Military Brain Health and Operational Exposures

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And so we're going to talk about very interesting things today, which basically is a framework for understanding brain health, especially coming from the military side as well.

So I can't wait to introduce you to, to Doctor Stephan and co. Brian, I'm so happy to have you on. We've known each other for a little bit, but this is really the first time we're really engaging into this conversation.

At the time, brain health. And when it comes to the military. And so, well, let's just kind of start there. Like what? What really should we focus on?

Like lessons learned from the military? When it really comes to brain health, what should we focus on? So, there's a lot of exposures that are unique to the military operational environment.

And when you break that down, that's the the living space, living environment, but also the training environments and the deployed environments that, are are a higher rates of exposure.

I mean, things like traumatic and non traumatic brain injuries, airborne hazards, toxic, exposures that are related to either heavy metals, munitions or industrial chemicals that were exposed to or even even things like EMF and radiation exposure, are uniquely, higher rates than the average Jane.

But extremophiles is a term that I want to mention. And we learn the most, the fastest from the extremophiles, from the people that have the highest rates of exposure.

So a lot of the lessons that we're learning with the military population and those increased rates of what could be common exposures or more than common exposures, really give us insight into how we can protect ourselves and how we can not only look for check engine lights or early signs of dysfunction and signs and symptoms, early on in ourselves.

But to the people to let the right of us. And how can you have maybe a more productive conversation about, hey, things aren't quite right, either in myself or you're noticing those patterns in the person to the left and right of you.

So, so really trying to make an impact not only on your own brain health and performance. But for those that are around you, and, there was some we have some of at work extremophile, some of microbiology in nature.

So my microbiology extremophiles are organisms that live in the most extreme places on Earth, from Antarctica to the Dead Sea, with the highest, highest amount of sodium. Right.

And they can only be found in those environments, I guess, your version of Sioux Falls is like the military, right? Extreme environments. That. Correct?

Yeah. You got it. So, extreme demands, physically. Mentally. Higher rates of exposure to, environmental exposures, lifestyle exposures. Some of these stressors, I'd say the total picture of stressors that we refer to as like allostatic load.

So in the functional medicine space and community, we talk about the total amount of stressors that are, stressing the system. So when you talk about systems biology, medicine and network medicine, the total number of stressors, tends to be uniquely a bit higher, in the extremophile population, that would be military population.

So, yeah, those lessons learned that knowledge can be translated over to, civilian sector. And the average person, listening to this podcast or listening to this video.

Right. So whenever, whenever we think about things in the extreme right, there's always characteristics of these organisms that are living in the extreme that they've adapted to.

Now, what are people in the military kind of adapt to is in extreme environments, and does that show up later on in their health? Definitely. The acceptance of high rates of stress as normal, and sleep deprivation, chronic sleep deprivation as normal, culturally normative and and socially acceptable.

There was a Rand study, I believe, in about 2016, that highlighted almost 50% of service members, averaged less five hours or less of sleep per night.

And that's mind boggling when you think about it. They had, significantly elevated rates of comorbid, sleep disorder conditions, brain health disorder conditions and chronic pain health conditions.

When you talk about orthopedic and MSK injuries, that is a norm as well. And self-medicating for, what they perceive as, normal aches and pains. So the risk of polypharmacy is, is a bit of a norm as well.

So over-the-counter self-medication, self supplementation, because of the performance demands that are normal. The acceptance of high levels of chronic stress is normal and chronic sleep deprivation is definitely a social norm and a cultural norm, and we're trying to change that.

So there's a lot of efforts to improve upon some of these norms that can be, you know, degrading health and brain health and performance over time.

The MIND Framework: Nutrition and Inflammation

So there's definitely efforts, but, figuring out not only what the biggest impacts are, how to change their culture, but then also how to change the conversation the day to day, decisions that are being made by the soldiers in the day to day, guidance that they're getting from the direct leadership.

Okay. So, you know, earlier, you kind of rattle off a lot of different factors that, can be big time, big time risk factors for brain health. You talk about different exposures from heavy metal exposures, right?

To organic chemicals, inorganic chemicals, pathogens, you know, bacteria, fungus, mold. And then that combined with sleep deprivation combined with an ability to detoxify and combine with not readily available foods, creates sort of this, this giant metabolic nightmare for, for the brain.

So, you know, how can we think about these risk factors and which ones are actually important for brain dysfunction? Is there a hierarchy, do you think?

Excellent. I definitely think there's there's a hierarchy. And, I mean, when you talk about supporting it, when you talk about therapeutic order and trying to support brain's ability to heal itself and the body's ability to heal itself, there's

there's definitely foundational health practices, that should be emphasized or, you know, conflicted or backwards planned to try and optimize now, I, I, had a chance to build out an acronym to share with your audience.

Haven't used it before, but I think it'd be fun, to to use here and share with your audience. And in general, it's ten protective strategies for brain health.

And, a term that I'll use is, is something that came from, some work with a task force resilience that I was part of on the military side of the house, where we talk about and and people, so personal protective nutrition and personal protective lifestyle.

And that became as important as PPE. So we always talk about PPE. And there's an enhanced awareness right now around PPE because of, you know, how Covid broke the world.

But yeah, the task force was actually a directory result in response to Covid shutting the world down. There was budget and health care and human performance professionals that were like minded saying, hey, lifestyle and nutrition have have an important role here.

We and the definitions will help you help you see kind of how our line of thinking got started. So just introducing people, that's the food and nutrients and the activities of daily living that improve metabolic and immune function to reverse disease and optimize performance.

So people the concepts are way bigger than the content themselves. And really what I'll what I'll introduce here is and and people for brain health. So protective strategies for brain health and performance optimization.

So the acronym itself first off acronyms in general are just a fun way of remembering things. They make things easier to mentally categorize. So when you and I are talking about, okay, you know, how do we think about these protective strategies?

