Methylene Blue 101

So, YouTube family, you've had questions So, YouTube family, you've had questions about the basics of methylene blue cuz about the basics of methylene blue cuz we've done lots of content on the big we've done lots of content on the big picture of what it does and the small picture of what it does and the small picture. Let's get into methylene blue picture. Let's get into methylene blue Hey, I'm Dr. A. Thanks for listening. I Hey, I'm Dr. A. Thanks for listening. I use this channel to answer questions.

use this channel to answer questions. I've been involved in teaching and I've been involved in teaching and research in the integrative and research in the integrative and naturopathic medical communities for naturopathic medical communities for 30-plus years at this point. Been 30-plus years at this point.

What Is Methylene Blue? (History & Medical Uses)

Been practicing a long time seeing patients practicing a long time seeing patients and this what we do here is just answer and this what we do here is just answer questions you have. So, the first thing questions you have. So, the first thing is what is it? Methylene blue is is what is it? Methylene blue is considered to be the oldest synthetic considered to be the oldest synthetic drug in at least modern human history.

drug in at least modern human history. Now, there's a lot of human history and Now, there's a lot of human history and about other drugs that we don't know about other drugs that we don't know about from past times, but in modern about from past times, but in modern times over 300 years of use of methylene times over 300 years of use of methylene blue as a synthetic drug. It's got blue blue as a synthetic drug. It's got blue in its name, it's a dye, and so it's in its name, it's a dye, and so it's used for all sorts of things that are used for all sorts of things that are non-medical, but also in medicine, it is non-medical, but also in medicine, it is commonly used for things like particular commonly used for things like particular metabolic toxicities. If you have your metabolic toxicities. If you have your hemoglobin doing something it's not hemoglobin doing something it's not supposed to and it's not wanting to bind supposed to and it's not wanting to bind with oxygen, you're in the emergency with oxygen, you're in the emergency room, they may give you intravenous room, they may give you intravenous methylene blue to help undo that methylene blue to help undo that particular problem. It's sometimes used particular problem. It's sometimes used in surgery again as a tracer dye. It's in surgery again as a tracer dye. It's also used in surgery, especially also used in surgery, especially neurological surgery, to help protect neurological surgery, to help protect the nervous system during and after the nervous system during and after neurological surgical procedures. So, neurological surgical procedures.

How It Supports Mitochondria & Energy (OXPHOS)

So, it's used that way and it's also gained it's used that way and it's also gained a following in the last, you know, a following in the last, you know, number of years, although it's been number of years, although it's been around for over 300 years, it's gained a around for over 300 years, it's gained a following for non- toxicology, following for non-toxicology, non-surgery use at lower doses. And what non-surgery use at lower doses. And what does that do? It basically helps to does that do? It basically helps to support your mitochondrial function. So, support your mitochondrial function. So, your mitochondria are what make energy.

your mitochondria are what make energy. The core part of the functional unit of The core part of the functional unit of the mitochondria is oxidative the mitochondria is oxidative phosphorylation. So, this is what like phosphorylation. So, this is what like NAD triggers and other B vitamins and NAD triggers and other B vitamins and other cool things that make energy in other cool things that make energy in your mitochondria. Well, turns out your mitochondria. Well, turns out methylene blue goes in kind of on the methylene blue goes in kind of on the side of the ox phos cascade and side of the ox phos cascade and jump-starts the cascade. So, it triggers jump-starts the cascade. So, it triggers more energy production. So, people will more energy production. So, people will use it for, you know, non-

hospital uses use it for, you know, non-hospital uses at lower doses for anything where your at lower doses for anything where your mitochondria might need some support.

mitochondria might need some support. The things to keep in mind with The things to keep in mind with mitochondrial support are the mitochondrial support are the mitochondria are numerous inside your mitochondria are numerous inside your cells and different cell types have cells and different cell types have different concentrations of different concentrations of mitochondria. So, like your brain and mitochondria. So, like your brain and your heart have lots. Your reproductive your heart have lots. Your reproductive organs have lots. Things like your organs have lots. Things like your digestive organs and your liver and your digestive organs and your liver and your muscles have, you know, medium amount.

muscles have, you know, medium amount. It just depends on the energy It just depends on the energy requirement for those cells. So, if I'm requirement for those cells. So, if I'm having, you know, chronic fatigue or having, you know, chronic fatigue or long COVID or I'm having trouble healing long COVID or I'm having trouble healing up after surgery or some other thing, up after surgery or some other thing, sometimes, you know, practitioner might sometimes, you know, practitioner might give you methylene blue as a support for give you methylene blue as a support for that. For example, so that'd be an that. For example, so that'd be an example of like a non-hospital use, example of like a non-hospital use, non-toxicology use. Quick interruption non-toxicology use. Quick interruption from the regular video. If you are a from the regular video. If you are a healthcare practitioner and you have an healthcare practitioner and you have an interest in this topic, we're going to interest in this topic, we're going to put a link in the description below to put a link in the description below to my CE website and specifically the my CE website and specifically the webinar that is about this topic. We'll webinar that is about this topic. We'll see you over there. Thanks. Now, it can see you over there. Thanks. Now, it can be taken orally. I mentioned in the be taken orally.

Dosing Basics & Safety Considerations

I mentioned in the hospitals usually given intravenously at hospitals usually given intravenously at higher doses. At lower doses, it can be higher doses. At lower doses, it can be taken orally and those dose ranges are taken orally and those dose ranges are all over the map because everyone's all over the map because everyone's different. So, you could see people different. So, you could see people reacting to 5 or 10 mg orally and people reacting to 5 or 10 mg orally and people not reacting until they get to 50 to 100 not reacting until they get to 50 to 100 mg. But, when you think about taking it, mg. But, when you think about taking it, we also want to consider what might some we also want to consider what might some side effects be so that we stay safe side effects be so that we stay safe with it. Now, the first thing is I think with it. Now, the first thing is I think if you're going to take anything like if you're going to take anything like methylene blue is not part of your body.

methylene blue is not part of your body. It's really a drug that is also sold as It's really a drug that is also sold as a supplement. You should probably a supplement. You should probably working with somebody who is a working with somebody who is a practitioner that knows how to manage practitioner that knows how to manage these things cuz you can get too much these things cuz you can get too much and get overstimulated. But that being and get overstimulated. But that being said, the side effects are either due to said, the side effects are either due to the nature of the chemistry, which is the nature of the chemistry, which is it's it is a dye, and or the nature of it's it is a dye, and or the nature of its interaction with your mitochondria.

its interaction with your mitochondria.

