Apollo Health – Vielight Webinar

Please note that the following information is not to be taken as medical advice but anecdotal discussions based on published and ongoing research with Vielight Neuro technology.

Dr. Dale Bredesen

Dr. Lim, thanks very much again for joining us. And so you were talking about starting the company in the mid 90s and what was the original name of the company?

Dr. Lew Lim

Actually the research was personal (at first). It started in the mid 90s. The we had another company that was formed before Vielight and we decided, OK, we go with Vielight and Vielight was formed and started operations in 2011.

Dr. Dale Bredesen

2011, OK.

Dr. Lew Lim

Well, so we're in business officially for 12 years now. But the technology has been around for awhile, we've been playing around with it. I was the first one to actually introduce intranasal photobiomodulation to the world. I own the patents for that. Yeah, but there are good reasons for understanding.

Dr. Dale Bredesen

Yeah, very exciting. We've got a lot of people joining us here. So as people come on, let me just welcome everybody fantastic to have you here.

Dr. Dale Bredesen

I'm here with Dr. Lew Lim, who is just explaining to me that he had the first patents on photobiomodulation. Is that fair to say Dr. Lim?

Dr. Lew Lim

I wouldn’t say the first patent on photobiomodulation but for intranasal like, I don't know, I lost count like 30 of our patents are in different places around the world. The way we try to reach the brain through the nose, the way we pulse, the way we get feedback from the nose to the brain and various other patents.

Dr. Dale Bredesen

Fantastic. So there's a tremendous interest, as you know in photobiomodulation. And we've actually talked about this in the past as well and this has been helpful for people and we're going to hear more wonderful data today from Dr. Lim.

This has been helpful for people with concussive injuries for traumatic injuries, helpful for people with cognitive decline associated with Alzheimer's disease, vascular related, and so forth and so on. And as Dr. Lim is going to show us today, even the different subtypes that we've described for Alzheimer's disease, where we see some people with where inflammation is a big issue.

Other people where it's much more about glycotoxicity and insulin resistance and others where it's much more about vascular damage or trauma. All of these are relevant for this exciting technology that Dr. Lim and his colleagues have developed.

A lot of people have been very interested in Vielight and we certainly hear from various groups. Ohh here's someone who started and is clearly doing better as part of an overall protocol and we're always all of us are interested in the same thing. What can we do for best outcomes? So we're really excited to have you here, Dr. Lim.

Dr. Dale Bredesen

Thanks so much for joining us.

Dr. Lew Lim

Thank you very much. I I was looking forward to this. In fact, Dr. Bredesen, I think we kind of got to know of each other, but we never got together.

Dr. Lew Lim

I think this is the first time we actually speak to each other live. Pleasure to be here.

Dr. Dale Bredesen

Yes, long overdue.

Dr. Lew Lim

Yeah. So if you'd like, we could look at how we can relate directly to your six types of Alzheimer's, would you like to do that?

Dr. Dale Bredesen

That would be great. So let's do that because again, we're all interested, whether it's family members, friends, ourselves, whatever. How do we get best outcomes and of course, for all of us, we'd like to be sharp and stay sharp until we're 100. So if you could, let's go ahead and I know you've got a couple of slides you could show if you can show us a little bit about how this relates and how your exciting technology has been used. Useful for people who have various things that are contributing to cognitive compromise, from inflammation to insulin resistance, and so forth and so on. So yeah, please go ahead.

Dr. Lew Lim

Well, let me start by saying some foundational facts. First of all, light in the red to near infrared spectrum actually and beyond penetrates a lot of substances. The longer penetrates more. But the issue is to get the right wavelength, so you get the brain or the body to respond so you know, FM radio waves are also, you know, electromagnetic waves, but they don't draw the same kind of response.

So with that understanding, we have devices that you position in your nose, on your head, and it penetrates. Let me just show you an example so you have some context. So this is an example of how this is positioned. And there is this, the normal way of doing it is through the nose to reach the brain. I have some.. For years we've been lacking data on, for example, how light from the nose reaches the brain. Now we have actually incredible imaging to prove it, but I will share how it relates. I I really love your work, how it comprehensively puts things together.

There you go. OK. Here are your six types of Alzheimer's now. Believe it or not, photobiomodulation research has been going on for many years. I'm just one of the many who have been doing it. Many universities and research institutions around the world have been doing it. And for each and every one of your type, inflammatory, atrophic, glycotoxic, toxic, vascular, traumatic. Photobiomodulation could possibly help. Did I get this right? You'll face six types.

Dr. Dale Bredesen

That is correct, yes, great.

Dr. Lew Lim

Now starting in inflammatory so you and I understand that a lot of this is attributable to inflammation, even today, we're researching long COVID,even COVID. The great news is a few days ago, Health Canada cleared us for our clinical trial on COVID-19 (recovery).

Dr. Dale Bredesen

Right.