I want to lay it out with this funny acronym, mind six mindsets for brain health. Yeah. We go MRI and sex and I'll, I'll just run through real quick, and then maybe we can backtrack, walk through it and and highlight.

You know what? What would check engine lights look like if this was not right. But then what is right look like? And how can I either figure it out myself?

Or where do I go for higher up? Awesome. So starting off with M, more fiber and healthy fats, and when I talk about fiber, essentially aiming for about half your plate of either, veggies and, like, high fiber veggies, some of those prebiotic foods, in particular the roughage, but also fiber containing fruits and keeping it diverse, colorful.

We know it's loaded with antioxidants. There. So half your plate veggies or high fiber fruits, keep it colorful. We know that fiber in general is helpful for intestinal integrity, motility.

And general gut health. But also, that's extremely important for helping with those detoxification and elimination pathways, those bio transformation pathways that, are going to be generally protective when we're going or living into, in or training in toxic environments, healthy, healthy fats in general.

I always start off by saying food sources first. And in general, we know that there's, excellent food sources of omega threes, movers, puffers, MCTs, and your audience hopefully is kind of spun up on those terms already.

But you want to get these foods in context because they're so much like, spills out some of those monounsaturated fatty acids. Right. And the proof of poly is fatty acids. Right?

Okay. Yeah. So some are liquid at room temp. That's the is and that's the EV of extroversion, olive oil, things like, avocado oil. And then mothers, that would be more like margarine.

Or coconut oil. Those are going to be the things that would likely be solid at room temperature. Even even avocado

straight up, would, would be more in that buffer category.

And then the omega threes, people tend to relate to fish oil. And when we talk about healthy fish and also, you're trying to layer in decreasing, additionally exposure to potential for heavy metal accumulation.

There's an awesome acronym called smash. Sardines, mackerel, anchovies, salmon and herring. Wow. I'm surprised I remember that one. I've never had. So that acronym can be helpful for food sources, of fish.

But in general, the smaller the better. The smaller and the easier it is to consume high amounts of omega three acids. The reason I'm saying food first on the healthy fats in particular, is that we're learning so much, new information about the dark matter of food and the dark matter of food in general is other compounds, that either have direct health benefits, that maybe it's coming from the way your microbiome digests them and some of the byproducts of their digestion of these compounds, or it's a synergistic effect of these compounds, plus some of the known compounds that we know in food.

So really food first, healthy fats eat more fiber helps you play make a diverse, you know, make it colorful. So that's the M. And if you're ready for me to move on I'll jump into the I.

Let's go something. Yeah. So in general inflammatory reducing inflammation and addressing chronic infections or stealth infections. And when I talk about inflammation I'll narrow down to inflammatory foods or dietary patterns as well as, inflammatory substances.

The substances is the low hanging fruit. That's the easy one. That's the smoking, which in the military community in general, smoking is bad for use is a, is a norm.

And there's a lot lower rates of smoking over time that, that we're seeing, at least in our current generation. What's the the use of vape is, is definitely going up.

And I'll just generally say, I don't think we know enough, to understand is if it is inflammatory or not, the compounds and chemicals are diverse. They change.

It's hard to truly understand exactly what's in it other than how it tastes. And I haven't I haven't come across an anti-inflammatory vape juice yet. So I would say those would be the substances for the foods.

It's the browned, the fried, the high sugar, the simple carbs. If if it's spiking your insulin, it's likely driving some chronic inflammation. So trying to minimize, the simple carbs, the added sugars, those are things we already know.

And then brown foods, fried foods, burnt foods, even, can be recognized by our immune system as inflammatory, so I'll, I'll leave the inflammatory, part of that acronym at that.

Now, infections, and the stealth infections and the chronic infections, this is where a lot of frustration can come from. And, typically you're going to need higher help if you think this is an area of a problem.

But some stealth infections, viral infections like EVs, CMV, and some Spyro ki infections, even things like syphilis. Now, I can only speak anecdotally to, the military population, you know, military aged males and females that are sexually active.

But we've been finding secondary and tertiary syphilis in individuals that just never sought care, and really well. And yeah, it's either they it had symptoms, it went away with the initial, presentation of, of syphilis.

But, clinically, I can just mention that we've had a couple of cases where they've had either hand in hand lesions that we were thinking about it. So we checked or there was, some cognitive impairment.

And the command teams were just like, we don't know what's going on with this kid. Can you please check? And in checking everything we found and we were like, wow, this is easily treatable.

And it's something that people just haven't been looking for or they hadn't sought care for. Yeah. So the the spark kids like syphilis. There's a lot of spark leads to the big problem with the spark.

It's that there's nonstop load of spark kids. So within the dental areas as well. So, dental hygiene is, is huge. And as you see, these same spark hits in the dental plaques and a lot of, people as well, I mean, literally, they just burrow into the brain.

They, they go directly to their cities. Yeah. And so that's preventative. That's that's kind of more common type of, spark eats a lot of the holistic of biological dentists.

They will literally put the plaques in the slides. And I've seen mine because I've had spark kids before. And they'll, they'll, they'll look at that and it's, it's literally like spiraling around like a corkscrew and it's moving, really high pace, fast food serving under a microscope every meal.

Well, those that do actually burrow into people's brains over, over time. If you've developed Alzheimer's and then on autopsy, you can see the same living spark hits that are actually in the brain as well.

And so but dental, dental health is, is is huge as well. Yeah. Just for the spark kids I, I need to start associating with some, biological dentists. Maybe maybe a link of, how I can find where.

Yeah, there we go. Right. And then the the other area of infection that that will, cause a lot of problem for individuals can be the intestinal parasites and military community in general.

We talk about the traveler's diarrhea. But they're there over in, in diploid settings or, in, foreign foreign countries that eating local water, drinking local, sorry, drinking local water, eating local meats, and bathing in, in local, you know, water.