Side Effects & Lab Test Interference

So, methylene blue will, if you take it So, methylene blue will, if you take it orally like it is a tincture or pill or orally like it is a tincture or pill or something, it might turn your teeth blue something, it might turn your teeth blue because it's blue. That will come off because it's blue. That will come off when you brush your teeth. But think when you brush your teeth. But think about it, there's a dye going through about it, there's a dye going through your body, you're going to urinate it your body, you're going to urinate it out, and so your urine will become out, and so your urine will become discolored and you may have toilet color discolored and you may have toilet color problems that

need to be cleaned as you problems that need to be cleaned as you go along. The one thing with medical go along. The one thing with medical testing you have to keep in mind is this testing you have to keep in mind is this is going through your digestive tract is going through your digestive tract into your blood plasma and then all the into your blood plasma and then all the way through into your urine to be way through into your urine to be excreted. So, if you're doing a urine excreted. So, if you're doing a urine test especially, but some blood tests, test especially, but some blood tests, and you can be off of your methylene and you can be off of your methylene blue, it would be really good not to be blue, it would be really good not to be taking methylene blue and trying to get taking methylene blue and trying to get a urine test on because you can throw a urine test on because you can throw off some of the urine tests. Usually 1 off some of the urine tests. Usually 1 day away from the methylene blue before day away from the methylene blue before you do your urine test is fine. 2 days you do your urine test is fine. 2 days would be even better, but let's say would be even better, but let's say you're in the emergency room or you're in the emergency room or something and you don't have the option.

something and you don't have the option. Just if they're going to take blood or Just if they're going to take blood or urine test, tell them that you're taking urine test, tell them that you're taking oral methylene blue and just so they oral methylene blue and just so they know if the labs look weird, that might know if the labs look weird, that might be why. Other side effects though would be why. Other side effects though would be metabolic. So, let's say you take too be metabolic. So, let's say you take too much methylene blue, you can feel very much methylene blue, you can feel very over caffeinated, shaky, can't sleep, over caffeinated, shaky, can't sleep, maybe anxious, other stuff. That's just maybe anxious, other stuff. That's just your mitochondria running a little too your mitochondria running a little too fast on that day. Now, in other content, fast on that day.

Quality Matters: USP Grade & Heavy Metal Risks

Now, in other content, we got a ton of other information about we got a ton of other information about quality concerns, and because there's so quality concerns, and because there's so much content that we've already done on much content that we've already done on this, I'm just going to remind everyone this, I'm just going to remind everyone that you can have a chemical like that you can have a chemical like methylene blue that has one name, but methylene blue that has one name, but there's different grades of methylene there's different grades of methylene blue and quality across the board. So, blue and quality across the board. So, on one end, you might have commercial or on one end, you might have commercial or industrial methylene blue, which is made industrial methylene blue, which is made as a dye industrially. Then, you might as a dye industrially. Then, you might move over a little more pure, have move over a little more pure, have reagent grade methylene blue that we reagent grade methylene blue that we would use in a laboratory setting, and would use in a laboratory setting, and then you move over to USP grade, which then you move over to USP grade, which is the United States Pharmacopoeia, is the United States Pharmacopoeia, which would be the kind we would use for which would be the kind we would use for human use as a medicine. So, what you human use as a medicine. So, what you don't want is to be taking something don't want is to be taking something that's not USP grade as a human, as a that's not USP grade as a human, as a supplement or medicine. Why? Because supplement or medicine. Why? Because methylene blue at these lower grades methylene blue at these lower grades often has a lot of heavy metals in it. I often has a lot of heavy metals in it. I spoke to a pharmacy that makes methylene spoke to a pharmacy that makes methylene blue, and we use them all the time, and blue, and we use them all the time, and they say they will get three batches of they say they will get three batches of raw material of methylene blue that is raw material of methylene blue that is USP grade, and two will fail for heavy USP grade, and two will fail for heavy metals before they get one batch that metals before they get one batch that they can use. So, because heavy metals they can use. So, because heavy metals are mitochondrial poisons, we don't want are mitochondrial poisons, we don't want to be taking a supplement or a drug for to be taking a supplement or a drug for mitochondria use and then have it full mitochondria use and then have it full of heavy metals, right? So, you want to of heavy metals, right? So, you want to make sure if you're getting it from a make sure if you're getting it from a pharmacy, they're doing QC on the pharmacy, they're doing QC on the metals. If you're buying it as a metals. If you're buying it as a supplement, they should be very supplement, they should be very transparent on their website or transparent on their website or somewhere and have quality control somewhere and have quality control information that you can look you can information that you can look you can look up the PDF to see how they test it look up the PDF to see how they test it for heavy metals. So, just keep the for heavy metals. So, just keep the quality in mind, know that we want to quality in mind, know that we want to start with the USP the pharmaceutical start with the USP the pharmaceutical

grade, not reagent grade, not industrial grade, not reagent grade, not industrial grade, and then we want to make sure grade, and then we want to make sure somebody has tested that for heavy somebody has tested that for heavy metals.

Methylene blue is a very old medication. Methylene blue is a very old medication. It's probably the oldest synthetic It's probably the oldest synthetic medication that we currently know of and medication that we currently know of and still use. It's used in emergency still use. It's used in emergency medicine for a very specific set of medicine for a very specific set of problems, but now you see it advertised problems, but now you see it advertised and it's it's all over social media, and and it's it's all over social media, and people ask a lot of questions about people ask a lot of questions about methylene blue. Now, it's a dye, and so methylene blue. Now, it's a dye, and so if you take it liquid and you say drink if you take it liquid and you say drink it or orally, your tongue will turn it or orally, your tongue will turn blue, and your teeth will, too, but you blue, and your teeth will, too, but you can get that off by brushing them. Also, can get that off by brushing them. Also, just as a note, your urine may turn a just as a note, your urine may turn a little bit greenish-blue, little bit greenish-blue, uh and you might have to clean your uh and you might have to clean your toilet different. Keep in mind, it is a toilet different. Keep in mind, it is a dye and it does go through you. Would we dye and it does go through you.

