



THE
FATIGUE
SUPER
CONFERENCE

Will CBD help my fatigue?

Guest: Dr. Michael Murray

Alex: So welcome to The Fatigue Super Conference - and for this conversation I'm talking with Dr Michael Murray. Hi Dr. Murray.

Dr Murray: Hello Alex, it's nice to be here.

Alex: It's great to have you I think this is going to be a really interesting topic for people as we were discussing over email what to explore at this point in recording I'm not quite sure where this one's gonna land in the agenda. But at this point in recording having done most of the interviews this just felt like an area no one's really touched on and it feels like with the significant influx of products and claims that have been made around CBD this felt like an area that we should be exploring. And as I was going a bit more into your work around it, it was kind of a rabbit warren of fascination. So I'm really keen to get into it.

Just to get people your background. Dr Michael Murray is one of the world's leading authorities on natural medicine. He's published over 30 books featuring natural approaches to health. He is a graduate, former faculty member and serves on the board of Regents of Bastyr University in Seattle, Washington. Dr. Murray is the Chief Science Officer of NZ Medica. And as I've been talking with various people about this conference as speakers I should also say you're one of the people that people consistently said you need to talk to Dr Murray so I'm very happy to have you as part of it. Thank you very much.

Dr Murray: Thank you.

Alex: I'd love to just start a bit with all of this kind of talk and noise that's happening around cannabis products and CBD. It rather feels that we're getting a bit ahead of, it certainly feels to me that we're getting a bit ahead of ourselves in terms of some of the claims, some of the expectations.

So maybe we could just start a bit with where are we in terms of the actual evidence base and the actual research that exists?

Dr Murray: Well I am a little bit of a popular character talking about CBD because I highlight what the research shows and there's very little research and what research there is, clinical research there is, it doesn't support many of the claims that are that are being made. The therapeutic efficacy of any natural product or drug is based upon delivering an effective dose and we don't really know what an effective dose is of CBD. We do know that it's poorly absorbed and it's quickly metabolized and broken down to compounds that aren't very active. There are studies with CBD for a few different applications that the results from those studies aren't all that impressive. Yes, it's been shown to be helpful in rare forms of epilepsy but when you start really looking at the data even in that application the numbers needed to treat are really high, meaning that not that many people are really going to show much benefit from it. When you're looking at it some of the data with CBD, clinical data, you know, they looked at it and for example in insomnia and they found in lower dosages it doesn't seem to be very effective. So the dosage is probably effective is in the range of 300 to 450 milligrams per day. That's a far cry from the recommendations that many marketers are making for the product, you know, 5, 10, 15, 25, milligram dosage.

I just they talk about the entourage effect but really when we're talking about cannabis in the entourage effect, we're talking about cannabis components that help THC work a bit better. And you know as far as CBD goes, although not technically correct from a chemistry aspect if you look at the molecule THC and if you break the cyclic ring, that's where you have CBD and I make the comment to physicians that that CBD is basically a broken THC molecule and like you said we're way ahead on the recommendations.

Now, I do believe that there are other components in cannabis besides cannabinoids there that have pharmacological activity there. There are terpenes and flavonoids and other compounds that certainly are active, we know that they're active. But I'd like to remind people that the endocannabinoid system predates the cannabis plant. So because it's named after the cannabis plant we think that the only way to influence that system is with cannabis. And the truth of the matter is I think that a more comprehensive approach to gaining the benefits that many people are seeking with the taking CBD can be achieved by working to tune up a person's endocannabinoid system through diet, through lifestyle, through proper supplementation with some herbal compounds and with some specialty nutritional compounds. I think that's a much more rational approach. The endocannabinoid system is not really a hero system and what I mean by that is some systems if we manipulate them like the gabanergic system. There are many drugs that you know, if you take a Valium, if you take Xanax, you're

basically pounding that gabanergic system and you're getting a really profound effect. With the endocannabinoid system it's really a system that's set up to regulate balance homeostasis. And so it kind of sets the stage for some hero ingredients such as various nutritional compounds and herbal compounds or drugs, but in itself that system is really not powerful enough sometimes to really produce a pharmacological effect or the type of medicinal response that we see through activation or enhancement of other chemical systems through the body.

