seriously, you look at these timescales, I think we're all selling ourselves short right now, because there's so much cool stuff, including stuff you're working on. It's changing the world.

Scott Nelson: That's actually really interesting. I've never thought about it in that light, that 60 something years ago, World War II. And so the changes that likely will happen then in that amount of time... Yeah, maybe I should increase that number, but-

Dave Asprey: They didn't have machine learning, they didn't have the internet, they didn't have the ability that you and I have to look at PubMed. I'm 46, so I'm just a little bit older than you. But did you ever have to use a microfiche?

Scott Nelson: No, I don't think so.

Dave Asprey: Do you know that is?

Scott Nelson: No.

Dave Asprey: There we go. World War II to now. You see why 180 isn't crazy?

Scott Nelson: [crosstalk 01:06:09]. 140.

Dave Asprey: There we go. All right. Upgraded. All right. There we go. Scott, it's always a pleasure to have you on the show. I totally appreciate it. You're doing really good work with you. I love that you're doing clinical trials, super cool stuff. Your website, J-O-O-V-V.com.

Scott Nelson: You've got it. Two Os, two Vs. It's a short for rejuvenate. So, check us out. We've got a whole host of educational articles there too if you want to get into the science.

Dave Asprey: All right. I appreciate it. Keep on pushing on that red light, the near infrared light, and I will keep using it.

Scott Nelson: Awesome. Thanks for having me, Dave. Really appreciate it.