How Mitochondria Actually Make Energy (ATP Explained)

Would we be talking about a dye that's a be talking about a dye that's a medicine? Well, I want to talk about medicine? Well, I want to talk about three big areas. One is the effect of three big areas. One is the effect of methylene blue on your mitochondria. The methylene blue on your mitochondria. The second is the effect on your overall second is the effect on your overall energy in your body, and the third is energy in your body, and the third is the effect on detoxification and healing the effect on detoxification and healing methylene blue can help support. So, methylene blue can help support. So, first, your mitochondria. So, your first, your mitochondria. So, your mitochondria, well, many of us have mitochondria, well, many of us have heard they're the powerhouse of the heard they're the powerhouse of the cell. What are they doing? Well, they're cell. What are they doing? Well, they're taking energy from the food that you taking energy from the food that you have eaten, it's all broken down, and have eaten, it's all broken down, and then that energy is broken into these then that energy is broken into these tiny tiny pieces, and they get into the tiny tiny pieces, and they get into the mitochondria, and then it runs the mitochondria, and then it runs the system on the inside membrane of the system on the inside membrane of the mitochondria that creates actual energy.

mitochondria that creates actual energy. How does it do that? Because we can't How does it do that? Because we can't create energy from nothing. Certain create energy from nothing. Certain parts of the food that you eat break parts of the food that you eat break down into very small molecules, and the down into very small molecules, and the inner membrane of your mitochondria inner membrane of your mitochondria borrows an electron, and if you go to borrows an electron, and if you go to the wires in your house, they're full of the wires in your house, they're full of electrons. That's what the current where electrons. That's what the current where the electricity. Well, in mitochondria, the electricity. Well, in mitochondria, it uses the electron to bounce down uh it uses the electron to bounce down uh an apparatus on the inner membrane. It's an apparatus on the inner membrane. It's like a wire, but it's a biological wire, like a wire, but it's a biological wire, so it doesn't doesn't have just one ion so it doesn't doesn't have just one ion like copper wires. It's got all these like copper wires. It's got all these intermediate steps, and they might be intermediate steps, and they might be fueled by the presence of iron, sulfur, fueled by the presence of iron, sulfur, coenzyme Q10, vitamin B2, vitamin B3, coenzyme Q10, vitamin B2, vitamin B3, and a number of other things that you and a number of other things that you probably heard of, right? Well, if you probably heard of, right? Well, if you think about the current of energy, the think about the current of energy, the electrons go bouncing on down, what electrons go bouncing on down, what happens when they get to the end that happens when they get to the end that makes the energy? They come to the final makes the energy? They come to the final complex, which we used to call uh ATPase complex, which we used to call uh ATPase pump, and that takes used up energy as pump, and that takes used up energy as ADP, so diphosphate, and it takes ADP, so diphosphate, and it takes another phosphate and puts it together another phosphate and puts it together with ADP to become ATP, which is with ADP to become ATP, which is triphosphate, and that last phosphate triphosphate, and that last phosphate has a high energy bond in it. So, we has a high energy bond in it. So, we take the energy from all those electrons take the energy from all those electrons moving, and we use that put the moving, and we

use that put the phosphate back on the ADP and recycle it phosphate back on the ADP and recycle it to ATP. Most people now have heard of to ATP. Most people now have heard of ATP, primary energy producer inside your ATP, primary energy producer inside your cell. Why would methylene blue, which is cell.

How Methylene Blue Boosts Electron Transport

Why would methylene blue, which is not native to the human body, affect the not native to the human body, affect the mitochondria? Well, turns out that mitochondria? Well, turns out that methylene blue goes in, and it goes to methylene blue goes in, and it goes to the end of that system where the the end of that system where the electrons are moving through, and it electrons are moving through, and it causes the end to keep moving. So, it causes the end to keep moving. So, it goes in, and it directly interacts with goes in, and it directly interacts with the last part of that complex that keeps the last part of that complex that keeps the electrons going to the ATPase pump, the electrons going to the ATPase pump, the ADP into ATP. So, it keeps this the ADP into ATP. So, it keeps this process going. And the reason that process going. And the reason that that's so important is that, of course, that's so important is that, of course, we think if our if our mitochondria slow we think if our if our mitochondria slow down, our whole energy down, our whole energy is going to slow down in our body, and is going to slow down in our body, and we'll feel tired and all that. Very we'll feel tired and all that. Very true. But, the reason mitochondria is so true. But, the reason mitochondria is so important to your functioning of your important to your functioning of your cells in your body is most of your cells cells in your body is most of your cells have mitochondria. Some cells have a ton have mitochondria. Some cells have a ton of mitochondria. Brain, your heart, your of mitochondria. Brain, your heart, your reproductive organs, lots and lots of reproductive organs, lots and lots of mitochondria. Others Other tissues have mitochondria. Others Other tissues have many as well. Well, if I take many as well. Well, if I take mitochondria and I get them to move mitochondria and I get them to move slower and slower and slower. The cell slower and slower and slower. The cell becomes dysfunctional because the cells becomes dysfunctional because the cells are made have a certain amount of are made have a certain amount of energy. Take away their energy, I can energy. Take away their energy, I can start to have a back of toxic material start to have a back of toxic material in the cell that I can't get out and in the cell that I can't get out and export. I have a cell that's export. I have a cell that's dysfunctional because it's not operating dysfunctional because it's not operating at a proper speed. And then if I take a at a proper speed. And then if I take a collection of cells, I have a tissue collection of cells, I have a tissue type. Take a collection of those, I have type. Take a collection of those, I have an organ. And you can actually have an organ. And you can actually have organs that slow down and don't work.

organs that slow down and don't work. Well, we call that pathology. So, that's Well, we call that pathology. So, that's the sort of big picture of how methylene the sort of big picture of how methylene blue makes an impact just on your blue makes an impact just on your general health. So, the first thing that general health.

Energy, Brain Function & Focus Benefits

So, the first thing that people often will feel is a sense of people often will feel is a sense of energy. If you think about what we just energy. If you think about what we just talked about with the mitochondria, you talked about with the mitochondria, you are the sum total of your mitochondrial are the sum total of your mitochondrial function when it comes to your energy.

function when it comes to your energy. If I take and figuratively speaking was If I take and figuratively speaking was to take and had like a thermostat or to take and had like a thermostat or rheostat that adjusted your mitochondria rheostat that adjusted your mitochondria to go slower, you would feel more tired.

to go slower, you would feel more tired. And indeed, people who are chronically And indeed, people who are chronically ill, chronically fatigued, chronically ill, chronically fatigued, chronically tired have lower mitochondrial function.

tired have lower mitochondrial function. Now, people will say, "Well, if the Now, people will say, "Well, if the mitochondria stop working, you're dead." mitochondria stop working, you're dead." Well, of course, right? But there's a Well, of course, right? But there's a range within they they can operate and range within they they can operate and they can be normal threshold, which is they can be normal threshold, which is up and down a little bit

every day. They up and down a little bit every day. They can be sub-threshold, which is usually can be sub-threshold, which is usually associated with illness, or they can be associated with illness, or they can be moving too quickly, which is usually moving too quickly, which is usually associated with a hypermetabolic state.