Alex: It's fascinating going deeper into the system because it feels like there's a you kind of touched on, there's a romanticism around this idea of taking CBD or having something which has this overarching effect, but actually this underlying system. It's something which exists in all animals, except for insects, and that its own bodily system and maybe to say a bit more about how this actual kind of system works and how it interfaces with other bodily systems as a way of having its impact.

Dr Murray: Yeah, the endocannabinoid system like many systems in our body, chemical systems, is kind of a key in lock system where we have receptors on cells throughout the body that are called endocannabinoid receptors and there are two types. CB1, it has more psychoactive activity and CB2, it doesn't have that that psychoactive activity but it has actions on the immune system, the gastrointestinal tract, on the nervous system in general. And so you know THC is a prime example of a CB1 receptor agonist and CBD is more of a CB2 receptor agonists. But there are many compounds that activate these receptors to varying degrees. THC is a bit of a special compound with that CB1 receptor it really fits in there very powerfully and produces that effect but there are other activators in nature of these receptors and our body actually makes compounds that bind to these receptors. The word 'endo' means within and 'cannabinoid' is named after these cannabis compounds, but we actually have compounds in our body that bind to those receptors and these include these fatty acid derivatives. One of them is called anamide and this compound was originally referred to as the 'bliss molecule'.

Alex: That's quite a claim.

Dr Murray: Yeah. I mean this is something that we can we can manufacture ourselves and in fact when we are feeling blissful, we got a lot of this this compound being produced. There are other lipid mediators that are that are responsible for either binding to these receptors or modulating them. Another one is to 2AG and then there's a PEA, which is short for palmitoylethanolamide. This compound is actually available as a dietary supplement and I think it provides the real answers that many people are looking for from CBD. For example, one of the prime of CBD in the U.S and I

assume that in the UK and other places is in pain relief, but do you know how many studies there are with CBD a pain reliever none? Yeah, there's not a single study and it's likely not to have much of an analgesic or pain relieving action again. The therapeutic efficacy is based upon dose and we just don't know what is an effective dose and I believe it's much higher than what is commonly recommended. With PEA we have over 17 double-blind placebo-controlled studies in pain and positive results have been produced and low back pain, sciatic pain, osteoarthritis, fibromyalgia, peripheral neuropathies, kind of neurological pain related to stroke and multiple sclerosis chronic pelvic and vaginal pain and post herpetic neuralgia and in these studies PEA's shown remarkable effectiveness.

One of the ways we measure the effectiveness of the drug in pain is called 'numbers needed to treat' and that means how many people do you have to treat to reduce the pain by at least 50%. If we look at the numbers needed to treat with PEA and low back pain it's 1.5. So you have to treat 1.5 people to see if 50% reduction in pain. Now ibuprofen, one of the more popular non-steroidal anti-inflammatory drugs, at 400 milligrams a day the numbers needed to treat is 2.8. Acetaminophen, Tylenol, paracetamol, these are popular drug. For Tylenol the number needed to treat us five.

So the point is that in these detailed double-blind placebo-controlled studies PEA out performs over the counter and some prescription drugs quite considerably and I just don't think you're going to get better results with the CBD than what has already been shown with PEA. And PEA has also been shown to be helpful in some of the other applications, namely with anxiety and depression and when you look at its mechanisms of action in pain and inflammation and depression again, I think it's the answer that people are trying to achieve by taking CBD. As I said that the clinical results with CBD that we have right now are not that impressive. There were some studies in anxiety, but those studies use really high doses 450 to 600 milligrams per day and they didn't show much of a benefit at those really high doses. So if you're not going to see the benefits at high doses, I don't think you're going to see the lower dosages being all that effective.