And they come across with issues that, hey, I've never been quite the same since that deployment or never been quite the same since that intestinal infection.

And there was some an interesting study in Polish soldiers that were deployed to the same Iraq and Afghanistan, regions that our soldiers were, where a surprising number of them were coming back, which and Jody in particular, with a majority of the, the number that they found being asymptomatic, so when you start talking about intestinal parasites, that are either non commensal or potentially non commensal, meaning like they, they might not be supporting your health.

They, they may actually be causing problems for your intestinal health or general health. Jihad is up there. At least with the military population, even asymptomatic or not previously symptomatic.

A lot of these parasites they hide in, they they cause just like a low level, like immune response. It releases histamine over time, which makes people have, like, brain fog and fatigue.

Right. And these parasites over time, like, disrupts the hormone balance, lowers the testosterone, the military personnel, you know. And in military women, it blocks progesterone receptors.

So all these receptors, the things that make the brain function well and that could be caused by low lying parasites. Now, the only reason I know this is because I started looking for them, in, in, in people either with an active, active military duty or recent deployment.

Right. And they come back and it's a surprisingly high number of people that actually have this. And the regular parasite tests that we get, can't even find it is a problem with this war specialty microbiome test.

But, yeah, you're nailing it. The standard tests don't find it. The the the history and the and the, you know, person in context, over time just screams, hey, something's wrong right around this time frame, right, right here. And it's been wrong ever since.

And the standard tests just aren't picking up on it. So I like that one. A Navy Seal that came and oh never. Course, I'll never forget this. And he was never right after, deployment.

But he basically, long story short, had, developed Parkinson's syndrome and tremors online yards. I mean, he's to 40 years old, is pretty young, right?

And so, long story short, turned out to be a parasite that's actually in his is a naval scientist. It's been there for years. For years. Right. And what, I have to give a lot of credit to dentists and EMC doctors for for even culturing that.

And, and you had to get certain surgical removal of some of the, the necrotic areas that the dead air is there. But my gosh, like, you know, maybe two weeks after surgery, this guy's like a different person.

He's like vibrant. He's not the press anymore. You know, at some of these kids, it was such a beautiful thing to see for transformation process. He didn't have dark silk around his eyes anymore.

And so parasites are a huge deal with them. I'm starting to realize that in the military population, so, so happy that we're talking about it. So, you know, people who are listening to this, most people listening to this probably either is in the military, wasn't military, or has family in the military, who are listening to our, this.

But if you have family members, you have friends, that are experiencing cognitive issues like these infections are so hard to find. But really take some dedication to, to keep going forward and not give up, especially when it comes to New York kinds of issues, you know?

Infections, Nutrient Gaps, and Dysbiosis

Yeah, neurologic, brain and cognitive, but then also, inflammatory based and like, immune based, issues, whenever that gut gut hasn't been right since, especially if it's around in deployment, like go get checked out and consider some, some specialty lab testing because standard lab testing available through military health system like, doesn't always show it.

As same goes for Lyme. Lyme is another one of those that can cause, a lot of frustration because the standard labs, the standard screening assessments, like don't always catch it.

And if it's, walks like a dog smells like that, talks like that, you know, then it's like, hey, okay, maybe I should do a specialty lab test in here. Yeah. All right.

Lyme disease is called the master Mimica of health. Similar to syphilis. And they're both Sparky, which means the under microscope, the spiral. So Lyme disease, can look like anything.

And a lot of times, you know, people are diagnosed with psychiatric conditions, Lyme disease, bipolar disorder, schizophrenia, and the people who have been an active combat get diagnosed with that more readily than those who have it.

Right. Because the kind of, you know, chalk it up to to being a combat veteran or something like that, right. And we've found a lot of these people have actually like Lyme disease and all these different things.

When we get treated, they get significantly better. But I'm so glad you mentioned that was awesome. Yeah, yeah. And you can't talk your way out of those issues right there.

You just know. Yeah. All right. So nutritional deficiencies is the and and nutritional deficiencies in the military population in particular. There was some studies that showed at least 70%, the military individuals that they, that they include in the study were vitamin D deficient, like deficient less than 30.

Now vitamin D and magnesium tend to be ones that across the board we can say, hey, there's lower sources in

food. If, if you're not regular in regularly eating higher magnesium foods, with dark leafy greens and getting out in the sun or taking vitamin D supplementation, then across the board you can kind of, start safely there.

But there's other nutrients, micro micronutrients in particular, that I want to highlight some relative insufficiencies that are important to address because it's the difference of going into a toxic environment and being a sponge versus building your building your force field and making sure that, some of those heavy metals or, other toxin exposures don't, don't cause a problem.

Things like zinc, selenium, B vitamins, and, Yeah. So, so I may kind of backtrack on that one, but, the zinc, selenium and B vitamins in particular, even iron, and calcium can be relatively insufficient, especially if you've been treating, chronic acid reflux, especially with over-the-counter acid reflux, medications or even prescribed, acid reducing medications for years.

Yeah. Relative insufficiencies here will create gaps and needs for, either two plus or three plus ions that, hey, heavy metals tend to look exactly like that.

And, let's just use the example of vitamin D deficiency or insufficiency. So if you're vitamin D insufficient or decision and your calcium, is coming from bone.

So there's high bone turnover rates and there's a relative insufficiency of calcium in your body. And you're doing a lot of range time and you're getting a lot of lead exposure.

Then your body will look at lead as calcium and immediately, start putting it in, depositing it into your bones because of that high amounts of turnover already.

Now, one protective measure here is just making sure you get plenty of vitamin D. And it's not just sufficient, it's it's optimal that we're aiming for.

So just using vitamin D as an example to where that calcium metabolism can create, a need and can be leveraged for protection if you just have enough.