associated with a hypermetabolic state. So, the energy effects that I've seen in So, the energy effects that I've seen in people when we use methylene blue, and people when we use methylene blue, and is it the only thing used? No. And is it is it the only thing used? No. And is it the first thing used? Usually not. But the first thing used? Usually not. But when you have chronic fatigue, when you when you have chronic fatigue, when you you're coming out of chronic illnesses, you're coming out of chronic illnesses, long COVID, all these sort of things, long COVID, all these sort of things, what I normally see is two major things what I normally see is two major things if we get the doses right that people if we get the doses right that people noted. One is that their overall energy noted. One is that their overall energy does slowly improve. That's good. But does slowly improve. That's good. But the other thing is that your brain cells the other thing is that your brain cells have lots of mitochondria. And a lot of have lots of mitochondria. And a lot of people will say that they have more people will say that they have more focus. Okay? We use this with a lot of focus. Okay? We use this with a lot of folks in the ADHD ADD spectrum and it folks in the ADHD ADD spectrum and it can help them with focus as well. And so can help them with focus as well. And so what's the only side of that that we what's the only side of that that we tell people to watch out for? You can tell people to watch out for? You can have too much of a good thing. So you have too much of a good thing. So you can have too much brain mitochondrial can have too much brain mitochondrial activity. So I always tell them if you activity. So I always tell them if you feel like you can't sleep, if you feel feel like you can't sleep, if you feel shaky, jumpy, that sort of thing, we shaky, jumpy, that sort of thing, we have to back the dose off cuz it really have to back the dose off cuz it really does affect energy and mental focus very does affect energy and mental focus very quick. Doses are all over the map and quick. Doses are all over the map and this is obviously not medical advice, this is obviously not medical advice, but I have seen but I have seen uh sensitive people do just great with uh sensitive people do just great with really low doses like 5 to 15 mg. I've really low doses like 5 to 15 mg. I've seen people on the high end that were seen people on the high end that were very resistant do, you know, 50 or very resistant do, you know, 50 or bigger or much bigger doses. And I've bigger or much bigger doses. And I've seen everything in between. The most seen everything in between.

Detoxification, Cellular Respiration & Healing

The most important thing about dosing is that important thing about dosing is that you're working with somebody who can you're working with somebody who can kind of objectively assess your kind of objectively assess your metabolism and how well the dose is metabolism and how well the dose is working and can level you off at a dose working and can level you off at a dose that works for you. Now it seems a that works for you. Now it seems a little odd that we would also tie in a little odd that we would also tie in a benefit with methylene blue of benefit with methylene blue of detoxification detoxification detoxification and cell healing. But if we go back to and cell healing. But if we go back to the original premise on how do cells the original premise on how do cells stay healthy versus cells that would get stay healthy versus cells that would get sick? The main premise there is that if sick? The main premise there is that if the cell has enough energy by the the cell has enough energy by the generation of ATP in the mitochondria of generation of ATP in the mitochondria of the cell, then the cell can do all of the cell, then the cell can do all of its processes at a correct speed. If its processes at a correct speed. If that cell's energy slows down and that's that cell's energy slows down and that's tissue wide or organ wide, then those tissue wide or organ wide, then those cells that are slower are going to have cells that are slower are going to have problems doing normal business of a problems doing normal business of a cell. Well, the normal business is cell. Well, the normal business is getting enough energy substrates in from getting enough energy substrates in from the food I ate, exporting the metabolic the food I ate, exporting the metabolic and other toxins out of the cell, making and other toxins out of the cell, making energy, and then running all the little energy, and then running all the little organelles that go on in the cell that organelles that go on in the cell that require ATP to operate. Let alone the require ATP to operate. Let alone the cell membrane, which is what cell membrane, which is what communicates with the other cells around communicates with the other cells around it. The formation of ATP, which is it. The formation of ATP, which is supported by the methylene blue, not supported by the methylene blue, not only gives me that energy we're talking only gives me that energy we're talking about, but it also keeps the cell about, but it also keeps the cell business of what goes in and what goes business of what goes in and what goes out operating at a normal level. The out operating at a normal level. The reason that this helps with reason that this helps with detoxification is is

that your your detoxification is is that your your cells, just just like your body has cells, just just like your body has respiration, we breathe in and we respiration, we breathe in and we breathe out, we breathe in mixed gases breathe out, we breathe in mixed gases from the air, we extract the oxygen, we from the air, we extract the oxygen, we put that in uh to the bloodstream, we put that in uh to the bloodstream, we breathe out, we breathe out more carbon breathe out, we breathe out more carbon dioxide, and that helps to keep our dioxide, and that helps to keep our oxygen tension, our oxygen balance oxygen tension, our oxygen balance normal. Well, your cells do the same normal. Well, your cells do the same thing. They take in oxygen, and they thing. They take in oxygen, and they export carbon dioxide as they have cell export carbon dioxide as they have cell respiration based on mitochondrial respiration based on mitochondrial function. So, if we just slow it down a function. So, if we just slow it down a little bit, we can get a backup in the little bit, we can get a backup in the carbon dioxide movement, the oxygen carbon dioxide movement, the oxygen movement, and that changes the pH. Now, movement, and that changes the pH. Now, it doesn't change the pH enough to make it doesn't change the pH enough to make you real sick or dead or anything, or you real sick or dead or anything, or really sick or about to die, but it really sick or about to die, but it changes the pH just a little bit, and changes the pH just a little bit, and that's enough to slow down the export of that's enough to slow down the export of the bad stuff, the toxic material, the bad stuff, the toxic material, including carbon dioxide in the cell.

including carbon dioxide in the cell. So, then the cell becomes more toxic, So, then the cell becomes more toxic, does not operate correctly. Well, what does not operate correctly. Well, what would that lead to then? That would then would that lead to then? That would then lead to your cell not healing as well as lead to your cell not healing as well as it should. Now, cells heal like your it should. Now, cells heal like your body heals. They have this innate sort body heals. They have this innate sort of architecture wisdom, if you will, or of architecture wisdom, if you will, or whatever. And they are set up so that if whatever. And they are set up so that if there's some sort of damage, they can there's some sort of damage, they can usually repair either self-repair or usually repair either self-repair or repair with the immune system. There's a repair with the immune system. There's a state where if they get really damaged, state where if they get really damaged, they will just implode on themselves and they will just implode on themselves and essentially take themselves out of the essentially take themselves out of the game. There's also a state where if game. There's also a state where if they're damaged enough, the immune they're damaged enough, the immune system will take the cell out of the system will take the cell out of the game. What we would prefer is to have game. What we would prefer is to have enough energy so that we move the oxygen enough energy so that we move the oxygen and the nutrients in and the carbon and the nutrients in and the carbon dioxide and the toxic materials out so dioxide and the toxic materials out so that the cell has what it needs to stay that the cell has what it needs to stay healthy and auto repair in minor healthy and auto repair in minor situation. So, this is another reason situation. So, this is another reason why people are chronically ill and why people are chronically ill and trying to get their cells back online, trying to get their cells back online, and this could be real chronic illness and this could be real chronic illness like fibromyalgia, chronic fatigue, like fibromyalgia, chronic fatigue, certain autoimmune conditions, long certain autoimmune conditions, long COVID, other post-infectious illness.