We will be kind of focus on these using these hero compounds whether it's CBD or PEA but really to address the issues of an endocannabinoid system dysfunction or insufficiency you really have to approach it from a very comprehensive standpoint. You've got to really focus lifestyle, diet and proper supplementation, and I think that's the future. The endocannabinoid system is going to be a major focus of not only drug research, but from a natural medicine perspective we're going to be working on ways to enhance that endocannabinoids system, but we're not going to be using these hero ingredients we're going to form a strong foundation of diet, nutrition, stress

relief, sleep, exercise and other factors that are really powerful influencers on this system.

And what's interesting about this endocannabinoid system, remember this is a system that its primary function is to promote homeostasis. And what does that mean? It means that every cell in our body strives to maintain a consistent internal environment so it can function properly and when you have disruption in homeostasis you have disruption in cellular function. Another word for that is disease. So the endocannabinoid system is an underlying factor in virtually every disease you can think of and that's why people are jumping to the conclusion that CBD is the answer. It may be part of the answer but I think we can't lose sight on these other important aspects of influencing this important system namely through diet, lifestyle and proper supplementation.

Alex: I mean, one of the things that seems interesting is that people which are naturally drawn towards a natural health methodology and understand the importance of a multi-faceted approach, it's kind of interesting how there have been pockets of practitioners who have suddenly latched onto this one kind of miracle thing and actually touched on it before but when I was watching a presentation that you'd given on this one of the things that was really interesting was actually looking at, for example, cases of epilepsy and if you were to follow the mainstream news here at certainly in the UK there's been a number I guess maybe up to half a dozen or so cases over the last 12-18 months of mothers of children with epilepsy who have her found that by giving them, I think it's a psychoactive form of CBD, have had a dramatic reduction in seizures. I mean to the point of like going from seizures multiple times a day to not having them, to then going abroad, buying them and then getting stopped by customs and having thousands of pounds of CBD taken away from them and then it becomes this big news story that the government is taking away the only drug that supporting this child with epilepsy.

But it starts to feel like oh my God what this this must be this this kind of Miracle answer and as I was looking at your presentation part of what was interesting was that actually the research data, as you touched, on was something like a hundred seventy seven people something that you would have to see to have that significant in terms of reduction. So again, it's the real world data be very different to the perception and the news stories.

Dr Murray: Yeah. Yeah so in the case of epilepsy that when we were talking about numbers needed to treat you have to see a 50% reduction in seizures. So the number needed to treat for one person to achieve a 50% reduction in seizures isn't too bad, It's 8, but these are people that aren't getting relief from conventional medicine and so reducing their seizure number and severity by 50% is huge. So you might have to treat eight people but it's worth it, but for someone to achieve complete seizure freedom from CBD alone, it's really high.

It's a hundred and seventy one so that it's just not a very effective solo medicine.

Now that's with CBD alone, you know Sativex is a mixture of THC and CBD and I think the numbers needed to treat her better. I think that in the future we're going to recognize that the importance of THC to the overall action of cannabis that we will be able to maybe reduce the amount of THC so it doesn't have you know, all those psychoactive effects. The chemistry of cannabis is quite interesting. It has over sixty two unique compounds, compounds that are found in any other plant, and these compounds many times when the plant is smoked for example or vaped these are converted into many more compounds over 2,000 different compounds are created when cannabis is heated and some of these compounds definitely contribute to its overall pharmacology. So it may be, you know, everyone's kind of moving to edibles and different forms, but it may turn out that there's some advantages to some people with CBD for example, if it's vaped versus taken in a pill and the pharmacokinetics, the way the body handles CBD, is much different when it's inhaled versus when it's ingested orally. So there may be some value there and I know that a lot of people are using CBD and these various preparations topically again, there may be some differences in the way. The CBD is utilized when it's applied topically where you're actually getting better results as like for arthritis if you're rubbing it on the area that's affected versus trying to take it orally.

