Quench Your Brain's Chronic Inflammation Today Transcript

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Introduction to Brain Inflammation

Welcome back to the Heal Your Brain Masterclass. I'm your host, Doctor David Jockers. And today I've got the honor of interviewing Doctor Peter Kan. He's a good friend of mine.

We're talking about quenching chronic brain inflammation, which is so key to healing your brain. And Doctor Kan is a board certified. He's board certified in integrative medicine, functional medicine, and board certified chiropractic neurologist.

He's a creator of neuro metabolic integration, a science based program that identifies the root cause of autoimmune and other chronic conditions. His website is askdrkan.com today we're talking about quenching chronic brain inflammation, which is a key to healing any sort of neuro inflammatory condition.

And we're talking in particular about major signs and symptoms of brain inflammation, the root cause factors that drive inflammation in the brain. We're going to talk about the gut brain communication process and how critical that is and how it plays a role in autoimmunity.

And we're going to go through the roadmap to reduce brain inflammation and turn on neuroplasticity. You guys are going to really enjoy this. So without further ado, let's go into the interview with Doctor Peter Kan.

Doctor Peter Kan, one of the most brilliant minds in the functional health space, somebody that I always enjoy my conversations with. Today we're talking about brain inflammation.

Huge topic, something that you deal with a lot of individuals that are suffering from the consequences of brain inflammation. So let's start by talking about really what brain inflammation is.

What are the common signs and symptoms that people may experience if they have brain inflammation. Well, David, always great to, be on your show. Thank you for having me.

And, yeah, brain information is a really common problem. And, you know, a lot of people don't realize the symptoms that they have is actually attributed to brain inflammation.

Now, realize that brain inflammation can be a mechanism for why someone has the symptoms that they're having. And in the most basic sense, brain inflammation.

Simply means that the neurons in your brain or the structure in your brain are inflamed. Now, to further clarify that inflammation is not a dirty word.

It's not a four letter word. Inflammation is a natural response. It's an immune response that your body use to either try to get rid of a pathogen or try to clear up cellular debris.

Signs and Symptoms of Brain Inflammation

So when you have inflammation in your brain or anywhere for that matter, the question is ask what's driving the inflammation, right? Is there some kind of damage or injury or infection or some kind of process driving inflammation.

So so inflammation in the brain then can cause symptoms. Now there's two categories of symptoms of brain inflammation there. There's a general systemic symptom that kind of covers the entire brain.

And there could be a localized symptom that can be related to brain inflammation. So the overarching the the

systemic, if you will, of brain inflammation symptom will be your fatigue.

Now a lot of people think, well, fatigue is not an energy problem. One of the first thing I do is I educate people that fatigue is a brain symptom, right?

Like when you experience fatigue, you're not experiencing it in your bicep muscle, right? Because if you have weak if you have weakness in your bicep muscle where you can't live, that's a muscular weakness.

Now, that could be caused by a nerve pinch C5 innervated bicep. So if you have C5 discrimination causing motor, sometimes you can have a weakness of the bicep muscle.

But even if you have weakness of the bicep muscle, even if you have paralysis of the bicep muscle, that does not necessarily mean that you're fatigued.

So therefore you understand fatigue is going to be a separate problem from, say, a muscular weakness. Therefore, fatigue is really something you experience in your brain.

So if you have fatigue you can just go and say, yep, I got to bring symptom because that's what it is. And understanding that is important because it helps you to sort of target the right place to address the problem.

So fatigue is a common brain inflammation symptom. So is brain fog. Brain fog is a sensation that you have this, you know, veil over your eye. Like if things are foggy, hazy, your thoughts are hazy, right?

Not necessarily your vision. Although some people can just feel like it's difficult to keep their eyes open. They have a hard time concentrating, focusing people who have brain fog that immediately like, oh yeah, that's what I got.

You know, people who never have brain fog is like, what's that? So brain fog is a very common symptom. Now, brain fog can be a symptom of brain inflammation.

The reason is because when you have brain inflammation, the nerve conduction between neurons to neurons, right? For you to carry on synaptic activity.