Dr. Lew Lim

Demonstrating that photobiomodulation, the way we do it, there is significantly quicker recovery. Meeting the statistical significance, so that's cleared by Health Canada. The FDA is still reviewing it.

Now we're going to go into long COVID. I can talk about it later, but let's get back to inflammation and try to relate it to..

Yeah, you, you know, there's evidence to show that photobiomodulation can reduce the cytokines and this here you can see that on the left here, this came out of Stanford. It's just like, literally last month, you know, they showed that photobiomodulation downregulates pro-inflammatory cytokines – IL-1, you probably recognize that IL-18 and upregulates, IL-10, which is the, you know the good guys.

Dr. Dale Bredesen

Of course.

Dr. Lew Lim

There are reviews being done and it shows that you know it’s anti-inflammatory, it’s found in quite a lot of different conditions including neurodegenerative conditions. You know for many years it's been based on animal studies but while research in COVID-19 was coming out, we had from our research the 1st expression of improvements in a human study, but this relates to COVID-19. So which is great, but it

shows that photobiomodulation can reduce the proinflammatories other kinds. In this case, IL-6, IL-8 it reduces IL-10 to some measure, but the ratio between IL-10 and IL-6 show that actually the increase in IL-10 was more so, so that was on.

Dr. Lew Lim

If you talk about autoimmune disease and you are also an expert in how it's affecting the expression of beta amyloid and there's good work actually going on in at the University of Toronto headed by Professor Donald Weaver. Now his group has been on it for quite a while and he's positing Alzheimer's disease is an autoimmune disease, really. And you can not look into expression of beta-amyloid like in isolation and so when you have things like.

Dr. Dale Bredesen

Sure. I mean in beta amyloid, as you know is really part of the innate immune systems response.

Dr. Lew Lim

Right, so infection, trauma, ischemia, depression, pollution, all that can cause the release of beta amyloid and OK, probably beta-amyloid proteins is a neuroprotective mechanism in the brain, but because, according to this group, according to Weaver, because the membrane of the neurons kind of has similar characteristics to the pathogens, you find that the beta-amyloid are also attacking the neurons and then you cause a cascade.

OK, let's see if we can reduce the expression of beta-amyloids. I know there's controversy, there's a lot of discussion, of whether it's a valid, you know, a symptom to go after. Now photobiomodulation has shown in one of the studies on auto-immune animal models can help to to reduce the scoles and symptoms of multiple sclerosis.

Now, if we don't see human because actually it's really difficult to to do human trials. I know the chief investigator here.

So we can get to amyloid on the Gamma treatment later.

But here, atrophic. Now if you want to get the brain to heal, you want to have expressions of BDNF, you know, bring your own neurotrophic factors and other growth factors. So this is actually a fairly strong piece of an area of research within Photobiomodulation and this study and you know, the lower left thought about the pathway your KRB to at least to you know the expression of brain derived neurotrophic factors.

Dr. Lew Lim

Are you seeing atrophy?

Dr. Dale Bredesen

I'm seeing inflammatory, so let's get you down to the atrophic. If you can show that one.

Dr. Lew Lim

So I thought about atrophic you known, the thing you want to express more atrophic factors like BDNF, which you speak about quite a lot.

Dr. Dale Bredesen

BDNF is huge.

Dr. Lew Lim

Yeah, so now this is a study that I was involved in on a traumatic brain injury case of a professional hockey player, you know, problems clinically, he improved. But what we did umm, and imaging was done at UCSF by Professor Linda Chao. What we found on the MRI was the regrowth of Gray matters in the hippocampal area.

Dr. Lew Lim

Now there are other works of Photobiomodulation that shows there seems to be in animal studies, particularly regrowth in the hippocampal area. So we found this in a human being, it's only one case, but in my mind is very significant because for the first time we're showing that brain cells can regrow with photobiomodulation.

Lot of review work, you know, discussing about how you need to have your glymphatic system drain away the unwanted, depositing debris away from your brain so, you know, your brain and glymphatic system should be healthy to do that.

There are some theories and hypothesis to show that photobiomodulation can work.

And I would say they actually forgot to look at this particular study that was done with our device the Vielight Neuro Gamma on veterans in the US at San Francisco through the University of California San Francisco.

So there was a couple of cases.

The case reports body shows that transcranial photobiomodulation improved toxins in the brain, as happens in Gulf War illness.

So go back to some history about the origin of Gulf War Illness, the soldiers who fought in the Kuwait War in the late 90s came back with this problem of pain and lack of sleep and symptoms they couldn't explain. So it could be attributable to this toxins. They were breathing in affects their brain. But it seems that photobiomodulation is helping.

At Boston, let me see. Ohh here. OK, there was this here on the right on the right, this the left one was done at the UCSF, the right one is a bigger study done at Boston University, right, the Boston, VA. So they did show improvements for photobiomodulation on the brain with.

Dr. Dale Bredesen

OK.