There's so much that we don't know but we do have some basic science information on cannabis and CBD and I think that it points to possibly delivering CBD by a different routes such as vaping or topically and it also may be that some of these other compounds are responsible for kind of the medicinal effects that are being attributed to CBD, basically these terpenoids and flavonoids. One of my favorite examples to illustrate that is one of my favorite natural products is deglycyrrhizinated licorice. This is a special licorice extract where they glycyrrhithinic acid, glycyrrhithinic is a healthful compound from licorice but some people can have an elevation in blood pressure. Glycyrrhithinic acid was the first compound drug or natural compound shown in a double-blind placebo-controlled study to be helpful in peptic ulcer disease. What's interesting about that is they started utilizing it as a ulcer medication but then some people started having reactions to having high blood pressure and when they were were looking at developing a placebo once in one of the studies they used the deglycyrrhizinated licorice, that's where they took the glycyrrhithinic acid out of the licorice and gave the placebo group this DGL and they found it worked better than the glycyrrhithinic acid.

So here's my point what medicine thought was the active ingredient when they removed it that crude plant extract was actually more effective than what they thought was the active constituent. Now ideally, you know, probably using the

whole plant with both the glycyrrhithinic acid and the other components might be the best approach and I think that's what we're going to find out with cannabis. I think that what will likely be discovered is that these terpenoids flavonoids other compounds are very important to the overall medicinal effect of cannabis and that includes THC and CBD. Cannabis is going to be around it's going to be a huge business and we're going to have the science, greater understanding of how we can utilize the plant, what forms are best, what preparations are best, do we need THC, can we get the same benefit without it? How important is CBD, do we need these other compounds so all of these things are going to be answered. But right now I think there's a bit of a snake oil aspect to it with the focus so much on CBD.

Alex: And I think we need those people which are off trying to make their fortune with CBD to actually pump some of that money back to research as well. Because it seems like it's that kind of classic thing that something becomes the fad and then you get the inflated claims and then there's the kind of pocketing of the money off the back of the inflated claims. And in fact if some that money went back to research you might actually feel some substance behind, or you might build more substance let's say, behind the movements.

Dr Murray: Yeah. I mean, I don't know what the finals number were for 2018, but it's easily to see that the CBD market in the us alone is over a billion dollars a year and with all that really there's no there's no funding of any significant research right now.

Alex: Just to change track slightly and to come back to this endocannabinoid system piece. How about Endocannabinoid Deficiency Syndrome? As was kind of looking into your work that struck me as something that could also be a factor in fatigue and even chronic fatigue syndrome. So maybe touch on that a bit.

Dr Murray: Yeah. No question about it, it's a real entity. The Endocannabinoid Deficiency Syndrome is thought to be an underlying contributing factor in chronic fatigue syndrome, which is very central to probably what a lot of the viewers are interested in, fatigue, fibromyalgia, migraines, IBS and seizure disorders. It's a condition where the endocannabinoid system is compromised due to either kind of poor nutrition or more often prolonged exposure to psychological, physical or emotional stress. Stress is very detrimental to the endocannabinoid system. So a lot of the things that are helpful for dealing with stress are really important in building up our endocannabinoid system. So anyone that's dealing with these conditions that I just mentioned, chronic fatigue syndrome, fibromyalgia, migraines, IBS, seizure disorders, they are

going to benefit probably more than any other groups with focusing on improving that endocannabinoids system.

Alex: Are there any particular ways that you find that are helpful to get clues that someone may have a deficiency that's going on here? Is primarily clinical picture or there particular tests beyond that?