So I just wanted to kind of highlight that one as. Yeah. Okay. So that's something that could easily be addressed with a high quality multivitamin and vitamin D, something like 4000 to 5000 IU per day.

And and that's super safe starting point. But that's just checking off all the boxes. And once again, that's the difference between whether or not you're going to be a sponge or have your forcefield built up going into these environments.

And that could be the difference between, a good outcome and a poor prognosis, after a traumatic brain injury, things like that. You know, your brain's ability to heal.

Next, I was going to roll into dysbiosis. And, when I talk about dysbiosis in particular, there's kind of three main categories I tend to talk about with my patients.

Candida in particular, fungal overgrowth. Whatever. You define dysbiosis first, what's the definition of dysbiosis. Yeah. So that can either be, unfriendly in, in the intestinal track or Friendly's in the wrong neighborhoods.

And I try and I like yeah, I like that. So I only use it and I use an analogy of cats that I'll mention in a second here. But in yeah, in general, I really just mentally categorize into those two buckets and say that, hey, unfriendly is in the wrong neighborhood, is like cats when you start feeding them at your front door.

Like what happens when you feed stray cats, they multiply. And it's almost like they tell other cats that, hey, food's here. So you start getting cats around the neighborhood when they really shouldn't be.

And that's the analogy that I talk about when we're setting the stage for intestinal, small intestinal bacterial

overgrowth. It can even be healthy bacteria that should be in the large intestine that is just baited and given food sources higher up in the track.

And that's feeding the cats higher up in the track. So they're overpopulated in the wrong neighborhood. And that itself can cause a lot of problems. So Candida, fed by, by simple carb foods and sugar foods, and foods that, Candida actually will stimulate your body to crave more of, in the setting of high fungal burden historically.

So athlete's foot jock itch. Maybe they've got some thrush or a little coating on their tongue and they've got some rectal itching, and maybe they've got some good stuff and some sugar cravings and, you know, we'll consider it.

So that's something that you kind of test for. You can start some dietary strategies and some herbals and nutritionals to, nutraceuticals to try and address that.

So it is one of those and then, small intestine causes that, and whenever there's this dysbiosis, candida overgrowth that signals to the brain to, hey, give me more of that stuff.

Can you give me more the, more the, the stimulating foods. And this is why people are addicted to, like, Doritos and Cheetos. There's so much energy in it because it is really addictive.

Plus, there's process carbs in there, and that stimulates that dopamine to continue to drive. But that causes major like insomnia and worsens PTSD for those who experience it.

The worst is my poor disorder emotionality. Right. And so, yeah, all those things, man, they they come from the impairments of the bacteria that's in the, in the, in the gut and even in your microbiome, even the sinuses, as well, you know, there's, there's there's so many things that affect like the gut bacteria, outside of food, as well.

Right. And one of the things, that I want to ask you about is overtraining. Overtraining is one of the major stimulators of dysbiosis and bacteria. Right.

And so what are we building as well? Yeah. Yeah, yeah. So what is that like in in the military population, do you see people like just being pushed to like a lot of training.

And then they come back and all of a sudden you have to sort of exposure as you have this for this, dysbiosis going on and their bloated, brain fog and fatigue afterwards.

What is that like? Yeah. So notoriously, there's certain training environments and training pathways that will push people beyond the max. And it's literally to find their limit.

And it's all voluntary. So people are able to quit at any time. But it's that mental fortitude that will, the mental fortitude in being part of the group of others that are looking at you as like, don't you dare quit, to where people will push themselves beyond their their body's ability to, to recuperate as fast as needed.

And everyone's, you know, different on the spectrum of, gut health to start off with. So, yes. Intestinal permeability. Well, there's, there's studies that have shown, during phases, like Ranger school, during, phases, like, going on 20 mile ruck marches that there will be, intestinal permeability at the end of that.

And dysbiosis can definitely, well be, you know, the resultant of that. I don't have that awareness on, on the literature, but there is a DoD microbiome, consortium that is thinking on that and doing studies around this.

And they're looking at these extreme environments for performance, extreme environments for environment, and how that impacts the microbiome. So there's some really exciting stuff that they're doing there.

And if there's an opportunity to share that with you, I'll try and share that with you in the future. Here. Amazing. Awesome. Yeah. Now, an interesting thing around that is that the intestinal permeability that results from this, this high physical demand that can lead to food sensitivities, for some of the common foods that we use to refuel and,

and, basically recover from those intense performance periods.

So things like dairy and egg, quite literally may be very common food sensitivities that you'll find if you look for them. And it might be the body's normal adaptive response to this overtrained period where there was intestinal permeability transiently.

Yeah. So yeah, you might find some interesting food sensitivities there. The sensitive that time, but not necessarily in other environments. Right. Yeah.

So when we see this so much in insomnia and PTSD, the general population. So if I were to test somebody who's super irritated and has really bad PTSD, their lives will be positive for everything that they react to in food.

But in times of like home in distressing or I will go negative. This and we see this because our body is always a moving target, you know, and there's sort of this misconception is I'll link to this food ontologies intelligence forever will not necessarily, you know, and and we have to appreciate the bodies for the ability to kind of come back and fight back, you know, and yeah, there's plenty of things that can tell the immune system to calm down, stop being reactive, and stop being self reactive, and rebuild the gut integrity, because that gut integrity can bounce back pretty quickly as long as it gets the right nourishment and the right time to relax, recover.

Absolutely. So, you know, the we talked about setting the stage for small intestinal bacterial growth. I think lactose intolerance is one easily overlooked and commonly overlooked, thing that can set the stage, for something like small intestinal bacterial overgrowth or even Candida, to where you digest that lactose poorly.

It's now a viable food source all throughout the small intestine, beating some of that bacteria from the large intestine and feeding some of those, fungal components like Candida that, that feast on some of these sugars, these natural sugars.