Dr. Lew Lim

With the Gamma which helped to remove these toxins in your brain, so here is some evidence. So 40Hz Gamma is discussed a lot in photobiomodulation. There was quite a lot of work done particularly by another group at MIT. Looking at brain entrainment and the encoding of memory in the publication.

Dr. Dale Bredesen

Right.

Dr. Lew Lim

It was correlated with the presence of Gamma and then in some other studies. So you know, looking at the mechanism. But MIT did this huge study published in Nature, in an animal study, when they expose this animals, the mice to flickering lights at 40 Hertz, at that time, no one could explain why 40 Hertz works.

But it did. It reduced the level of beta amyloids as I mentioned earlier in the brain, so you know some ways it was clearing and but we actually looked at this earlier because we were studying EEG expression to bring to *mumbles* I want to revert again to Professor Linda Chao again from the UCSF. She says, “OK, I want to do this with Gamma at 40 Hertz (with the Vielight Neuro Gamma).

And this was a study that she published, among other things. She actually studied 8 patients, 4 in control and 4 given the active Neuro Gamma passing at 40 Hertz and they were studied with fMRI.

She's a also a professor of Radiology, so had she had access to the MRI scanners and so on. Now the MRI, if you look at the data after 12 weeks you can see the brain has degenerated among the usual care patients.

But in those who were exposed to photobiomodulation, there was improved connectivity in certain nodes of the Default Mode Network in the PC part (parietal cortex).

But just looking at the images, you can see that the expressions were pretty, you know, pretty much stayed the same or improved slightly in.

Dr. Dale Bredesen

Yeah. Good to see. So, Dr. Lim, let me just let me just interrupt for one moment here.

Just a couple of basics, because you're going through some beautiful data here and I want to make sure that everybody can appreciate some of the things. So number one, you mentioned the wavelength of.

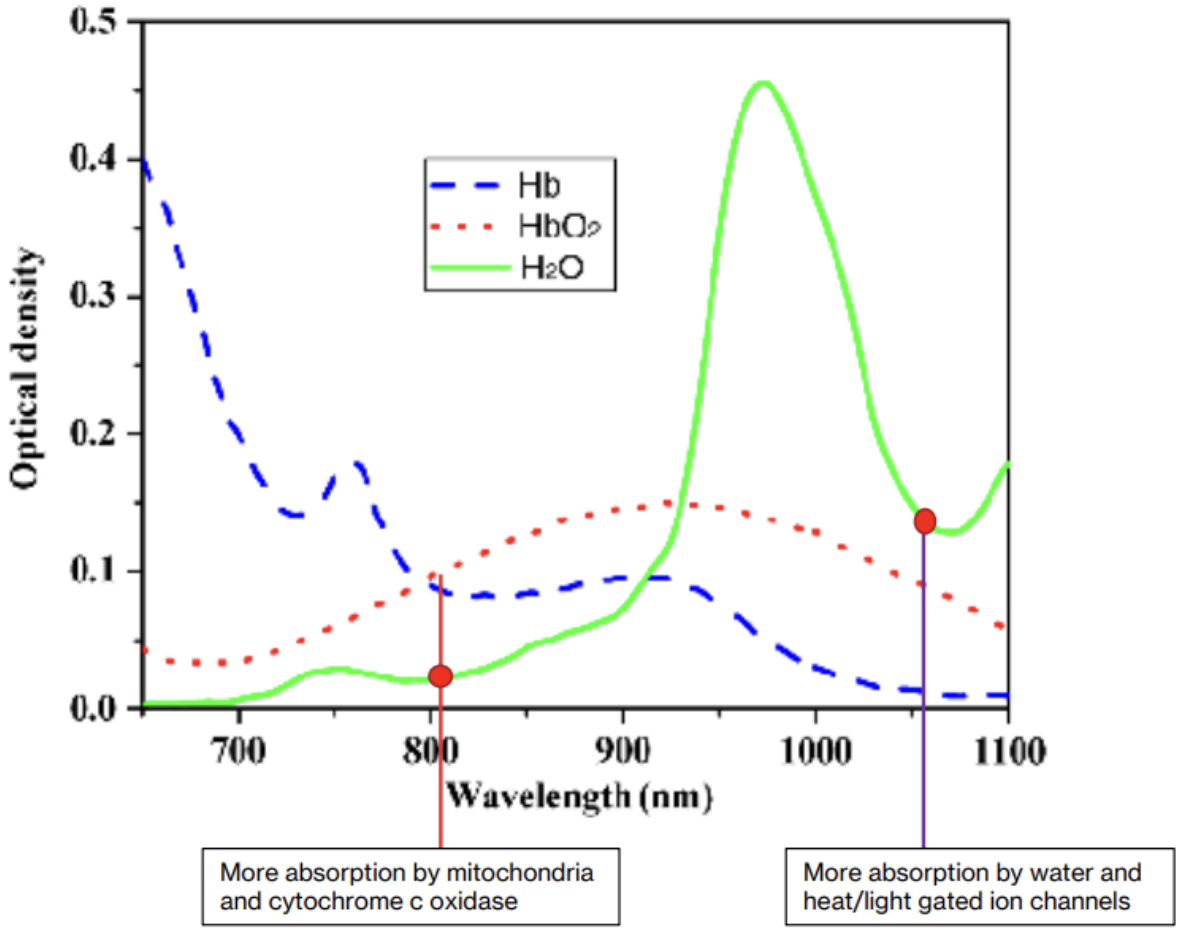
Right. And often it's said that photobiomodulation is dependent upon cytochrome C and its absorption of light. Do you what is the wavelength that you're typically using with Vielight and how have you chosen that particular wavelength?