That process can be clouded or impeded by inflammatory processes of the brain. Therefore, the speed at which you transmit signal from one neuron to another slows down, and that feels like you have slower mental processing.

And because the brain works by making decisions or processing through networks, if the speed at which you pass the information from one neuron to another slows down, then the speed at which you'll retrieve information from different brain network will slow down.

Therefore, it becomes hard to retrieve information. So a lot of time will say they have brain fog. Then they also mean to say that they have short term memory issues, right?

You walk into a room, you forget why you walk in the first place. You misplace things, you put the keys down. Next thing you know, you're looking for it.

You know where's my glasses? And it's on top of your head. So these are very common symptoms of brain fog, short term memory and then fatigue. Those are the systemic type of problem.

Another systemic type of problem that's associated brain inflammation is depression is very clear in the scientific literature. Now that depression is not just a neurochemical imbalance where you don't have enough serotonin, therefore you have Prozac deficiency depression. It's very clear in the literature that it's an inflammatory condition of the brain.

And when your brain's inflamed again, you cannot carry on synaptic activity. And therefore you can retrieve information, you can process and depression becomes a symptom or the end result of brain inflammation.

So again, it's important to know that because if you understand that depression can be caused by brain inflammation, then the way you address that, if it's in fact caused by brain inflammation, is you want to address the root cause of brain inflammation instead of taking SSRI or something that manipulate the chemicals in the brain.

Now those are general symptoms. And then there could be specific brain symptoms. What do I mean by that. Well you have different lobes of the brain and different specific cortex and different, regions in the brain that process very specific information.

For example, your frontal lobe is a part of your brain that is primarily dealt with executives decision as well as, processing of certain emotion. And also the the primary motor strip is part of frontal lobe that handles movement.

So if you have inflammation in the frontal lobe more specifically, and it can give it even more detail as far as specific area of the frontal lobe, you can have something that can be very characteristic.

For example, some people with frontal lobe dysfunction may experience inability to dampen their impulses because frontal lobe helps you to make executive decision.

Loss of frontal lobe function can make someone become less inhibited, so they may be doing socially inappropriate things right. If you blurt out in public or, you know, you know, sexually inappropriate behaviors.

So these can be frontal lobe issues. And then if you have temporal lobe issue, it depends on what part of the temporal lobe. The temporal lobe is a part of the brain.

That's the auditory cortex. It's also where the olfactory center is. So smell and sound as well as short term memory information. Certain part of the the language formation.

So it depends on what part of the temporal lobe is a fact that you may have trouble with those specific function. So in someone with a very specific inflammation in a specific region, the temporal lobe.

And this inflammation could be caused by concussion or head trauma. It can be caused by some type of, stroke or circulatory problem. Blood supply to the brain.

Common Root Causes and Triggers

Then that can cause very specific deficit in that particular region of the brain versus if your whole brain is implying that you're going to have just very general fatigue, depression and brain fog.

Yeah, great analysis there. And I know, like, for example, when somebody drinks too much alcohol, they oftentimes the cerebellum, the little brain is kind of the most that's some area of the brain that tends to be affected first by alcohol.

And so all the different kind of DUI tests are actually testing like cerebellum has to do with balance and posture and coordinated motion. So they're doing the finger to, to nose and things like that.

Absolutely. Yeah. Cerebellum is an area of the brain that can very easily become inflamed. And reason because the cerebellum is an area of the brain to process vestibular information, which is like balance and coordination, coordinating that with eye movement and neck movement.

So very processing intensive. In fact, there are more neurons in the cerebellum than there are in the cerebral cortex combined. That just tells you that smaller volume is more densely packed with neurons than the entire cortex.

So that just how mission critical that is. And and because of so packed in with neurons, the energy demand for it is very high and therefore also oxidative stress.

You know, the ability to build up oxidative stress becomes high. So you got to have good antioxidant protection so

that part of your brain can become very easily damaged through toxins like alcohol and otherwise.

And we also know that certain food, like gluten, is very commonly can react with cerebellum tissue cause cerebellum autoimmunity. Yeah. So those are some of the root causes.