COVID, other post-infectious illness. This is one of the reasons why as a This is one of the reasons why as a piece of the big protocol that we might piece of the big protocol that we might do, methylene blue can fit in because it do, methylene blue can fit in because it helps the cells get back online, and it helps the cells get back online, and it helps the overall healing capacity of helps the overall healing capacity of the cells in the body. One thing you do the cells in the body. One thing you do want to make sure of, and you can look want to make sure of, and you can look at our other methylene blue content on at our other methylene blue content on the YouTube channel, is that you have a the YouTube channel, is that you have a reputable source for the methylene blue.

reputable source for the methylene blue. So, methylene blue is one of those So, methylene blue is one of those oddball things where it's technically a oddball things where it's technically a drug, but you can buy it over the drug, but you can buy it over the counter. Whether it's made by a drug counter. Whether it's made by a drug company or by a supplement company, you company or by a supplement company, you need to make sure that they have need to make sure that they have certificates of analysis because raw certificates of analysis because raw material methylene blue can have a lot material methylene blue can have a lot of heavy metals, and the last thing you of heavy metals, and the last thing you want to do is be taking methylene blue, want to do is be taking methylene blue, let's say as a supplement or a drug, and let's say as a supplement or a drug, and have it be toxic for you. There are very have it be toxic for you. There are very reputable companies that make methylene reputable

companies that make methylene blue, but there's a lot of blue, but there's a lot of uh poor grade methylene blue sold on the uh poor grade methylene blue sold on the internet, which should never be ingested internet, which should never be ingested by humans because it has too much of the by humans because it has too much of the And so, the first thing that you want to And so, the first thing that you want to remember is in low-dose methylene blue, remember is in low-dose methylene blue, it doesn't take very much. It's an it doesn't take very much. It's an outside, meaning it's not part of our outside, meaning it's not part of our body. Methylene blue doesn't exist in body. Methylene blue doesn't exist in our body. But, the big thing that it our body. But, the big thing that it does is it can go to your mitochondria, does is it can go to your mitochondria, which help you make the energy in your which help you make the energy in your body, and it can be an accessory body, and it can be an accessory electron carrier, meaning beyond where electron carrier, meaning beyond where your nutrients go into your body and we your nutrients go into your body and we take certain things like the vitamin B3 take certain things like the vitamin B3 nicotinamide, turn it into some you nicotinamide, turn it into some you know, kind of advanced nicotinamides and know, kind of advanced nicotinamides and help that run through the mitochondria help that run through the mitochondria to make energy by moving electrons to make energy by moving electrons around. Methylene blue can come in around. Methylene blue can come in support of that and actually add in more support of that and actually add in more electron carrying capacity. More electron carrying capacity. More electron carrying capacity equals more electron carrying capacity equals more energy. Now, you might be saying, "Oh, energy. Now, you might be saying, "Oh, so it's just going to jack up my energy.

so it's just going to jack up my energy. Well, wouldn't caffeine do that or Well, wouldn't caffeine do that or something, right?" Well, it's not just something, right?" Well, it's not just for improving energy. When we talk about for improving energy. When we talk about improving energy in the mitochondria, improving energy in the mitochondria, what we need to remember is most what we need to remember is most disorder and disease of the cell starts disorder and disease of the cell starts from the mitochondria and works its way from the mitochondria and works its way out. Many disorders and diseases are out. Many disorders and diseases are when the mitochondria slow down or get when the mitochondria slow down or get broken and they can't produce energy for broken and they can't produce energy for the cell, so the cell gets broken and the cell, so the cell gets broken and slows down and then often it goes away.

slows down and then often it goes away. So, the methylene blue helping with the So, the methylene blue helping with the energy is actually helping at the base energy is actually helping at the base level for many chronic illnesses, uh level for many chronic illnesses, uh certain conditions and cancer, other certain conditions and cancer, other things of that nature. The other thing things of that nature. The other thing which is really interesting is is that which is really interesting is is that methylene blue adds to your natural methylene blue adds to your natural processes that make the electron processes that make the electron transport system work. Methylene blue transport system work. Methylene blue actually adds on to it. It's not just actually adds on to it. It's not just priming it. It actually adds extra priming it. It actually adds extra electron support to go through the electron support to go through the mitochondria. So, it's sort of double mitochondria. So, it's sort of double energy producing. It's been looked at a energy producing. It's been looked at a lot in a number of areas. One big area lot in a number of areas.

Neurology, Brain Injury & Neurodegeneration Research

One big area is in the neurology area because trying is in the neurology area because trying to get the brain repaired after certain to get the brain repaired after certain types of diseases and disorders is quite types of diseases and disorders is quite a big problem and the brain has some of a big problem and the brain has some of the most dense areas of mitochondria in the most dense areas of mitochondria in the body. So, the first paper was the body. So, the first paper was targeting mitochondrial dysfunction in targeting mitochondrial dysfunction in central nervous system injury using central nervous system injury using methylene blue. If you have a high methylene blue. If you have a high density mitochondrial tissue like the density mitochondrial tissue like the brain, you're going to have a high brain, you're going to have a high density need for repair there. So, density need for repair there. So, they've actually done studies both with they've actually done studies both with animals and humans in trying to target animals and humans in trying to target injured brains and get them back online.

injured brains and get them back online. And how often do we hear about traumatic And how often do we hear about traumatic brain injury, post-COVID illness, brain brain injury, post-COVID illness, brain fog, chronic

headaches, all those other fog, chronic headaches, all those other things, things of that things, things of that they've looked at the actual thought they've looked at the actual thought processes and that what they call processes and that what they call connectivity in the brain. So, another connectivity in the brain. So, another paper talks about methylene blue through paper talks about methylene blue through its effect in the mitochondria helping its effect in the mitochondria helping to modulate the functional connectivity to modulate the functional connectivity of brain tissue. And this this looks at of brain tissue. And this this looks at a lot of things such as not only our a lot of things such as not only our processing and executive function, but processing and executive function, but also things like memory problems and also things like memory problems and dementia, potentials for use in those dementia, potentials for use in those areas. So, again, a really not uncommon areas. So, again, a really not uncommon area of dysfunction that methylene blue area of dysfunction that methylene blue blue, this very old drug for new blue, this very old drug for new purposes, may have a role in. Another purposes, may have a role in. Another one related to all that is actual one related to all that is actual looking at in science at protection from looking at in science at protection from neurodegeneration. Well, we all can neurodegeneration. Well, we all can undergo neurodegeneration. We all do at undergo neurodegeneration. We all do at a certain point, but it can be sped up a certain point, but it can be sped up by underlying genetic disorders, by underlying genetic disorders, traumatic brain injuries, chronic brain traumatic brain injuries, chronic brain trauma, chronic chemical traumas, trauma, chronic chemical traumas, infectious traumas. In the neurology infectious traumas. In the neurology literature, they talk about COVID being literature, they talk about COVID being like a traumatic brain injury. So, like a traumatic brain injury. So, again, you can have infectious traumas, again, you can have infectious traumas, etc. And they there are papers about the etc. And they there are papers about the use of methylene blue with use of methylene blue with neurodegenerative conditions. There's neurodegenerative conditions. There's also just some speculative papers about also just some speculative papers about helping us with healthy aging. But, it helping us with healthy aging. But, it would kind of make sense if the sum would kind of make sense if the sum total of our health is largely total of our health is largely predicated on whether all of our cells predicated on whether all of our cells have the right amount of electron have the right amount of electron transfer and the right amount of transfer and the right amount of mitochondrial function that makes our mitochondrial function that makes our cells healthier, the healthier all that cells healthier, the healthier all that is, the healthier we are going to be.