Dr. Lew Lim

OK. Well, thank you for asking, because I've prepared a bunch of slides, slides, so I can go back to some of those and show you.

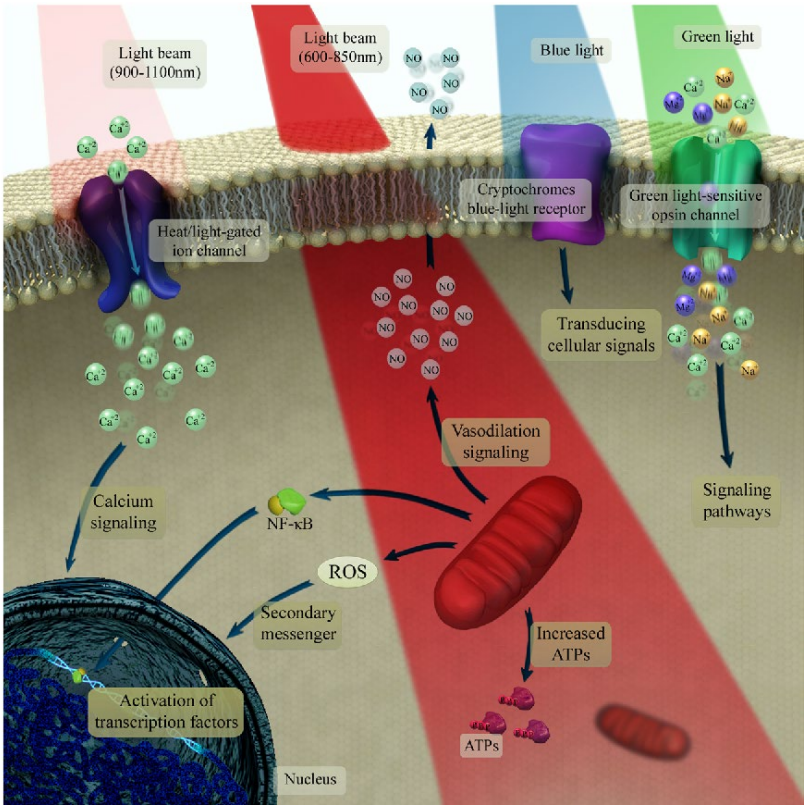
Dr. Lew Lim

(Please note that this is theoretical and based on a hypothesis from Harvard Medical School, from back in 2016. Both 810nm and 1064 have their strengths and have shown overlapping effects. However based on biophysics, what is clear is that 1064nm has a greater absorbance by water and less by biological matter, like mitochondria)



Sordillo LA, Pu Y, Pratavieira S, Budansky Y, Alfano RR. Deep optical imaging of tissue using the second and third near-infrared spectral windows. J Biomed Opt. 2014 May;19(5):056004

Now here is a very well used picture of what's happening in the mechanisms for photobiomodulation. If on the left here you can see this one (picture) is actually bit old but it was at a time when Michael Hamblin published it in 2016.



Salehpour F, Mahmoudi J, Kamari F, Sadigh-Eteghad S, Rasta SH, Hamblin MR. Brain Photobiomodulation Therapy: a Narrative Review. Mol Neurobiol. 2018 Aug;55(8):6601-6636. doi: 10.1007/s12035-017-0852-4. Epub 2018 Jan 11. PMID: 29327206; PMCID: PMC6041198.

There are two sub two groups of what you can call you know the range of wavelengths between 900-1064 which is longer than what we use. The light activates, here, heat-/light gated ion channels, it goes direct and on the on the picture on the right, you can see the same thing.

The 900 to 1100 right here, it's activated by water. The light energy gets absorbed by water and activates calcium signaling and the heat and light gated ion channel to activate the brain. But with the 810 which we we use, it falls under this group that actually activates the mitochondria.

So when people talk about activating mitochondria because of for a long time now there's discussion. OK we want to activate cytochrome C oxidase, which is in the last terminal of the electron transport chain.

Then you start activating transcription factors that help with BDNF and a bunch of other things.

So here's the one where I want to clarify using 810 versus the 1070 is another discussion. Either one is right or not wrong. It depends on what you want to activate here. Both activate your brain, but if you want to activate the mitochondria, ATP and so on. 810 actually falls within that spread and activates that (better).