Somebody might have a food sensitivity whether it's gluten or dairy or really almost any food. Obviously there are certain culprits that, tend to be more common than others.

But food sensitivities are a factor. Toxins are a factor. What are some of the other root cause things I know you talked about, brain trauma, concussion. What are the big things you got to rule out when you're looking at root causes?

Yeah. So again, as we talked about earlier, brain inflammation, right. The word there, the operative word is inflammation. And inflammation is not a dirty word.

It's just something that happens because your body's responding to something. So what can cause inflammation in the brain. We talk about concussion which is an injury to the brain.

Right. If you hit your head hard enough, the brain tissue inside the skull gets kind of squished around too much can a shearing force can create concussive force, could, clue contract, whiplash injury, which can all cause your brain to get injured, and then that creates swelling.

And then once your brain experiences a concussive or or traumatic brain injury is another word for it is that you get you got your brain cells that are injured will go through what's called neuro excitable toxicity, because injury, brain cells are not able to use energy as efficiently because they're injured, right.

Their capacity to produce energy and utilize energy becomes deficient. And they go through neural excitable toxicity, which is a process where the neurons literally die off from, like, you know, over excitability.

So the way it neurons work is that as they go through degeneration, before they completely die off, they go through a period of over excitability. So the over excitability literally is a pre death of a neuron and injured neuron tend to experience more neuro excitable toxicity.

Now the clinical application of this is that when you go through neural excitable toxicity, this pre death of the neuron neurons will start to fire more rapidly.

That's why it's called neuro excitable toxicity, excitable mania firing more spontaneously more rapidly. And this can result in unstable neuron function meaning it's firing when it shouldn't be firing. Right.

So it's kind of like it's always on when you want to be able to turn on and off your brain cells, but you can't turn it off. It's always on. And then that causes the neurons to basically burn themselves out.

So in that process, people may experience unstable neuron functions. They may become light and sound sensitive. If those part of the neuron that process light and sound are going through degeneration and they're are firing excessively, it may be very difficult for you to process light and sound information.

People with cerebellum issues, they may go through periods where they can handle some vestibular and motion stimuli. But then if it's too much, then they'll start to, you know, wig out and there's sort of half symptoms, you know, nauseous balance problems, maybe even action tremors that are associated with cerebellum issue from overusing that part of the brain.

So people with, you know, brain injury tend to have weakness or low mental endurance, especially in that part of the brain that's injured. So those are the things that we look for.

That could be a root cause, concussion or injury. Now, other things besides that you already mentioned could be

food sensitivity. Now we talk about gluten because gluten is a known neurotoxin.

It's known to create neurological problems. In fact, many of the symptoms of gluten reaction is actually extra intestinal manifestations, which means that the reaction and the symptom caused by gluten reaction is outside of the intestine most of the time.

In fact, in the scientific literature, lutin reactions often associated with neurological manifestation. That's actually the most common manifestation of of that non celiac gluten sensitivity.

Some of these are not developing. You know the gut's not being massively inflamed and destroyed like that, like an individual that's dealing with celiac.

But other areas of the body are reacting to the gluten and like you said, neurologically, the neurons in different parts of the brain, different parts of the nervous system, the most commonly area that's affected outside of the gut.

But keep in mind, besides gluten, there are other foods that can cause problem within the brain itself that can cross react. For example, dairy has a potential to cross react with brain tissue.

Egg has been found to have the potential to cross react with cerebellum tissue. So the key word, the key takeaway here is that food sensitivity is something you need to be aware of.

You need to track. Some people have very obvious symptoms where every time they eat certain food, they get brain symptoms. In other people, it's more subtle and it's not as clear.

So a detailed workup and history is necessary to uncover these food reaction, if they're indeed the cause of brain inflammation for some people. So we've talked about trauma.

We talk about food issues. Now infection is another category here. There are many infections that can either directly or indirectly cause brain inflammation.

We know many of the viruses like herpes family viruses, can actually literally crawl up through the vagus nerve and cross the blood brain barrier, get into the brain, and cause brain inflammation.

And we also know that there are many other infections like bacteria. This is what meningitis is, right? They can cause infection of the meninges and therefore cause inflammation in the brain, encephalitis and so forth.