Dr Murray: You know there's really no tests right now. It's basically just w looking at the you know, where the endocannabinoid system plays a significant role and matching that with what people are experiencing, you know, we know that these endocannabinoid receptors are concentrated in certain tissues. Those CB2 receptors are very much concentrated in the immune system, gastrointestinal tract and peripheral and central nervous system. So we know that the endocannabinoid system is a central control system in those tissues. And again, when you have loss of homeostasis, you have disease and the cells are their best and sometimes they're somewhat functional but there's a low level of function and that's really what you're looking at with something like chronic fatigue syndrome or fibromyalgia. The cells just joined getting fully recharged, they're not able to protect themselves or get rid of toxins or respond to hormones and controlling factors like they should.

So, you know, we should probably give some specifics of how to support they have the endocannabinoid system. Fats are really important and it's no different than when we're talking about what fats do we need to eat to support our brain, what fast do we need to eat to support our cardiovascular system, what fast do we need to consume to reduce her risk of having cancer?

Basically the monounsaturated fats so we get from nuts, seeds, olive oil, avocado these are really important. So too are the long-chain omega-3 fatty acids that we get from fish and fish oil supplements. Although omega-6 oils are important to the endocannabinoid system most people living today or getting enough for those omega-6. So we don't really need to be that concerned with the omega-6 unless somebody's really on a low-fat diet. Stress reduction and regular exercise is a critical contributor to having a healthy endocannabinoid system, learning to breathe with that diaphragm, learning to put yourself in that relaxed state, becoming mindful, that working on that mind-body connection that seems to reinforce the formation of these compounds that our body produces and our brain produces the Into those endocannabinoid receptors. Hot and cold therapy seems to be an important contributor to maintaining the tone of that endocannabinoid system. So classic hydrotherapy, you know saunas, steam, cold water baths, the simple one is just when you're done with your shower in the morning, the hot shower that we all love, if you just switch it onto immediately to cold water for a few seconds that's a good that's a good way to tone up that endocannabinoids system.

Alex: It always sounds so easy as always but it's always so unappealing.

Dr Murray: Yeah it is. I got my hair cut the other day and I don't know why but when they wash your hair they like to do a cooler rinse at the end, it's probably really good for your hair and hair shaft and good for your endocannabinoid system, but I always tell him I don't need the cold rinse. I do think that getting that that shot of cold is good and I do that on occasion but not as much as I probably should. But you know, I got my endocannabinoid systems working pretty good. Anything that's going to support your adrenal glands is going to support your endocannabinoid system. So there are a lot of herbs that have historically been used to support the adrenal glands and its interesting Alex we call these herbs adaptogens. So, you know things like Siberian ginseng, Panax Ginseng, rhodiola, ashwagandha, and one of the interesting things about these adaptogens is that they have an ability to basically increase our overall sense of well being and they tend to help our body and brain and emotions deal with stress better. These are clues that these herbs are working on the on the endocannabinoid system. So dietary supplements and herbs that work to support the adrenal glands work to support the endocannabinoid system.

And the last area that I that I love to talk about for supporting the endocannabinoid system is the use of herbs and spices. Herbs and spices are powerful influencers on the endocannabinoid system. I tell people to spice it up to use herbs liberally as well. You know, these compounds are really God's gift to us as medicine and also they appear to have significant effects on the endocannabinoid system. Even something like ginger, you know, everyone's jumping on the CBD bandwagon there are over a hundred double-blind placebo-controlled studies with ginger in the reduction of pain and inflammation. It's fantastic for that. Curcumin is good and it gets a lot of the attention these days but the real hero, I think, from a culinary aspect is ginger and it's easy to prepare, you can juice fresh ginger, you can have ginger tea, you can add ginger to a lot of your dishes. There's ways to use ginger very liberally in the diet has just tremendous benefits and one of those benefits appears to be really helping that endocannabinoid system tone up and work better.