So that's an interesting let's, let's break that down for a little bit. So for those of you listening small intestinal bacteria overgrowth. So, in our gut we have the stomach, we have the small intestine, we have the large intestine.

So, majority of these bacteria are supposed to exist within the large intestine. And the small intestine, for the most part, doesn't have any organisms or very few organisms in it, unless there's times of high stress or eating inflammation, the bacteria will overgrow into those areas.

As sort of almost like a compensation mechanism. The first mechanism is that whenever in times of stress or training, there's less blood flow to the gut.

And so, there's less digestion, there's less stomach acids produced. So when people are eating on a run and the faster you eat, the more bloated you get.

Well, that's because bacteria tends to overgrow in the small intestine. And the byproduct of some of the bacteria is gas, such as hydrogen sulfide or methane.

And so what we're talking about is the mechanism that's really behind this. So yes, training is a big part of it, right? Eating poor quality foods is part of it.

Eating inflammatory foods is part of it. You know, to those probably doesn't doesn't doesn't help. You know either. Right. And then eating up and not just that, but alcohol consumption makes that a whole lot worse, as well.

And then pop in Tums just makes it worse later on as well, which I see a lot of that and habits. So yeah, absolutely. We write this in and you know, work connects to the brain.

Is this. So these small intestinal back to overgrowth and in turn these these gases gets create as methane gets created. It actually stuns the gut. Right.

So well that's a shame because the if the gut is stunned, the gut cannot activate serotonin. And so people get get focus on dopamine, which is the addictive neurotransmitter excitatory transmitter.

Right. It's also the angry and emotionality neurotransmitter as well. And so this is where sort of that the bipolar, you know, labeling kind of hits is that people have sort of this bipolar tendencies of depression and mania, and there's a lot of like gut issues.

So, yes, like healing the gut issues can resolve a lot of these bipolar, tendencies. As well. And so and this is I think this is just really heavily missing within, all of psychiatry is that we really need to focus on not just labeling them a disease and give them a medicine, send them home.

I out what the root causes is going on, you know? But, you know, that's the reason we have these summits. But yeah. Yeah. Go ahead. Definitely. The other, the other, understanding that I try to arm my patients with is what is a microbiome disrupting event.

So if they can understand that, hey, intestinal infection or an antibiotic course, especially six months or nine months of anti-malarial, doxycycline, something like that, where they get an antibiotic exposure or intestinal infection.

There's a unique opportunity for dysbiosis right there. That's microbiome disrupting event. And when you talk about these intense, physical performance, training demands that that could generally be in class, you know, categorized as a, microbiome disrupting event as well.

And once again, that D. O. D. microbiome consortium is likely going to come out with some good information about microbiome disrupting events in general.

So whenever they can identify a micro microbiome disrupting event, then how do I support, you biases and how do I support good microbiome health right around that time, or at least recovering and rehabilitating it?

Now there's some there's some conflicting information about whether probiotics would be helpful during, the actual either intestinal infection or the antibiotic course.

But there is, good evidence that talks about, friendly fungi like Saccharomyces baladi that are antibiotic resistant, and that could be started at the same time.

So, yeah, as you're taking the and let's use antibiotics as the specific example, as you're taking the antibiotic course, you can jump on a probiotic that contains Saccharomyces baladi, friendly fungus because it's relatively resistant to some of those, those, antibiotics.

But you could also start a prebiotic focused, dietary regimen so you can incorporate more prebiotics, and that'll help support good, healthy microbiome that's present, whether that's still trying to recover.

And you can, repopulate with essentially a, friendly fungi containing, probiotic. Now, once you finish the antibiotic course, I usually focus on at least two weeks of at least 10 billion CFU, per day.

And the, the sources can be diverse. But we'll usually get something, something prescription greater over the counter and at least 10 billion CFU for at least two weeks.

Once again, with military population, I think the frequency of microbiome disrupting events is so, so high that you want to create a good foundational base that has both healthy fungi as well as healthy bacteria, and as a foundational base for the microbiome.

So in creating a resilient and resistant microbiome, I think that that, healthy fungi is something that we're going to start hearing more about. And then I definitely talk with about my patients.

Yeah. I'm so glad you brought up second bases. Baladi. Because we know that supplementation has a massive

effect on mental health improvement, mental health and quality of life.

It actually decreases chronic inflammation, chronic pain as well decrease oxidative stress. And we actually did these studies on some pretty end stage, brain disorders like multiple sclerosis and Parkinson's, as well.

So we know there's a gut firing connections. Right. When we talked about the microbiome disrupting events are the same thing as the brain disrupting events.

There's no difference, you know, and that's really important to to know. And the same things that we're feeling, the gut is going to heal the brain as well over time.

And so and I'm really excited to get this out to the military population. Because since, extremophiles. Right, living in extreme environments, going under tremendous amount of stress, doing things that, regular people do not do.

And I think this is, this is certainly the one of the most important topics and that's, that's not talked about, you know, very frequently.

Sleep, Hydration, and Elimination

And I'm so glad that you're, you're you're one of the few that's on board to talk about it. Yeah, definitely. Hey, one important disclaimer that I want to make that, I'd love to ask your team to kind of put up front, as much as possible is that the views and opinions I expressed are my own.

They do not represent that at the DoD, the military health system, or any governmental agency. So I just once again want to want to highlight that I'm speaking from my own personal experience, my own personal perspective.

Yes. Right. I think, and my pleasure, just for time situational awareness. How are we doing? I can blast through the last three, and then we'll work through it.

Let's go. All right, so the next one is, being able to track your sleep and stress on wearable tech. So things like Garmin watches or rings, there's plenty of other, other options.

Hook is another device that we're seeing some groups use in the military, military community. Now, any thing that can measure and evaluate accelerometer, so whether like your, you know, step counts or movement throughout the day, or even throughout night, so movement hr v and an added bonus if you can track oxygen levels at nighttime as well.