So there and Michael toxin from mold, mold exposure can also cause issues. So we know that infections can drive inflammation in the brain. And then the next category will be things like your, environmental toxins, like heavy metal toxins or any number of things that will get exposed on a daily basis can get deposited in the brain.

And once in the brain can create oxidative stress, which causes tissue damage. And then you're going to have inflammation as a result of that. Right? So those are the major routes that root cause factors.

Now what is the relationship between gut the gut health right and the gut microbiome and perhaps intestinal permeability and gut inflammation? And how does that correlate with neurological symptoms and brain inflammation?

Hugely. Yeah. And then, you know, many people are familiar and may have heard of, you know, this brain gut connection or the gut brain connection depends on who you talk to.

You know, people who are more focused on the gut. They'll say the gut brain connection putting the gut first. And other people who are focused more on the brain will say, bring gut connection, putting the brain first.

But really, it's a bidirectional, communication, both hardwired through neurological pathway and lymphatic system pathways, as well as chemically through different, neuropeptides and cytokines.

So the brain and the gut are intimately involved in each other's function. And the reason is because the brain is mission critical, okay? And is constantly trying to communicate to the gut what is happening within the brain.

And so back and forth, the gut is also communicating with the brain what's happening in the gut. So in a gut we have what's called a second brain. And these are the interact and nervous system, which is this network of neurons that innervate the gut.

And some people say that the, enteric nervous system have more neurons than the entire spinal cord combined. Right. So your spinal cord is all neurons that transmit information from you, from the body, up and down through to the rest of the body, to the to the brain.

But your enteric nervous system has more neurons than the spinal cord. So that just tells you how densely populated it is.

Gut-Brain Connection and Autoimmunity

And what happens is through a process called leaky gut, which is intestinal permeability, you're going to develop this, double whammy of malabsorption and inflammation when you have leaky gut, the intestinal junction starts to become disintegrated and becomes more permeable.

And microbial content, dietary protein or whatnot, starts to leak in and out of the intestinal lumen into the system as a circulation that drives an inflammatory immune response.

This inflammatory immune response is actually not happening just in the gut. Remember, once you have leaky gut, this process is an immune response that starts at the gut, spills into your systemic circulation.

But once it's in the blood, you have all these cytokines and chemicals that are signaling, hey, we got damage here. We got something we got to kill. That inflammation chemical is just in your blood sloshing around, and it gets to your blood brain barrier, which are just simply blood vessels that supply blood to the brain.

And if they and when they cross, the blood brain barrier is going to signal to the micro glial cells in your brain, which are specialized white blood cells in the brain, to say, hey, we are on alert, make sure you guys, you know, get geared up for war here.

So the micro glial cells in the brain will start to become more sensitized. They can trigger more inflammation than normal. And then that can be an impetus for brain inflammation as well.

So gut problems can definitely to brain symptoms and brain inflammation and vice versa. Brain inflammation can also lead to gut inflammation. Famous study.

They induce brain injury in animal studies like in rat studies. And when they lesion the rat's brain within hours, they start to see the intestinal lining started to disintegrate, meaning leaky gut.

So this process can happen really rapidly and clinically. We see this play out to people with concussions. They tend to develop more gut issues, they get leaky gut, and that can later on develop into systemic inflammation and even meta autoimmunity.

Yeah. It's it's it's fascinating that relationship. Now let's talk about brain inflammation related to autoimmunity and how those are linked. Yeah. So autoimmune disease obviously is a condition where the immune system attack the body.

Now you can have autoimmune attack any tissue in the body right. It could be thyroid organ. Could be the pancreas could be the small intestinal villi.

It could be the liver could be a joint. Could be a cartilage but could be the brain itself. Now when you have

autoimmune disease, what happens is your immune system is basically lost tolerance to self tissue.

So there's a certain degree of loss of self tolerance and even certain degree of loss of oral tolerance. Oral tolerance, how well you tolerate things you put into your mouth.

That means how well can you tolerate the food that you eat? And people with loss of oral tolerance typically have more sensitivities to sensitivities.