Dr. Dale Bredesen

Right, and then could you talk a little bit about then you say if you want to activate mitochondria use 810, OK, well, when do you when do you use the 1070?

Dr. Lew Lim

Here's where we still need to learn more because both seem to activate the brain. So I have been having discussions with my research team. We actually see literature and some of the work we're doing and 1070 does activate the brain. But do we switch over to 1070s? Should we do more with 1070, but there's so much more clinical evidence that's coming out of coming out 810nm over the years.

Is 1070 wrong? No, it's not wrong, it's just that we haven't done enough research so we are doing, we're actually literally doing the research right now (with Baycrest Hospital)

Dr. Dale Bredesen

If someone were to buy Vielight today - number one, what's the wavelength? I assume that they would buy Gamma and how often would you recommend that they do it and for how long?

Dr. Lew Lim

So all our devices currently for the brain use 810 nanometers.

Dr. Dale Bredesen

OK.

Dr. Lew Lim

So it doesn't mean we will stick to that forever, but at this moment in time, I would say that the body of clinical studies favor 810 and because 810 is again based on the collection of literature. Somebody like Michael Hamblin said. OK, you know, it looks like between 600 to 850 will be activating the mitochondria.

And but it looks like actually for a long time, people like him and me didn't think going longer than that would work well. However some things are showing the brain does respond to 1070 so we can't dismiss it, but I would say the 1070 activates the water structure (more), the light and heat ion gated channel would activate the brain. Whether it brings better results in at clinical level outcomes, we don't know yet.

Dr. Dale Bredesen

Yeah, OK. So OK. But certainly we come across again and again and again getting the appropriate activation of mitochondria is clearly an important thing for many neurodegenerative conditions. So this makes a lot of sense. And then as you mentioned earlier, pulsing it, so you're talking about Gamma, which is what's typically suggested for MCI for dementia. So something like 40 Hertz, 40 per second, 40 pulses per second. Do you recommend that they people do this every day? Do you recommend that they do it a few times a week?

What is your suggestion and for how long should they be doing it and should be once a day twice a day. What do you recommend for best outcomes at least? And I understand that you're still doing research, but for the best outcomes that you're aware of currently.

Dr. Lew Lim

So here's my general recommendation.

Now in our Alzheimer's clinical trials, this is what we propose for those who have been tested with MCI for Alzheimer's, they can do once a day. Give the 7th a rest because the way it works is you don't want to overstimulate.

Dr. Dale Bredesen

To absorb more and then once a day, for how long?

Dr. Lew Lim

It's 20 minutes. It's set for 20 minutes, automatically for 20 minutes.

Dr. Dale Bredesen

20 minutes gotcha. So once a day 20 minutes, something like 5 or 6 times a week but not 7 times a week is that.

Dr. Dale Bredesen

Fair to say no.

Dr. Lew Lim

So I'm trying to generalize so that we don't have to make it so difficult to you know to make a recommendation. Now if for other people, if you're healthy, you want to improve your brain, if you have, say you suffered a stroke but you see significant improvement, I would say when you see improvement cut back because in photobiomodulation there is such a thing as the biphasic response. You know, if too little, it doesn't work. Too much, you get over stimulated. You produce too much free radicals and your brain will get rid of those things.

Dr. Dale Bredesen

Yeah, good point. So what about for those of us who just like to be sharp, we're not complaining about memory loss, but we'd like to be a little sharper in our day-to-day interactions. What do you recommend for us?

Dr. Lew Lim

Personally, myself, I do once every two days with the neuro, but I have other intranasal devices which are have less power than I use in between, but.

Dr. Dale Bredesen

OK.

Dr. Lew Lim

There's no hard and fast rule, but that works for me. I have done it every day. Nothing wrong with my brain so, but those who have experienced it, some have come back with quite remarkable feedback. Like, you know, they feel that their memory improves even though they're healthy.

I would say I'm in my 60s now. I would say that my brain is as sharp as when I was in my 20s or 30s.

Dr. Dale Bredesen

And have you done tests on healthy volunteers and shown that you actually do see an improvement in cognition?

Dr. Lew Lim

We had an independent study done at the University of New Mexico by Vince Clarke's group. He was actually funded by the US military and see we could improve the mental performance of it was a small group. He found they actually improved in the stimulated response to threats, you know, and, you know, and the response for decision making. So that small case, very hard to make a claim, but we want to build on that.

Right now, on top of that, we want to see what happens to long term meditators. The study is ongoing. We see some preliminary data, there's one study going on in the University of Arizona in Tucson, there's another study that is ongoing in Toronto which we are collaborating with the Centre for Mental Health and Addiction which is part of the University of Toronto.

Dr. Dale Bredesen

Well look we we can discuss this again. I think we've got some fantastic questions here that have come across and we've got dozens of them. So we've since we've got your expertise right here and we're grateful for that.

Let's go through some of these excellent questions and I and I recognize you know the six types that you mentioned, you actually have data for all of these, which is fantastic. We greatly appreciate that. Again, we're all interested in the same thing, which is best outcomes for everybody. So there's there are a bunch of wonderful questions here.