is, the healthier we are going to be. And I think that's where they're going And I think that's where they're going in that particular paper. And uh got a in that particular paper. And uh got a paper in there that's looking at paper in there that's looking at specifically tick-borne diseases. We specifically tick-borne diseases. We hear about Lyme disease, but there's a hear about Lyme disease, but there's a lot of other diseases related and lot of other diseases related and methylene blue. It's used a lot in the methylene blue. It's used a lot in the chronic Lyme community, etc. How's that chronic Lyme community, etc. How's that connect? It connects on a number of connect? It connects on a number of levels. One is there's a lot of energy levels. One is there's a lot of energy depletion, but also damage to the depletion, but also damage to the mitochondria that occur when you have a mitochondria that occur when you have a chronic infectious disease such as, you chronic infectious disease such as, you know, Lyme or Epstein-Barr or any of the know, Lyme or Epstein-Barr or any of the other chronic infections that people other chronic infections that people get. So, you get damage eventually to get. So, you get damage eventually to the electron transport chain in the the electron transport chain in the mitochondria and our and our energy.

mitochondria and our and our energy. But, the other side of it is our immune But, the other side of it is our immune system uses a lot of mitochondrial system uses a lot of mitochondrial energy to keep up with stuff. And so, energy to keep up with stuff. And so, imagine the beating that takes in a imagine the beating that takes in a chronic infectious disease setting. This chronic infectious disease setting.

Chemotherapy, Mitochondrial DNA & Mucositis

This also really cool set of papers that I I also really cool set of papers that I I just presented one of these at a just presented one of these at a hospital to the oncology department hospital to the oncology department looking at use of methylene blue in looking at use of methylene blue in repairing the damage to the repairing the damage to the mitochondrial DNA. So, there's specific mitochondrial DNA. So, there's specific DNA that help us remake our mitochondria DNA that help us remake our mitochondria after particular type of after particular type of chemotherapy-induced chemotherapy-induced chemotherapy-induced injury. One of the problems with injury. One of the problems with chemotherapy is that it goes in and it chemotherapy is that it goes in and it might help you with

your cancer, but might help you with your cancer, but it's really hard on the rest of your it's really hard on the rest of your body. It might be hard on your heart, or body. It might be hard on your heart, or your brain, or your kidneys, or you some your brain, or your kidneys, or you some other important part of you. In this other important part of you. In this particular type of chemotherapy, it's particular type of chemotherapy, it's actually damage directly to the actually damage directly to the mitochondrial DNA. If they get damaged, mitochondrial DNA. If they get damaged, then they can't really form new then they can't really form new mitochondria appropriately. And if it's mitochondria appropriately. And if it's in a sensitive area, like say your in a sensitive area, like say your kidneys, then you get kidney damage.

kidneys, then you get kidney damage. But, the kidney damage really starts at But, the kidney damage really starts at the DNA level. And they've now, through the DNA level. And they've now, through modern science, found out ways why this modern science, found out ways why this happens, okay? What they're looking at happens, okay? What they're looking at is methylene blue can actually go in and is methylene blue can actually go in and it can undo the mitochondrial DNA it can undo the mitochondrial DNA damage, actually turn it off, so that damage, actually turn it off, so that the cells have a chance to operate the cells have a chance to operate normally and build normal mitochondria normally and build normal mitochondria even after an insult from particular even after an insult from particular types of chemotherapy. This also uses in types of chemotherapy. This also uses in the palliative, or helping with the palliative, or helping with symptoms, part of cancer care. And one symptoms, part of cancer care. And one of the things that's a really horrible of the things that's a really horrible side effect with with a lot of side effect with with a lot of chemotherapies, they call mucositis.

chemotherapies, they call mucositis. But, it can be anywhere from your lips But, it can be anywhere from your lips all the way through your digestive all the way through your digestive tract, where you can get swollen, you tract, where you can get swollen, you can get inflamed, it can be very can get inflamed, it can be very painful. And in certain cases, the pain painful. And in certain cases, the pain is so bad you can't eat or drink. It can is so bad you can't eat or drink. It can be that bad. And so, mucositis is always be that bad. And so, mucositis is always one of those things we're working with one of those things we're working with with cancer patients, just to try and with cancer patients, just to try and keep it to a minimum or at bay. Well, keep it to a minimum or at bay. Well, they looked at treatment of mucositis, they looked at treatment of mucositis, which, you know, there are things to which, you know, there are things to calm it down palliatively, but actually calm it down palliatively, but actually treat it underlying, there's not as many treat it underlying, there's not as many things. But, treatment of mucositis in things. But, treatment of mucositis in pediatric patients, and they actually pediatric patients, and they actually had very positive results with a small had very positive results with a small trial in in children, so human trial in trial in in children, so human trial in children. And then, there's more papers children.

Long COVID & Chronic Infection Support

And then, there's more papers coming out about this, and I mentioned coming out about this, and I mentioned it earlier, but repurposing methylene it earlier, but repurposing methylene blue in the management of COVID-19. If blue in the management of COVID-19. If we think about it, among the many, many we think about it, among the many, many reasons that SARS-CoV-2, COVID-19, reasons that SARS-CoV-2, COVID-19, creates trouble in the body and creates creates trouble in the body and creates long COVID and all those bad things, a long COVID and all those bad things, a lot of them are because of the lot of them are because of the immunologic dysregulation that that that immunologic dysregulation that that that virus has like many other infections, virus has like many other infections, but SARS-CoV-2 is a little more but SARS-CoV-2 is a little more aggressive in some areas and then that aggressive in some areas and then that immunologic deregulation beats up on the immunologic deregulation beats up on the cells, beats up on the mitochondria, it cells, beats up on the mitochondria, it takes people some people with long COVID takes people some people with long COVID a long time to recover. So, they're a long time to recover. So, they're looking at repurposing methylene blue looking at repurposing methylene blue just like we talked about with all these just like we talked about with all these other things other things in the setting of COVID and long COVID in the setting of COVID and long COVID as well. So, those are just 10 of many as well.