And people with loss of oral tolerance. Typically this is associated with leaky gut as well. So in the case that leaky gut has a big role to play in autoimmunity, and when you have autoimmune conditions and you have usually leaky gut associated with it, and what happens is your entire immune system becomes essentially more sensitized because you're constantly reacting to something that's constantly in your body, which means cell tissue.

For example, if you have autoimmune to thyroid tissue, you're constantly going to react to thyroid tissue. The cathartic tissue is always there. If you have rheumatoid arthritis, you're constantly reacting to your cartilage in your joint because your joint is always there.

So it's kind of like almost like you're constantly having an infection and your immune system's constantly trying to kill an infection, but instead an infection is constantly attacking your joint, attacking your thyroid, attacking whatever tissue you have. Autoimmune.

So therefore the inflammation at baseline for someone with autoimmune, it's always going to be greater than inflammation at baseline. For someone who doesn't have any autoimmune.

The question is how much can we turn that volume dialed down to dampen the immune response. So then the person can experience remission and improve quality of life.

Now the connection here between autoimmune and brain is that once you develop autoimmunity again, your immune system is more on high alert. You're going to have this intestinal permeability, you're going to have cytokines, and all this can get to the blood brain barrier.

Many of these cytokines can simply cross the blood brain barrier without even the blood brain barrier being damaged. Right. We used to think that, oh, you have the brain is an immune privileged site, which means that the brain with the blood brain barrier is kind of like a fort that protects the brain against peripheral immune responses.

So if you're fighting virus bacteria in the body, your brain kind of just being left alone. But we now know that the blood brain barrier has many different mechanisms through active transport, passive transport, meaning things can just get transported through the blood brain barrier, to passively or actively with energy pumps, without having blood brain barrier bridge.

So you don't have to have blood brain barrier compromised to have these cytokines cross and trigger some type of brain inflammation. And once that brain inflammation starts, what happens is anytime when you have inflammation that's out of control or more excessive than your body needs, then that inflammation is going to cause tissue damage in the brain.

When you have too much inflammation, it causes tissue damage to brain tissue. When you have tissue damage to brain tissue, you're going to have brain cellular fragments of brain floating around.

And then what happens is your meme system is going to start to pick up those cellular fragments of your brain, and it's going to started making antibody to it.

Now, this is worse when you do have a blood brain barrier breach, because then antibodies and B-cells from the periphery, from outside the brain can cross into the brain, and these B-cells will start to be able to make antibody to brain tissue.

And that's going to promote brain autoimmunity. So this can actually become the onset of neurological autoimmunity. And this could be against any neurological tissue.

It doesn't have to be just a region of the brain. It could be against a specific protein. It could be against a specific receptor like dopamine receptor antibody to be could be in any protein really any tissue in the brain.

And this can become a problem because once you develop autoimmune to neurological tissue, even if it's not an autoimmune disease yet, because autoimmune disease come in stages, in the early stages, it simply just causes tissue destruction and inflammation.

And that's where you get the brain inflammation. Symptom of fatigue, brain fog, depression, short term memory issue that we talked about earlier. So this could be just this diffuse pattern and could come and go wax and wane because that's the nature of autoimmunity.

So periods you'll find periods you're nothing. Sometimes you eat something. It makes it worse. And other times you're just worse. Just because your immune system just flares up because you're stressed or you have blood sugar spikes.

So this can become very difficult for someone to identify, diagnose until you realize this mechanism. And you can start to make that connection between gut issues, inflammation, brain symptoms. Right.

And if it doesn't get corrected down the road, you're damaging all this brain tissue that leads to neurodegenerative conditions. Dementia plays a role in Alzheimer's, plays a role in Parkinson's, ALS, right?

All of these types of issues. Yeah. Even if you currently say you have this inflammatory response and you have some type of autoimmunity and they're starting to create these neurological autoimmune reaction, but it's not a disease yet, even if you're not diagnosed with any kind of brain autoimmune disease.

But that damage is still occurring. And over time it's going to lead to, as you say, David, neurodegeneration, because neurodegeneration simply means you're losing neurons. Now, we're all losing neurons every single day just by having this conversation.