Here's one from Nancy who says I have primary progressive aphasia this, as you know, is one of the non amnestic presentations of Alzheimer's disease and is something that we typically find is associated with toxin exposure and interestingly responds to detox as well as responds to EWAT exercise with oxygen therapy.

And so, she says, is the study of PPA with photobiomodulation of Vielight devices. If so, what does the study say? And have you looked at people who have Primary progressive aphasia as a presentation of Alzheimer's disease.

Dr. Lew Lim

There's somebody I work with, Dr. Margaret Naeser of Boston University. She's somewhat of an expert in, you know, private, progressive aphasia, actually, right, but not necessarily linked to Alzheimer's disease.

But what she recommends is this. She, you know, she used to be an expert in TMS. But she's also in photobiomodulation but she says just focus on treating the left side because Aphasia is really due to a dysfunctioning on the left side of the brain so that's the recommendation because stroke, hemispheric stroke happens at once left or right side always say expose that part of the brain that has lesions and she found that it's better than doing both sides.

Dr. Dale Bredesen

OK. Be a problem? And how is she shielding? What's she using to shield the other?

Dr. Lew Lim

You can use like aluminum foil as a shield for the modules.

Dr. Dale Bredesen

OK, good point. So this sounds like this could be something very helpful for Nancy to be shielding the right side and doing more on the left side and then she goes on to say, what's the frequency? I'm assuming that it would still be the gamma that you would recommend, is that correct?

Dr. Lew Lim

(Please note: A traumatic brain injury(TBI) study used the Vielight Neuro Gamma with 49 ex-football players by the Department of Neurology, University of Utah for TBI/concussion is pending publication. Here is the abstract of results: https://academic.oup.com/acn/article-abstract/37/5/1066/6643234?redirectedFrom=fulltext&login=false

Here is a documentary-style interview with the researchers and participants: https://www.youtube.com/watch?v=YTxITq7j9iE&ab_channel=VielightInc

Anecdotally, based on pre-publication research on humans, the Neuro Gamma was the device of choice)

I am actually in this case, recommending Alpha, this pulses at 10 Hertz now. There's, there's a lot of stuff that we are kind of discovering, 10 Hertz, 40 Hertz in all kind of actually. But I would say that the body of research for stimulating healing, and that's that goes back to animal study directed by Mike Hamblin, Harvard going back a number of years and he found that 10 Hertz works the best for traumatic brain injury where there's lesions, you know, in in the brain, right.

So let me just differentiate this so here we're talking about stimulating, say, BDNF growth factors in the brain and see that 10 Hz is stimulatory. It seems to work better and Gamma based on a number of research, including MIT is suggesting that 40 Hertz is activating processes of brain, including activating and non-inflammatory microglia to help remove the debris in the brain, which is a little bit different in the mechanisms.

Dr. Dale Bredesen

Traumatic, but it is, as you indicated, it is lateralizing.

She goes on to say what you know, how often do you do this? Do you do? Is it best in morning or afternoon and evening?

And do you like to do it every day or three or four? Now you've said before, probably do it five or six days a week.

What about? What about time of day? Is there a preference there?

Dr. Lew Lim

No, not really. You can do it anytime of the day.

Dr. Dale Bredesen

Got you.

Dr. Lew Lim

But.. umm.. for, you know, in our phase 3 clinical trial for Alzheimer's (n=221), we often say, preferably when you're sleeping, you're going to sleep or taking a nap because that's when the glymphatic system in your place in your brain becomes more active and it helps to emphasize on the glymphatic drainage.

Dr. Dale Bredesen

OK, so you're recommending that people actually do this while they're sleeping while they're napping, or you mean right before they go to sleep.

Dr. Lew Lim

OK, here is the Gamma you want to remove the unwanted deposition of brain still, recognizing that that drainage system in your brain is most active when you're, you know, slumbering or, you know, weeping, then use the you know, you know you use it when you're in this in this state.

Dr. Lew Lim

That is for a neurodegenerative disease, but for alpha, for in her case it, it doesn't matter what time of the day.

Dr. Dale Bredesen

I see. OK. All right. And there's one here from Sharon says, has your device been studied on glaucoma patients needing to get more blood slash oxygen to the optic nerve part of the brain?

Dr. Dale Bredesen

So it's interesting, this brings up a whole as you know, a whole field red light for age-related changes in the eye and there's some nice studies out of the UK.

Dr. Dale Bredesen

Growing improvement with age-related not just glaucoma but things like macular degeneration, especially with, you know, red light stimulation. Do you have you worked much with people with glaucoma?

Dr. Lew Lim

Oh, we haven't, actually. We haven't done much work on the eye, but I'll just say like you mentioned. For dry age related macular degeneration and that goes as a different part of the eye, they've been using 670 nanometers or red seems to work. I think there are very good outcomes in clinical studies, Glaucoma, I don't have much. At least I don't recall. Yeah, studies being done.