Alex: It's interesting. I can imagine some people that kind of watch on or listening to this feeling a little bit deflated from their idea of thinking they've got this kind of miracle answer in terms of in terms of CBD and I think what's promising in terms of what you're saying is that it's not that there isn't something wonderful that's on offer. It's just that one small way to achieve something of which actually impacting the endocannabinoid system, there's lots of other ways that people probably are already doing and already have access to. And I guess part of what it makes me think in terms of a kind of

more broad question really is you are someone who has been in this industry for a long time and seen a lot of I guess fads come and go and have seen the movement in different directions in terms of I guess particularly the functional medicine movement, when you when you see something like this kind of happen where there's a particular kind of buzz around something, is that something that is personally a concern as a practitioner that suddenly people are being pulled in a direction or is it more of a kind of like I've seen this before taking that steady path in terms of helping I guess, you know the industry to find a more measured perspective around it?

Dr Murray: Boy. First of all, I don't think there's ever been anything to this scale. There's been hyped products that have come and gone but they have not been at this scale. This is this is unprecedented. I mean, like I said the CBD market in the U.S. is probably over a billion now, so that's huge and it's growing. So globally we've never seen anything like it. You know, we've seen similar things in the drug realm where drugs were hyped and then didn't quite pan out, either some side effects or they weren't as effective as is a originally promised. But we've never seen anything to this degree in the supplement realm and I think there's going to be more good that comes from it than negative. The negative is that you know, some people may not get all the benefits that they're looking for. But hopefully that won't turn them off to natural approaches it will stimulate them to dig deeper. Good medicine is always about trying to identify the underlying cause and address it effectively.

So right now we're focused on CBD to influence the endocannabinoid system, but you know, there might be some better approaches. There might be other plants that are more effective. We talked about PEA, I think PEA, I just I think it's again what people are looking for was with CBD we know for many of these applications that PEA at the dose of 600 milligrams per day can produce fantastic results. So, you know we can we can use hero ingredients but they are always going to work better when they're in the context of a truly comprehensive approach and maybe that's what we'll find was CBD too. We can always enhance the effectiveness of natural product, drugs or any hero ingredient by making sure we improve our overall health and it's the nature of the era that we're living in, you know, kind of looking for that that cure-all, that magic bullet that's going to be a biochemical band-aid and take care of all of our issues and I think that's a bit of a trap. I think that health involves much more than taking a single ingredient. It involves having this very strong foundation.

And this is important I think when you're trying to boost energy levels because there are many facets to energy and I'm sure all your other speakers talked on these. When I approach a person that wants to have higher energy levels I first tell them that what influences the way that they feel and how much energy they have in their body is a combination of two things. One is their internal

focus, what they're focusing on with their mind, with their conscious thoughts because those influence our subconscious thoughts and actions. So we have to pay attention to what we're putting in our mind as much as we are paying attention to what we put in our body. So the way we can influence energy for a lot of people is influencing the amount of optimism and positivity in their life. That sounds, maybe something that's a little bit Pollyanna, but it works. There's there's a reason that you know, so many health experts and motivational speakers are preaching the power of the mind and the power of optimism and the importance of a positive mental attitude because it does influence the way our cells work and it does influence the amount of energy that we have in each cell in our overall body.

Next is physiology and physiology doesn't just mean the nutrition that we have in our body the hormonal aspects, various chemicals. It's also how we hold our body and you know, if you want more energy, you have to learn how to have an optimum physiology and that means, learning how to hold your body and proper posture, breathe in a relaxed but deep manner, be energetic, create energy in your in your body by moving on a regular basis. Exercise is important in influencing our physiology. And then you know, we have specialty substances in compounds that we can use to enhance our energy through acting on our physiology that again, I like to kind of break things down in simple and simple terms. It's it really comes down to what you're what you're feeding in here, which you're putting in here and what your feeling in here in terms of the degree of energy that we have in our life,

Alex: I didn't mention before we started recording but my backgrounds on psychology so you're certainly preaching to the choir here and it's great to hear as we're taking the kind of tour as we are.