We lost a few thousand neurons just from normal processing, normal aging. But the key question here is that are we losing neurons before it's time? Right.

Are we losing at a faster pace than what we can compensate with neuroplasticity? If we're losing neurons at a faster place, faster pace, then neuroplasticity can compensate for it.

Then we're going to have loss of function. And that's neurodegenerative condition where people start to you know, they get lost, they forget what they are forgetting names.

This can become very severe. Yeah for sure. And you use that term neuroplasticity. Let's let's tell the audience, explain a little bit more about that neuroplasticity.

And you know, and then let's go into the roadmap of things we can do to help support brain tissue and dampen down the inflammation. Neuroplasticity is a process where neurons can make new connections to other neurons.

So the way the brain works, the brain functions I should say, is not by growing more brain cells. In fact, on the day that you're born, you're born with the most number of neurons.

And every day that goes by, you're losing neuron losing neurons every single day. Now you say like, so how can everybody have any brain function left by the time they're 70 or 80?

Because obviously 80 years later, you'll have a lot less number of neurons or brain cells than the day you're born because you're losing them every day, or that the thing that makes up for it is the fact that we can develop

neuroplasticity.

In neuroplasticity is your ability of your brain cell to connect with another brain cell and therefore make a network or develop a learning pattern so you can do things more efficiently.

Right. So babies, you know, they can't really do taxes. They can't program your VCR. Oh my gosh, I just data myself. So, you know, babies can't do very much.

They can't even walk. But through time, they get to the brain cells, the brain gets myelinated. But then they also develop plasticity in doing the things that they do all the time. Right.

Anything you do with repeated practice gets better. You get more skilled at it, because you're literally developing more plasticity by having brain cells connect with each other that help you to perform that particular task.

So developing neuroplasticity is actually the other half of the equation. Yeah. You know, compared to, you know, nutrition right. We talk about nutrition a lot less sugar stability like one of the main causes of brain inflammation is actually blood sugar, which I failed to mention earlier.

But but, you know, all these things that we talk about can be fixed by nutrition. But the other side of that is plasticity. In, in functional neurology, you know, we say that neurons are kept alive by fuel and activation.

Right? Fuel comes from the food that you eat, or activation comes from doing stuff with your brain. That could be physical activity, that could be thinking, that could be, you know, doing things with your brain.

So the activation part is just important, isn't the nutrition part.

Neuroplasticity and Brain Repair

So now I'm pretty quick note on that too, is Einstein actually studied his brain at Stanford and they wanted to see did he have more neurons. Was his brain larger than the average individual?

The same body size found? You know, basically brain size, exact same as somebody else of his age. And, you know, and body size. But he had twice as many synapses, these little gaps that create that connectivity and connect different, different areas of the brain that allow for more creative thoughts and, you know, in-depth thinking.

And so, that was kind of proof of this idea of neuroplasticity and how big a role it plays in our overall health, quality of life and just our ability to, you know, obviously, Einstein came up with ideas that revolutionized the world.

Well, I would say there's nature versus nurture, right? So some of some of this is genetic, right? How much how much neurons you're born with, how much, you know, your capacity to make synapses.

But there's also nurture, right. Your environment. And I bet Einstein probably did a lot of exercise with his brain. Right? By thinking through different models, thinking through math equations or, you know, theories.

And like this constant abstract, high level thought thinking probably is like exercise for his brain that helped to build that plasticity. So definitely and and we get better with use.

What's interesting too is he actually did a cerebellum exercise, but I don't think he knew anything about it. But he would they say he would pace back and forth and almost like do like almost like a heel to toe walk, right?

Like he would pace. And sometimes he'll close his eyes and just kind of visualize when he was really trying to trying to solve something. So he was actually working certain areas of the brain associated with balance.

You know, and so movement in general, right, helps rev up the brain, stimulate Bdnf, brain derived neurotrophic factor. And he would do that while he was thinking a lot of people say, you know, I get my best thoughts right when

I go take a walk right.

Or something along those lines. And so, so it's interesting, you know, and, you know, I don't think he knew anything about real brain physiology, but he found that that helped him think and come up with breakthroughs.