So I'm, I'm bringing these three capabilities up in particular because, they're being consolidated, to create composite readiness metrics and composite kind of recharge recovery and readiness, numbers that you can look at each morning and make a decision of, how hard should I go today?

How well is my body recovering from what I did the previous week, the previous day? Is and it gives you such good insight to see yourself on the impact of the decisions you make day in, day out of what you eat, what you don't eat, what you do.

And how you recover. Now quantity and quality of sleep is dependent upon, you know, how stressed your body is throughout the night as well. And in the military population there is such, surprising incidence and prevalence of sleep breathing disorders and sit otherwise fit, maybe even like, extremely healthy appearing individuals.

There's sleep breathing disorders, especially in special operation community there where they've got, a tremendous amount of like blast overpressure exposures and, traumatic and non traumatic brain injuries.

The risk of and the impact of sleep breathing disorders is such that you want identify it if it's a problem. And, my threshold for sleep studies and polysomnography is like ordering a sleep study on those individuals is extremely low, because I want to know if it's a problem.

I want to know that's it's significantly, undercutting our ability to heal and our ability to to improve brain health, or maintain it over time. Yeah.

So sleep studies are something that I think everyone should get, almost like a, as a before I even join the military. I wish, I wish that's one of the screening tools because, and, and bleeding disorders and obstructive sleep apnea.

So then comments one on one for humans, right. And so and that's, that's probably understating it because, you know, our jaws have changed over the last 200 years.

Our sinuses have changed in the last 20 years. The structures or faces change over the last 20 years. So because becoming much more prevalent in the population, and now we're understanding that it may be very independent of, obesity, weight gain, large necks and stuff like that.

It is because there's other soft tissue structures, within the, the oral cavity and the nasal cavity that can create obstructions and even in the trachea as well.

And so, and so this this goes back to my story, 2018. We actually, did brain mapping, with quantitative EEGs on the PTSD population, from the VA hospital here in Houston.

And we had this whole program that we actually did just just brain screens right within the PTSD population. So we have over 500 people on, on those, on those scans.

Right. And, 500 out of 500 actually had obstructive sleep apnea. That's ridiculous. They're already get this. They're already diagnosed with PTSD. They're already they're already diagnosed with like mental health disorders.

So this is sort of the population that the medicines the work. Right. Right okay. And the therapies didn't work. Right. The group sessions didn't work right.

The peer session work. So we're talking about the actual population. Yeah. And guess what. When you treat the sleep, you know a lot of them get significantly better.

And it's so rewarding to to to see that really open my eyes. I'm like, oh my gosh, I think everyone should get screened with a sleep study prior to going into combat.

You know, I think that's really 100%, hey, I, I strongly support, that that especially after hearing 500 out of 500, that's like impressive. Oh, boy. All right.

So, yeah, your ability to see yourself, readiness, recovery, nighttime sleep, quantity and quality, critical for brain health and performance and ability to do that with wearable tech, even just to see trends over time that provides you the opportunity to self experiment and make some different decisions.

You get to you get to see the impact of whether you do chewing tobacco or not before bedtime, whether or not you, you know, how you sleep and how stressed your body is after a drink or two before bedtime.

You know, do you really want to have those two, two drinks before you have to go be, you know, ready for optimal performance the next day? If you know that, hey, your response to it is this, throughout the night and how you feel the next day.

So, yeah, you start attaching data to how you feel and the mental clarity and the physical and mental performance the following day. And you get to make some different decisions with good, information.

So next area is elimination habits. And when we talk about protecting the brain from some of the toxic environments or the training exposures, the deployment exposures, making sure we're not a sponge and that we've got a force field that we're building up.

You want to ensure that bio transformation pathways and elimination pathways, specifically the urine, sweat and stool are flowing well, that the exit pathways are unblocked and things are going good.

A lot of individuals, not just military population, walk around chronically under hydrated or even dehydrated. Now think about how often you walk around with some dry mouth, chapped lips, you know, knowing that your bottle of water is sitting at the edge of your desk, but you haven't touched it all day.

You know, that's just a byproduct of our busy lifestyle here and and oversaturation with tasks. However, that directly translates to your ability to, make urine offload, metabolic byproducts, to sweat and sweat efficiently and effectively.

That's that's ways we get rid of some of these industrial chemical byproducts that your body has metabolized successfully and is now trying to eliminate.

Let it, you know, help your body get it out of the dance system. And, with regards to, a goal for hydration, for an active community, for the military population, we say, hey, take your weight and pounds, divide it by two.

And that's your goal for ounces per day. And that's a good starting point if you don't know any different. And that's a great starting point. But once again, knowing some of those symptoms of, relative low hydration status, that'd be good.

And, the color of your urine in general, it shouldn't be so dark. It can be a little bit color, you know, colorful, especially if you're taking your daily multivitamin.

But by all means shouldn't be, you know, brown or, dark orange. Now, stool in particular, we talked about, fiber and for, for a goal of fiber, we talk about 25 to 35g of fiber per day.

Diversify the sources of fiber. And a plant based fiber, you know, vegetable based fiber is excellent, in food, in context, is a great starting point.

But in general, have you heard about the sesame seed test, where essentially, you know. Yeah. A way of checking of either how constipated you are or how good intestinal motility is.

You take, half a teaspoon or a teaspoon of sesame seeds, and you see how long it takes for for your body to eliminate it. And it come out the other end.

Okay. In general, in general, you know, really good is less than 24 hours to start seeing some, some sesame seeds. Now, if if it's approaching 48 hours, you haven't seen any sesame seeds.

Like, you just start asking you questions of why do you need more fiber? Do you need more fluids or movement? Fiber, fluids? Movement can help things along.

And if you're still unable to, improve things, get help, ask you know, ask questions, seek out clinical support and find out you know what's going on.