I'm mindful of time but just a few more questions. I'm curious as to either in this area that we've been talking about or more broadly. What are you excited about for the next 5-10 years? As I say someone who's got a lot of experiences and seen a lot happen over the years in this field. What excites you about either what you see that's starting to emerge or what you hope is going to start to emerge?

Dr Murray: What we've been talking about is very interesting, right, the endocannabinoid system that's emerging. Another aspect of our health that's emerging is the importance of the microbiome and you know my view on that is again, it might be a little bit of a heretic but I predict that what the research is going to focus on is the importance of the terrain. We've almost had kind of reversed germ theory happening right now with the microbiome. So the germ theory was developed by Louis Pasteur, he thought he could tag a disease every disease would have a microbial origin and counterpart to pasture was Bernard. And Bernard said the pathogen is nothing, the terrain is everything and Metchnikoff and others kind of prove that as well. But Pastor and Bernard

were engaged in very scientific debate their whole lives. On Pastors deathbed he confessed, he said Bernard is right. The pathogen is nothing the terrain is everything and right now we're focusing on certain bugs but those probiotics they're not that influential in changing the overall microbiome. And that's where I think looking at ways in which we can change the terrain will become the chief focus and it's really exciting because what the research shows is that we can change the terrain dramatically through what we eat and there's this mind/body connection it goes both ways. By the way that we think, our lifestyle, everything that influences health influences the microbiome and I think we're going to be able to dial it in a little bit better than right. Now we're just kind of throwing seeds. It's kind of like our microbiome is like a forest, it can either be a bearing forest or it can be a rich rainforest. If the land is barren in the soil is fertile, you know, you might be able to throw seeds on it and grow some grass or whatever. But if you're trying to throw seeds on a well-developed forest, they're not going to they're not going to spring forth any plant new plants. So I think that's kind of what we're trying to do right now with some of our approaches to the microbiome and that's going to change, it's going to be phenomenal. That's a really key area of focus.

The other are is probably your area. When I was first starting in my medical career, the field of study was referred to as psychoneuroimmunology, then they realize that the endocrine system was involved and it became psychoneuroendoimmunology and then they realized that the way our mind works and the way our detoxification system works is closely intertwined. So it became psychoneuroendotoxicology and my point is that the word is going to keep getting longer and longer trying to drive home the key fact that everything is connected, every thought, every emotion, every experience that we have in life makes an imprint on not only our subconscious mind but also our physiology. Identical twins when they're born they express about 99% of their genome identically by the time they're 50 its less than 3%. So what's changed? What's changed is what they've been exposed to in their environment, what thoughts and emotions and experiences they've had, and their diet. These are things that influence the way genes are expressed. So I think that this field of the mind-body medicine is going to just continue to explode and we're going to learn how important these relationships are between our thoughts and our body functions.

Alex: Fascinating. You've just given a bit whistle stop tour some of the key pieces we've been exploring in the conference so it's nice to hear the validation from your perspective in terms of the importance of those pieces.

Dr Murray I'm mindful of time that the people that want to find out more about you and your work what's the way to do that and I know that also you have some products you created that effect the endocannabinoid system maybe you want to touch on that as well?

Dr Murray: Yeah, so the best place if you're interested in following my work is doctormurray.com and we've been talking about this endocannabinoids system. I wrote a little booklet that is available. I got to get the right website down, but I think it's an emeraldhealth.com. So I want to give make sure everybody gets that little booklet because I gave a lot of information on the endocannabinoid system, but I've written a little booklet on it and we'll make that available to people for free.

Alex: Fantastic. Dr. Murray, thank you so much. This has been really fascinating and I hope for those that we popped the bubble we re-inflated a larger bubble let's say in terms of recognizing that there are many ways to work with this and actually ways that are validated and actually have the potential to make lasting change I think is very exciting.

Dr Murray: Yeah, great. I really enjoyed it. Good luck.