Yeah, movement is alive. And it's not surprising that that really helps in. Yeah, absolutely. Well, let's go into the road map now. Strategies people can take to reduce brain inflammation and support neuroplasticity.

Right. And then the road map really is taking from just some of the things that we talked about. Right. The first step, the road map to understanding what's causing the problem.

And you'll have a high level understanding of some of the mechanisms and what are some of the causes so that we can work our way backwards, but in the way that I help people and educate the public is that there are certain priorities, right?

Certain things are more important on the roadmap or should be done first compared to some other, aspects. So, for example, one of the big things that I talk about is blood sugar stability, which is something that you talk about quite a bit to metabolism.

I think that's so key for for brain cells. Most people, you know, I think we obviously we need to focus on the micro as well. Right. The micronutrients but the macro nutrient just as important I think sometimes where so focus on, you know, some exotic herbs and some exotic vitamins or forgetting to get our protein right, get our blood sugar right, get off fatty acid.

Right. You know, intake of fat, protein and carbs and just getting, you know, the right amount of calories for us or the timing of the calorie. I think that's really important.

So for brain function, blood sugar is really one of the most important things. And so therefore if you have hypoglycemia you got to fix that because your brain cannot function on low blood sugar.

It's going to go through neural cytotoxicity. In fact, the symptom of hypoglycemia where you get hangry is literally neural cytotoxicity. Yeah. And so so you know, when you get hypoglycemia, you can't just say, oh, I just get a little hangry.

It's kind of funny. I kind of funny when I get hypoglycemic. I don't think it's funny at all because, you know, you just said bye bye to some neurons and you're not getting those back when you get hypoglycemic. Yeah.

It's like it's almost like a head trauma. It's almost like you got head trauma. Yeah. That's how serious I would put that. Right. Yeah. And then the other side of that, along that I put it on equal importance as blood sugar is oxygenation to the brain.

Right. And we all know how important oxygen is to the brain. You know, brain can function very long without oxygen, and it's not going to function very well with suboptimal oxygen and oxygen problem can come in the form of anemia, can come in the form of poor circulation, can come in the form of low blood pressure or too much blood pressure.

High blood pressure is just as bad as low blood pressure that they both can cause perfusion problem because when you have high blood pressure, you're basically choking off the blood vessel because they're constricted.

So much, you have less blood flow. Therefore higher pressure, low blood pressure, same thing. Low pressure both means that you don't get not blessed applied to your tissue.

And that's the brain. Then your brain is going to suffer. So those are the two things that I look at first. I gotta make sure those things are working right before I do anything else with somebody.

You know, people always jump right into heavy metal detox. I say, you know what, let's get your blood sugar right and make sure you're getting blood flow to your brain.

We do that right.

Roadmap to Reduce Brain Inflammation

Then you might have better luck with heavy metal detox. So those are two. And then the next thing is obviously work on digestion. Now when I say digestion, meaning your ability to break down nutrients because you can break down nutrients, then you're going to have a chance to absorb them better.

And after digestion then of course the absorption. So really we want to work on digestion in a sequence way, right? Starting from mastication even vagus nerve.

We want to go above mastication, brain function drive digestion and mastication. And you know, stomach acid, pancreas, gallbladder, intestine on down.

So those three things we can get right for most people it's going to produce a lot improvement. I would say though, those are kind of the foundation thing.

So an outlier will be if you hit your head, if you have a concussion, well, you know that those three things still matter because if you already had blood sugar problem, you already have oxygenation problem, you already have digestion problem.

And then you hit your head. You're the one that's going to have more complications from a head trauma than somebody who's got all those things. Right? Right.

So again, it's always about doing the the right things. On a lifestyle. Right. Keeping everything at baseline good. So that you're more resilient against head trauma or Covid or illness or whatever life might throw at you.

Yeah, that's really good. And then I know this isn't as personalized, but what are some of the top supplements that you have found that help reduce brain inflammation in the body?

Yeah. So when when we have brain inflammation, remember what's happening here is that your immune system in your brain is upregulated. Right. Specifically the primary cells here that are at play is micro glial cells.