Drug Status, Prescriptions & Safety Warnings

So, those are just 10 of many many many areas in science that we're many many areas in science that we're

looking at the use of repurposed looking at the use of repurposed methylene blue. Number one, remember it methylene blue. Number one, remember it is a drug, it has to be monitored and is a drug, it has to be monitored and dosed appropriately, should never be dosed appropriately, should never be ordered online and dosed on your own, ordered online and dosed on your own, etc. Number two, you need a healthcare etc. Number two, you need a healthcare provider who is used to using methylene provider who is used to using methylene blue. And blue. And most healthcare providers, everybody's most healthcare providers, everybody's heard of it for its emergency use in heard of it for its emergency use in certain types of blood disorders, but certain types of blood disorders, but you need a provider who's used to using you need a provider who's used to using low-dose methylene blue in these other low-dose methylene blue in these other settings. In North America, at least, it settings. In North America, at least, it is a drug, it is a legend substance, is a drug, it is a legend substance, which means it needs to come from a which means it needs to come from a pharmacy of some kind or another through pharmacy of some kind or another through the prescription of a healthcare the prescription of a healthcare provider. Now, does that mean you can't provider. Now, does that mean you can't find it online and buy it? Certainly not find it online and buy it? Certainly not even find anything online and buy it, even find anything online and buy it, but one of the cautions is that a lot of but one of the cautions is that a lot of them material that's online is not them material that's online is not pharmaceutical grade, even though it's pharmaceutical grade, even though it's labeled that what is available is full labeled that what is available is full toxicity and contamination. So, we don't toxicity and contamination. So, we don't want to putting that in our body. This want to putting that in our body. This is where it cross purposes, if we're is where it cross purposes, if we're going to try and help our mitochondria going to try and help our mitochondria and our energy and then we're poisoning and our energy and then we're poisoning them with the heavy metals, why do that?

them with the heavy metals, why do that? Getting it through a pharmacy source, Getting it through a pharmacy source, the pharmacy will have to do quality the pharmacy will have to do quality control and quality control data in that control and quality control data in that the methylene blue has been checked for the methylene blue has been checked for that. So, it's another checkpoint in the that. So, it's another checkpoint in the system, if you will. The other thing is system, if you will. The other thing is that you do have to be careful with that you do have to be careful with certain drugs, especially drugs that certain drugs, especially drugs that manipulate serotonin, and there can be manipulate serotonin, and there can be incompatibilities and safety issues incompatibilities and safety issues around combining methylene blue and some around combining methylene blue and some of those drugs. But, let's get into the of those drugs. But, let's get into the positive end of this, which is why does positive end of this, which is why does it work and how is it so powerful in it work and how is it so powerful in helping a person recover from, say, a helping a person recover from, say, a post-viral illness or long-term illness post-viral illness or long-term illness or drug-induced toxicities like or drug-induced toxicities like chemotherapy-induced toxicities, chronic chemotherapy-induced toxicities, chronic infectious illness, etc. How is it doing infectious illness, etc.

Deep Dive: OXPHOS, Oxygen & CO2 Balance

How is it doing all of this? Well, the first thing that all of this? Well, the first thing that we want to think of is, in general, we want to think of is, in general, where does the methylene blue go and where does the methylene blue go and what kind of work does it do? So, the what kind of work does it do? So, the work that it does mostly at the level of work that it does mostly at the level of mitochondria. And if you remember from mitochondria. And if you remember from many of our other discussions about many of our other discussions about mitochondria, our cells all have mitochondria, our cells all have mitochondria at different levels, and mitochondria at different levels, and the mitochondria are in the cell on the the mitochondria are in the cell on the inside, and they help through oxidative inside, and they help through oxidative phosphorylation to use nutrients to phosphorylation to use nutrients to create more ATP energy units, okay? We create more ATP energy units, okay? We normally have a nutrient side that is normally have a nutrient side that is run by the nicotinamide family, the B3 run by the nicotinamide family, the B3 family, and many people have heard of family, and many people have heard of NAD or precursors to NAD as a NAD or precursors to NAD as a supplement, and that's often used to supplement, and that's often used to help that side. Well, methylene blue help that side. Well, methylene blue actually can go and go in through kind actually can go and go in through kind of a side pathway and help to increase of a side pathway and help to increase ox phos. So, separate from the nutrient ox phos. So, separate from the nutrient pathways, it helps to increase the pathways, it helps to increase the mitochondrial output and helps to get mitochondrial output and helps to get the cell back on an equal energy footing the cell back on an equal energy footing to where it may be used to be when

you to where it may be used to be when you were healthier. Now, there's a couple of were healthier. Now, there's a couple of other reasons why this can be very other reasons why this can be very useful, but that's the bottom line.

useful, but that's the bottom line. That's the base of the way it works. That's the base of the way it works. But, when we look a little bit deeper But, when we look a little bit deeper and we look at that, then there's and we look at that, then there's another thing that improving the another thing that improving the oxidative phosphorylation cascade, the oxidative phosphorylation cascade, the energy producing cascade does, and this energy producing cascade does, and this is known as cellular respiration, where is known as cellular respiration, where oxygen diffuses into the cell, it goes oxygen diffuses into the cell, it goes in and is used in oxidative in and is used in oxidative phosphorylation, and then out the other phosphorylation, and then out the other side comes ATP energy units and carbon side comes ATP energy units and carbon dioxide. Carbon dioxide diffuses out of dioxide. Carbon dioxide diffuses out of the cell. So, one of the things that the cell. So, one of the things that happens when you put more oxygen in, happens when you put more oxygen in, which if I speed the mitochondria up, which if I speed the mitochondria up, move more oxygen in, I'm going to move more oxygen in, I'm going to naturally move more carbon dioxide out, naturally move more carbon dioxide out, and I'm going to help in establishing and I'm going to help in establishing and keeping the pH balance inside and and keeping the pH balance inside and outside of the cell, because carbon outside of the cell, because carbon dioxide shifts pH to a more healthy and dioxide shifts pH to a more healthy and a more balanced sort of pH balance. Now, a more balanced sort of pH balance.