Dr. Dale Bredesen

Gotcha. All right. And then Barbara is asking, see, oh, sorry, I'm I missed one here Patricia. So Patricia saying would be possible for the Dr. Lim to discuss the use of photobiomodulation in the treatment of early stage dry age-related macular degeneration. So this is basically Really. Just what you're talking about. And yes, I think this is going to be a a field where you're going to see more and more, you know, from from our work we would recommend you do more than just that because you've got to think about oxygenation and mitochondrial function and how much blue light you're exposed to and what altitude you're living at, whether there are toxins or and there are a lot of other things.

In this systems biology approach, but clearly it does look as if some red light stimulation and this again a nice studies coming out of the UK to support that idea.

And then Barbara asks, would infrared and near infrared therapy helmet device help preventing cognitive decline or even stimulate mental acuity? Well, I think that's exactly what you're publishing. That's exactly what you're seeing.

It looks like this is going to be a for many, many people. This is going to be very helpful and obviously should be part of the overall protocol.

If for everybody to get that stimulation now, you mentioned alpha as well as gamma. You mentioned alpha as part of healing.

It seems like most of us really want both. We want some degree of healing, but we also want some degree of mitochondrial activation.

Do you ever recommend going back and forth and doing one for a period of time and then switching and then going back?

Dr. Lew Lim

Yeah, we actually have. The Neuro Duo, which comes with the Alpha and Gamma so you can switch back and forth between 10 Hertz and 40 Hertz. Now, generally speaking, I would say that the 10 Hertz, 10 Hertz actually works for a broader spectrum of conditions in our use Gamma for cases where there is there is instances where you have to clear deposit their brain, like Tau or beta amyloid, so that happens in Alzheimer's disease, CTE in in repetitive traumatic brain injury in Parkinson's disease where you know the deposit of alpha synuclear deposits.

So if neurodegeneration where you feel like your brain is kind of, you know, you're not functioning as what could be you need to get tested, so probably the Neuro Gamma.

Dr. Dale Bredesen

Alright then there's one here from Bella who says any data on subcortical dementia slash cognitive decline? Of course, this is essentially a generic term subcortical dementia. There are a number of things that can give you a subcortical dementia, so I would at least I would recommend. Please get evaluated, find out what different processes you know.

The whole point here is that people have made these diagnosis as pathological diagnosis, OK, it's Alzheimer's pathology, or it's Lewy body pathology. Or it's Parkinson's associated dementia pathology and so forth.

And so on. We're really now taking that next step to say, is this driven by a process that relates to a specific pathogen, what what we call Alzheimer's disease is really a chronic largely innate immune and cephalic, tis that over time is causing a loss of network function you're getting fewer and fewer synapses until the point that you're you have problems, and so the photobiomodulation is part of an overall approach to improve the function of the synapses to improve the number of synapses, as Dr. Lim said, you're actually increasing BDNF, which is which is important. So I would find out what's causing the subcortical dementia. Whether you work with a a neurologist, whether you work with someone that we've trained now, over 2000 physicians, whatever.

Next one here is from Alan saying. Is it possible for Photobiomodulation peak to be developed to stop the development of Alzheimer's completely with regular usage until a cure is discovered and available?

Well, as we've talked about this of course is about what's driving the process. And I think Photobiomodulation has has had wonderful effects, but it is.

Not the only thing. If you have a specific infection that is driving this, you're going to want to get rid of that infection as well.

And but but clearly the PBM has been very, very helpful. Dr. Lim, could you comment on people where where they've had specific infections or you you mentioned the head trauma or specific drivers of the problem, have you seen people wear the, the photobiomodulation is all that's needed?

Or do you recommend that they also look at what's actually driving the process?

You're talking about head trauma.

Dr. Lew Lim

You know our some of our most solid evidence is coming from traumatic brain injury.

Dr. Lew Lim

We have an ongoing study at Boston University. It's going it's been going on for a few years now. It's a very much controlled study. So we're waiting for, you know, for that to come out. But before that, just literally maybe about a couple of months ago, the lab in Boston University led by Margaret, NASA specially published 4 cases of retired athletes. The outcomes are really very significant and these are athletes that are are showing sign of CTE.

Dr. Dale Bredesen

Right, very common.

Dr. Lew Lim

Yep. So what we're talking about, I can show you some of the slides here that I wanted to show you.

So these are utilization 4 cases (for CTE). And now look at the I want to explain this you know. That was with the Neuro Gamma because you want to get rid of the Tau proteins and then they improved.

Now I want to talk about a very significant body of study is coming up University of UtahThey've done extensive work using the V light devices.

Dr. Lew Lim

To to treat generally, at least with the training brain brain injury, here's one that they presented as a poster. So I'm I'm OK to show it to you now.

Symptoms like depression, PTSD. You know how they adjust to life, sleeping reaction time improves significantly. You will see more. Coming up, they they did this more than a year ago. Just taking time to write the manuscripts. You'll see the evidence being published, hopefully in a few months.