These, Michael glial cells outnumber your neurons by about 10 to 1. So there's more micro glial cells. Then you have neurons. And these used to be thought of as structural cells, just kind of scaffolding.

But now we know that they're actually immune organs. They may have some endocrine function. They do a lot. And these microbial cells, they can have an M1 or M2 phenotype, which means that they can be in an inflammatory state or they can be an anti-inflammatory state.

Saying white blood cell okay Michael. Micro glial cells are simply macrophages. They're macrophages in the brain. But they can take on two different shape and function depending on whether you irritate the heck out of it or not.

So we want to do things that will promote these micro glue cells to take on the entire inflammatory phenotype. And the way you do that is through nutrition, through proper exercise, through proper sleep, managing stress, healthy gut minimize inflammatory responses and having, you know, less toxic burden.

So kind of really the foundations of functional medicine is kind of what we're talking about here. But specifically what can help dampen hyper glial activation from a supplement.

Right. Well, we at a lot of time we help people by taking away taking away gluten. Yeah. Taken away too much glucose. Right. Taken away stress. But as far as supplementing what would we add in?

I think you know that your basic fish oil is like one of the most important things. The reason? Because your brain is very, highly, high composition of structural fat, right in the cell membrane is structural fat and myelin sheath is structural factors.

Your brain is like 70% fat by by composition. So getting fat into your brain is going to help with the general structure. Also, when you have brain injury and brain inflammation, your brain or literally sacrifice or take out the omega three fatty acid like DHEA from cell membrane to help dampen inflammation.

So you want to supplement with omega three DHEA, which are specific omega three fatty acid that are used by neurons to kind of provide its own structural integrity.

So a fatty acid could be really important to help dampen some inflammatory response. I think glutathione is hugely important. That's one of my favorite supplements because it serves so many function.

You know, some people have trouble tolerate loose iron or sulfur compounds. But, you know, for most people this is something that just so critical and glues on it being an antioxidant can help dampen that oxidative stress.

And when you hit your head with brain trauma or you get inflammation in your brain or otherwise that you're going to have more oxidative stress happening.

So dampening oxidation is always helpful. And gluing sounds going to be a key player there. Vitamin D can be important here because vitamin D can modulate dendritic cells and other immune response interior and upregulate T-Rex cells so that we can have less of an, overexaggerated immune response can be really helpful in people with autoimmunity.

So those are the top three that comes to mind. Yeah. And then as far as dampening inflammatory response due to and of kappa B response, turmeric, resveratrol a very helpful here oftentimes using combination.

And these are kind of addressing inflammation. And the at the common denominator the final common pathway we're all inflammatory signal eventually comes into the nucleus of the cell.

And then that triggers this. And of kappa B self amplifying loop. So if we can block it at that step then we kind of dampen many of the other downstream inflammatory response.

Yeah that's great. Great summary right there. Really good stuff. Doctor Kan this has been a great interview. We can go all we can go in so much detail on this.

But but that's all we got for today. Great topic. And obviously people can reach out to you and ask drkan.com and any last words, inspiration here for our audience.

Yeah. I mean I think for, for brain function, most people should really focus on the foundations, right. The foundations being blood sugar. Right. Metabolism doctor Jockers talks a lot about fasting and ketone diet and those are really helpful.

I think for most people exercise is an underutilized tool. To stimulate blood flow, to help keep the brain function and bring healthy sort of movement and also to blood flow.

I think those are the two biggest one. And then, obviously we got to mind the environmental exposure to toxins and, and, you know, processed foods or too much sugar, but it's actually it's actually not that difficult.

Right? It's simple. It's not always easy, but as simple, once you can distill it down to the foundation basics and do the basics really well, and then we can work our way up the chain to do the more complicated stuff.

Yeah, really good stuff. And there is hope because your brain can rewire itself. It can heal and rebuild. You can create neuroplasticity. No matter how far degenerative your brain has become, no matter where you're at, you can

improve your quality of life.

So check out ace drkan.com he's got a lot of great information there and we will see you all on a future video. Be blessed everybody.