How can I support gut motility? Is there any blockage I should be aware of? Help me look. So, yeah, unblocking that that stool and, exit strategies for those bio transformation pathways.

So one of the most compelling reasons for hydration and stool is that anybody listening is a runner. You'll know that if your gut is not right, your your your split time is terrible, for running.

And actually it has to do with reaction time and brain function. As well. And so if you're dehydrated, just just by, you know, 20% dehydration, by the way, most people walking around these days where 80% of people walking around these days are, are dehydrated right there, you know, and, and even with, with, with just 20% of your hydration over a 24 hour period, the reaction time and the human reactions and visual reaction time increases by 400

milliseconds.

That's a life or death decision making process. You know, with the military population. And but more importantly, the longer you go dehydrated that that doesn't just linear goes exponentially, goes up in terms of the reaction times.

So it takes longer for for you to react. So that's a that's a that's a very huge issue. You know, water and hydration is is so crucial to, to the human body.

And there's two reasons for them. One, okay. What can I just say? Okay. Well, good water is good for me. And it helps hydrate me and stuff like that. And my cells can work. Right.

And two, this is more of a recent discovery. Adequate hydration is the only way we can flush toxins from the brain called the lymphatic channel. And these lymphatic channels. Yeah.

The the, the the mirror, the gut. So if you have, like, leaky gut, you have, like, leaky brain, the same, the same construct. And when you have gut dysbiosis, leaky gut, those lymphatic channels in the brain, they look almost identical.

And these, these cells, class of size, they just get bigger and bigger, bigger, more things filtered through. And so these toxicities can build up in the brain.

And then what happens over time is you go you go into deployment and boom something happens right. Whether it's concussive injuries from other brain injury right.

Or what are the individuals going to have been the brain. Maybe it's, it's limb, limb, limb wounds. Right. Your immune system just revs up, and then the brain just goes into this, this, this like napalm effect of of of, of auto immune response and this is where the brain fallout can really occur.

This is kind of what happens with, with Covid 19 when when humans are exposed to the spike protein on Covid 19, we're seeing these curves post-Covid syndrome.

And it's similar to systemic inflammation due to systemic inflammation from people who are already triggered to be inflamed. And in the first place, right.

And this is so important for people, you know, prior to deployment to really understand that I just can't stress this, how important this, I love this conversation, how we're talking about hydration from a both a brain protection and a brain performance perspective.

Especially the studies that you were talking about with, adequate hydration leading to a 400 millisecond difference in decision making time. That's huge.

Thanks for mentioning that. And that's impressive from so, last one being exercise. So that's that's my ex for the, for the mind six acronym. Is that exercise. Two things in particular.

So I mean yeah, we know the general recommendations that moderate intensity for most days per week, at least five. From previous recommendations for like cardiovascular type exercise and then vigorous intensity or resistance exercise training for at least two days per week.

There is some overlap of the protective benefit and the metabolic benefits from both cardiovascular exercise and the resistance exercise. And you've even got blends or types of, training regimens that can that can hit the benefits of both, like high intensity interval training, to where you can get cardiovascular benefit as well as resistance exercise benefit, but in general anti-inflammatory, it increases antioxidant capacity.

And the, the increase in that burden for brain derived neurotrophic factor, which is Miracle-Gro for the brain. You're not only doing brain protection, you're.

Yeah. That's it. I never heard Nicole grow up for the brain. That's true. The heart is. The more the brain. Yes. Yeah, yeah. So the metabolic impact, the the brain protection and brain performance, impact of exercise is just something that can't be understated.

So that that benefit sticks around for 48 to 72 hours. So at least one out of exercise every 48 to 72 hours. And once again, you can get creative and you can minimize time and even equipment necessary.

Things like tomatoes, things like, high intensity interval training can really, be, one stone in several birds like you can you can minimize that time and equipment burden.

The the other thing that I'll mention is that, yes, you can definitely overdo it. And we talked about it.

Exercise, Recovery, and Brain Performance

The training pathways that taxi individual to where there's, detrimental impact transiently, on gut health, brain health, overall body health, hormonal balances, metabolic function like across the board.

That's where being able to track your sleep and stress matter. And that's where being able to, see your composite readiness metrics in the morning matter.

And that's where being able to make a determination. Hey, is today where I go for my PR, or where I go for that really long run ruck? Or should I find a more restorative, restful recovery type exercise, going for, you know, walks outdoors, more of a stretching and self-care regimen.

Or should I go sit in the hot sauna for some cardiovascular benefit instead of, really pushing it to the max today? So being able to track with that wearable tech can definitely help you understand if you're at risk of overtraining or you're currently in an overtrained state and you need to rest and recover, and prioritize those, that's, that's kind of the big scale on exercise here.

But, I do want to highlight, another opportunity for physical activity and specifically mindfulness based physical activities, things that require intentional focus, and cognitive, high cognitive demand in order to perform things like archery, things like golf, things like table tennis.

I've even had patients that did bowling and that was like an enjoyable hobby for them, but we identified it as their mindfulness based physical activity that they could use as a yardstick, they could use as a yardstick for determining whether they're having a good day or a bad day, and whether they could track progress over time.

So they, they then utilize that as, as, yeah, hey, we're doing these interventions. Let's number one get you back to it and doing it regularly because it's something you enjoy. And we're we're going to prioritize joy.

That's an easier way than just trying to de-stress. So rather than just focusing on minimizing or reducing stress, we're going to focus on prioritizing joy, putting it on the calendar.

What's something enjoyable that you've done in the past? And yeah, it's dual purpose or even triple purpose activity. So for for me, I always try to identify what's that mindfulness based physical activity that, that you do or have done that you enjoy, that we can use as a yardstick and we can get you back to doing, to assess yourself, but also track progress over time.

Do you have, any specific examples that jump out to you? Something that I'll tell you what. I think there's a lot of research done with, some of these activities, especially like Tai chi and qigong, with the Chinese martial arts.