So that was PTSD. Now while we were talking about this, I also want to say because there's interest in in Alzheimer's disease. I would say that the Vielight devices generally are low risk general Wellness device under the category by without by FDA. So we don't make a medical claims, so I'm referring to all these via various evidences. But I say that we have submitted a big clinical trial which we're doing for severe Alzheimer's disease, there's something one for mild, we're gonna something one for long COVID. So I say that I'm just referring to related evidence, but not claiming yet until we have the evidence.

Dr. Dale Bredesen

Yeah, I understand. I I think it's worth pointing out though that you have people with depression where depression seems to be responding to photobiomodulation quite nicely and I know some something has been published on that just recently, as well as what you're showing here, though I think this is the very important what you're showing here with the with CTE where I know we're running out of time here, so I want to take one more question here. There's one here from Michael and then we can send you if it's OK with you.

Dr. Dale Bredesen

Let's send you the questions cause we've got about another 50 on here or so. Yeah, actually, now we're up to 80, so they probably more like another 75. Lots and lots of questions, which is great. People have all sorts of questions about how to use this. Test one of the points that Michael's asking about here is the the the coverage of the brain, he says.

Since you're looking at fueling mitochondria, it seems surrounding the brain would be more beneficial. But there must be some reason for the choice. So could you talk a little bit about why the stimulation, which is where the stimulation? Is how did you choose that?

Dr. Lew Lim

OK, it's a very interesting questions and obviously, when we developed this, I worked with some collaborators from Boston Medical School, Harvard and they said, OK, we want to hit the Default Mode Network because it's like a template network of the brain.

If it's healthy, it helps settle a lot of conditions. So you're looking at that, and you know what?

About 2-3 years ago, we looked at the expression in EG and see if we move this around. Doesn't matter, so EG shows that it it matters because you know it. It seems to activate different parts of the network and then where we did. Some meditators as well. We had this and we moved it somewhere else. They didn't experience the same thing. Now for that it's quite complicated.

I'll say at that high frequency was activating the ceilings network. Now we have a reason to do that, but I I want to.

This is my chance to show. What we found you. Know having said that. Now I this is novel, it is because we are collaborating with biggest hospital which is probably University of Toronto.

They they're they're presenting this in a bringing meeting conference this month in Montreal. So I'm OK to share this with you. This is actually positioning on the right, a laser real time imaging in fMRI. So no one, not many people can do this, but we've designed the, you know, the device such way.

So I so these are the right refundable on the right. You can see reactivation left not so much. So it's actually quite global. And when we introduce the left into nasal combined with the right.

The whole brain gets light up. Light up. You know, it shows that the nasal itself works. The on on the head it works but I don't want to go into the details, but the power matters. I need quite significant. We need actually did I say here 150 milliwatts, so it's not small numbers. We can do it and you have this kind of expression in the in the cerebral blood flow, Dr. bredeson urine to cerebral blood flow.

This is the demonstration of cerebral blood flow in significant ways, much more significant than what I've seen in the literature Therefore, magnetic stimulation or or electrical stimulation.

Dr. Lew Lim

Right. So.

Dr. Dale Bredesen

So that's exciting. So that offers a wonderful way to stimulate blood flow. And you've already shown improvement mitochondrial function, you've talked about healing. You've talked about trophic factors. So it it does appear that there are multiple mechanisms and we.

Dr. Dale Bredesen

That you're showing us these data very exciting and we should probably have a follow up to to continue to talk about this.

I think you know we're we're all looking at how do we translate this today into best outcomes for people who are either at risk for cognitive decline or who are suffering some cognitive decline. So this looks very, very promising.

Dr. Dale Bredesen

And and again, lots of people already using it very successfully. We're running out of time here. And any final words you want to say before we before we wrap up here?

Dr. Lew Lim

Well, first of all, thank you. I want to thank everybody for the interest.

Dr. Lew Lim

I know we've not had had a chance to kind of speak to everybody. We are a very research oriented, yeah company as you can tell, we are crazily disproportionately interested in the research because I think we're only discovering a small percentage we're just opening more information of and or more discovery to be made andI I didn't do this alone, we have a team of highly qualified researchers we have 7 pHD's and MD's you know, small company we have at least 30 or more collaborators around the world and we are still going to new things like magnetic resonance spectroscopy.

You understand? What are the, you know, the metabolites are happening, but watchers, you know, as we progress we will tell people what we'll just share with people, new information. Hopefully we make the world a better place.

Dr. Dale Bredesen

Absolutely. Yeah. So more and more exciting things to come. We look forward to that and we appreciate the fact that you've already developed things that are that are highly clinically useful.

Dr. Dale Bredesen

So Dr. Lim, thank you so much for your many years of of work, of research for your commitment and for your continued development. And we look forward to talking to you again.

Thank you. Thank you. Very much thanks, everybody. We'll see you next time.