Immune System, Detox Organs & Bone Marrow Support

Now, that can improve a number of things, but that can improve a number of things, but one of the things that that whole one of the things that that whole process will trigger is it will speed up process will trigger is it will speed up the the the cell in making the little vesicles that cell in making the little vesicles that take garbage out. So, it helps to take garbage out. So, it helps to detoxify the cell, remove the garbage, detoxify the cell, remove the garbage, right? Now, you take it back a step, and right? Now, you take it back a step, and you say, "Well, people will say, you you say, "Well, people will say, you know, it helps out, you know, with cell know, it helps out, you know, with cell energy, that's what you just described, energy, that's what you just described, that kind of makes sense, the more the that kind of makes sense, the more the mitochondria work, the more energy I mitochondria work, the more energy I have." But then they'll talk about, have." But then they'll talk about, "Well, it can help also with more global "Well, it can help also with more global things like detoxification things like detoxification or the production of immune cells." or the production of immune cells." How's it do that? Well, it's the same How's it do that? Well, it's the same mechanism, but it's just in particular mechanism, but it's just in particular tissue, such as the liver and the tissue, such as the liver and the kidneys. When the mitochondria start kidneys. When the mitochondria start working faster, if that cell is one of working faster, if that cell is one of the cells that helps to create some of the cells that helps to create some of the detoxifying either enzyme systems or the detoxifying either enzyme systems or processing systems for toxins, etc., the processing systems for toxins, etc., the cell will run faster, and the cell will run faster, and the detoxification will run faster, as well.

detoxification will run faster, as well. Well, what about with your immune cells? Well, what about with your immune cells? Same thing. Your bone marrow, where the Same thing. Your bone marrow, where the majority of immune cells are made, is majority of immune cells are made, is very responsive. It's a It's a high very responsive. It's a It's a high turnover, high metabolic tissue. It's turnover, high metabolic tissue. It's very responsive to the effect of the very responsive to the effect of the mitochondria on the progenitor cells, mitochondria on the progenitor cells, the the sort of, you know, upstream the the sort of, you know, upstream waters of making all of your cell waters of making all of your cell families, whether it's white cells, red families, whether it's white cells, red cells, and all of the specific immune cells, and all of the specific immune cells that are made there. So, if the cells that are made there. So, if the mitochondria slow down there, you often mitochondria slow down there, you often have a slow down in the output of all of have a slow down in the output of all of these good cells. Well, that becomes these good cells. Well, that becomes incredibly important because if the incredibly important because if the marrow slows down, if the mitochondria marrow slows down, if the mitochondria can't get back online and they're can't get back online and they're affecting the bone marrow, we can't get affecting the bone marrow, we can't get these good cells to be produced again.

these good cells to be produced again. There's other reasons why it's helpful There's other reasons why it's helpful

in immunity, but that's just some big in immunity, but that's just some big high-level sorts of things. So, as far high-level sorts of things. So, as far as the way it works, you want to think as the way it works, you want to think about helping the mitochondria to run about helping the mitochondria to run faster, you want to think about moving faster, you want to think about moving O2 and CO2 in and out of the cell O2 and CO2 in and out of the cell better, moving garbage out of the cell better, moving garbage out of the cell better, so to speak. And in the specific better, so to speak. And in the specific tissues, if it's detoxification cells in tissues, if it's detoxification cells in the liver or the kidneys or in the gut, the liver or the kidneys or in the gut, etc., they're going to run faster. If etc., they're going to run faster. If it's the bone marrow and producing your it's the bone marrow and producing your immune cells, that'll run faster. If immune cells, that'll run faster.

Combining with NAD, NR & NMN

If it's your brain and brain function, that it's your brain and brain function, that will improve and run faster, and you will improve and run faster, and you probably will also have a better probably will also have a better movement of things in and out of your movement of things in and out of your neurological tissues, which is very neurological tissues, which is very useful as well. Now, I mentioned useful as well. Now, I mentioned earlier, but I just want to point out, earlier, but I just want to point out, if you're doing NAD or a precursor of if you're doing NAD or a precursor of nicotinamide riboside or nicotinamide nicotinamide riboside or nicotinamide mononucleotide, NMN or NR, those things mononucleotide, NMN or NR, those things go in, you could say, on one side and go in, you could say, on one side and help run the natural ox phos. The help run the natural ox phos. The methylene blue comes in on the other methylene blue comes in on the other side and supports it. So, sometimes we side and supports it. So, sometimes we have people doing both. We have to have people doing both. We have to adjust the doses because you get two adjust the doses because you get two stimulants in there at one time and stimulants in there at one time and sometimes that's great and sometimes sometimes that's great and sometimes it's too much. You have to balance them it's too much. You have to balance them out. Now, as I mentioned earlier, it is out. Now, as I mentioned earlier, it is a drug. I know that, you know, anything a drug. I know that, you know, anything can be bought online, but that is always can be bought online, but that is always as good. I did mention a lot of the as good. I did mention a lot of the product out there, majority of the product out there, majority of the product is full of heavy metal toxicants product is full of heavy metal toxicants that you don't need your body. So, it's that you don't need your body. So, it's just better not to do that. But, the just better not to do that. But, the other reason to work with a practitioner other reason to work with a practitioner is that the practitioner can decide what is that the practitioner can decide what you're going to tolerate and help you you're going to tolerate and help you adjust the doses. They can make sure adjust the doses. They can make sure you're not any medications that may be you're not any medications that may be contraindicated with the use of contraindicated with the use of methylene blue so you don't hurt methylene blue so you don't hurt yourself. But, then also the clinical yourself. But, then also the clinical management of something like methylene management of something like methylene blue, it's something that should come in blue, it's something that should come in for a particular time to help you for a particular time to help you recover and recover function, but in recover and recover function, but in most people it doesn't need to be there most people it doesn't need to be there forever. And so, the important part forever. And so, the important part about that is that's a clinical about that is that's a clinical determination and it's best if that's determination and it's best if that's made by someone who isn't you, who is made by someone who isn't you, who is health care provider who is methylene health care provider who is methylene blue aware. And I think that that's just blue aware. And I think that that's just really important for safety, etc. The really important for safety, etc. The final thing is that the health care final thing is that the health care provider can help you in combining it as provider can help you in combining it as we said maybe with NAD therapies or NAD we said maybe with NAD therapies or NAD support therapies, maybe with other support therapies, maybe with other therapies like photodynamic therapy has therapies like photodynamic therapy has research with methylene blue. It's a research with methylene blue. It's a very good photodynamic activating agent, very good photodynamic activating agent, so that's one. Hyperbaric oxygen is so that's one. Hyperbaric oxygen is another that helps sort of that O2 CO2 another that helps sort of that O2 CO2 turnover to help the mitochondria, etc.

turnover to help the mitochondria, etc. Maybe just global antioxidant support Maybe just global antioxidant support cell membranes. There are all kind of cell membranes. There are all kind of things that can go on and this is where things that can go on and this is where a NAD aware and informed practitioner a NAD aware and informed practitioner can help you out and so you get the most can help you out and so you get the most