And you're not just bringing mindfulness, you bringing breath to it as well. And we're seeing, amazing amount of data for, increasing and literally that you can increase thing that grows brain by doing some of this stuff, sometimes a lot more.

And then, then that hit exercises and in high intensity training as well. And so, there's I think there's multiple reasons to this one and kind of goes back to the lymphatic channel earlier, where the brain is able to detox to sort of the circular, type movements and then to the breath.

I think most of us kind of, breathe in with our chest up and then raise our shoulders, let's say the deep breath. And really, the true deep breath is expanding your belly out.

Right? So a lot of these exercises require, like, belly breathing to move the actual air, which has huge physiologic changes on the brain, massive changes on the brain.

In fact, there's studies showing that breath techniques changes over 100,000 gene expressions for the brain after about five minutes of a specific breath.

Techniques. Right. And so so this is, absolutely huge in developing that resilience before deployment. This is super preventative, for for, for a lot of things.

But developing that deep brain resilience. So another another interesting that came up is that so some of the stuff you're talking about go and specifically and and some other stuff that actually, shows, improve the cerebellar connections.

So cerebellum is part of the for part of the brain. Yeah. That's, it's under the, the major part of the brain, all the super cortex and the cerebellum.

What I was taught was, was like a balance center, that of a body. But actually it does a whole lot more. It coordinates the rest of our heart concept order systems.

So cerebellar training has been huge implication, in like, PTSD, an early cognitive, dementia and stuff like that as well. And so I think there's, there's true there's a true purpose to these, intentional, exercises in that we're actually engaging higher order thought processes of brain rather than just, you know, running and, and stuff like that.

So I think that's that's an amazing thing. Real quick on, on the topic that you're mentioning in this cerebellar activity, we had a cerebellar expert, from Stanford Brain Performance, clinic, talked to a virtual learning lab collaborative that we had on Warfighter Brain Health, and he explained it very simply that the cerebellar it's job is to predict and coordinate and predict where things will be at in space and where you'll be at and your body will be at in relation to that in space and time.

And its ability to predict is reliant on your ability to focus and pay attention. And then its ability to coordinate is based off of brain connections and neural connectivity.

So by all means, it's it's integration into every function is extremely important. And such a window into brain health and brain performance, that can change minute by minute, hour by hour, day by day.

So there's a fantastic opportunity with some eye movement tracking technology. Just new companies that come to mind, that I know that are used in some of our circles is right, IQ and, I sync by sync, think, both of both of those, technologies have been incorporated, but it tracks eye movement technology, eye movement, and ability to track.

But really, what they're assessing is cerebellar function, your ability to maintain attention and focus, predict, you know, incorporate that information into your cerebellum, cerebellum and the simple action of following a, a target.

So I think that's something that we're going to see utilized more to assess readiness, prior to high demand activities, no fail. You know, no fail activities.

And that can be a window into brain health, that might have been impacted by poor sleep the night before. Two drinks. Three drinks the night before. What you eat for breakfast that morning?

Like little things can impact your your cerebellar and brain activity. And we can see, real time changes with some of these technologies. Yeah. The knowledge that's going such a long way.

Yeah. That individual brought up another thing that I think is extremely helpful and important that we're going to that we're going to see some changes in practice, with post TBI return to exercise, specifically return to cardiovascular exercise.

So at the Stanford Brain Performance Center, they, they have their collegiate athletes come in typically within 24 hour period of a traumatic brain injury from whatever, whatever sport they play.

They'll get into the center and get on a stationary seated bike and they'll start doing some cardiovascular exercise. That we know reduces inflammation, increases antioxidant, it reserving and capacity.

And, once again, that PD and component goes up. There's some endothelial growth factors that, also help support that recovery and regrowth of not just the the nerves themselves, but the vascular, components that, that supply those nerves.

So there's some benefits and some brain protective benefits and brain healing benefits that they're seeing with early return to cardiovascular exercise.

That's not part of the standard care right now. I'm excited to see it phase, in phases, become more standard practice. But once again, starting simple, starting safe, something like a seated stationary bike and managing the expectations of the individual saying, listen, your symptoms are going to get get worse during this, this bout, let's just do a little let's see where you're at right now.

And we can use it to help heal, but we can also use it as a gauge of how you how are you doing over time? I mean, you talk about something like that, plus eye movement tracking technology, which can show, change, you know, and change in course over, few days.

I think our return to exercise, return to performance, return to training protocols are going to change pretty significantly in next few years. Wow. So that's going to be exciting to see when we're able to execute a lot of these technologies, within these populations.

Well, I would say it's a wonderful conversation with you would talk all day long. Yeah, that was fun. But I think that yeah, the the big takeaway is that, you know, within the military population, there's so much we can do for for total body health and brain health. Right.

And mental health as well that it doesn't necessarily, you know, have to be the it doesn't necessarily have to be a losing battle when it comes to brain health.

You know, we have our brain. That's the amazing ability to heal. And we have an amazing ability to look at the brain in ways we've never looked at before, using technology.

As well. And, and I want to thank you for what you do. I mean, you're doing something that nobody in the military talks about, which is, you know, and, and the ability for you to, to get this information from a functional, perspective, to that population is absolutely extraordinary.

So I want to thank you for what you do. Thank you. Thank you. Got to say it. We're not talking about it yet. And there are definitely pockets and groups that are that are being trained and seeking out this information, this knowledge, and incorporating it immediately.

Because once you know it, you can't unknow it. And once you know it, you start incorporating it to save lives and help people and improve quality of life immediately.

I know you're doing that with your population over there in Texas. And then, with your reach, some things like this. I

just thank you for the opportunity, to share some of the lessons learned and some of the experience here.

Really appreciate you. All right. Appreciate you. All right. Thank you very much.