Introduction to Depression, Anxiety, and Inflammation

Well. Hey there everybody. Welcome back. We've got a really fun episode right now talking all about depression, anxiety and what is on everybody's mind.

Everybody's talking about inflammation. Everybody's talking about immune activation when it comes to depression and anxiety. But so often we don't get a chance to like, slow down and really break down.

What does that mean? How does that relate to depression and anxiety? And most importantly, and why we're all here for depression and anxiety solutions.

What do we do about it in our everyday lives to improve our mental fitness, to improve depression and anxiety? We've got an all star of the medical world, Doctor Austin Perlmutter here with us to get into that and talk brain metabolism.

Austin, welcome. And it's great to have you here as part of this year. What a topic. You know, I have the opportunity to do a lot of summits, to do a lot of interviews, but this is absolutely top of the list because what could matter more than our mental state?

It is literally the single most important driver of our life experience. Nothing matters more than mental health. And when we talk about what is driving mental health and the epidemic today, we absolutely have to talk about inflammation.

So I'm super excited to be here for this conversation. Well, thank you so much, Austin. It's really I just love that of the way to start. We all know it's just such a tough it also is top driver of disability.

And I don't mean to minimize that. That's true worldwide but also just in our own lives. We all know everybody watching knows you know, when we're struggling with our mood, when we're struggling with worry and successive, it's just not a great space to be in.

Austin's a new there's a long list, kind of, inflammation right underneath. This is also this whole new idea of thinking about brain. Brain matters. Metabolism, brain immune status.

Can you just talk us through what these ideas mean to you? Yeah. Well, I, you know, even in my medical training, learned about the brain as this really unique organ that was encased in the skull and as it related to conditions like cognitive decline or mental health conditions, you know, we learned that people had psychological aspects this.

And then we learned that there were certain drugs that we could use to target the biological aspects of it. But I don't think there was ever the representation that the brain was being intimately affected by these core systems that operate throughout our bodies.

And two of these core systems where I've spent a lot of my time both learning and educating others on our metabolism, meaning how we use kind of building blocks nutrients and how we dispose of the waste, as well as the immune system and immunity.

It often kind of gets portrayed as a defense system in the body, but the reality is that the immune system is located in every organ, including the brain, and has so much to do with how we think, how we act, how we feel, as well as just the way that our bodies function as a whole.

How the Brain Is Affected by Metabolism and Immunity

So what I would want to start by saying, for everyone who's out there who hasn't necessarily made this connection, is that your brain, despite the fact that it's located in your skull and despite the way that many people describe it, is absolutely influenced by what happens in your body.

And two of the major ways that your brain is influenced by what happens in your body is through metabolism and according to, you know, some of the most cutting edge research available through the immune system, in particular, that inflammation in the body can increase rates of conditions like depression and PTSD, as well as other mental health disorders.

By way of increasing inflammation in the brain. So this is this is a vital pathway that is revolutionizing the way that we look at brain health. And I think most importantly is something that we can act on right now.

Even in the absence of a pharmaceutical, it's something that our day to day choices can influence. It's just a great point. And that's why we're here, is to think about this actions that we can take when you're thinking about immune activation and just making the great point, right.

The micro glial cells, which are the immune cells inside of our brain, we have this specialized immune system in the brain. They're kind of, you know, watching, paying attention.

And when there's a lot of inflammation in the body. And I love the points that you often make us and that, you know, we need to think about this is related to us, right?

When we're talking about inflammation in the body, when we're talking about metabolic syndrome. So oftentimes we're not really thinking about that as something that either we have or something that we're incredibly high risk of having in America.

I don't want to take this away from the metabolism, but can you help us understand how prevalent is this? You know, how many people listening should be concerned about inflammation and about metabolic dysfunction?

The answer is everyone. I mean, that's the short answer. Everyone needs to think about this. So if we look at the top contributors to death and disability around the world, seven out of ten of the top killers are chronic diseases associated with inflammation.

As we look at brain specific conditions, you know, the the most common brain conditions in the world, for example, Alzheimer's disease, for example, depression, Alzheimer's, which affects almost 60 million people around the world, depression, which affects about 300 million people around the world.

Those are both tethered to inflammation, even stress, which is arguably the single most common mental health issue, which probably affects billions of people in a pathological way, is tethered to inflammation.

And I want to make a point here that, you know, I cannot make often enough, which is that thinking about inflammation in the context of a disease state is usually the way that it's described.

And for example, having higher levels of inflammation in the bloodstream correlates with a stronger chance of developing depression and also correlates with having more resistance to, antidepressant medications.

Having higher levels of inflammation in the bloodstream increases the risk for conditions like Alzheimer's and Parkinson's disease. But here is something that very, very few people know.

Higher levels of inflammation may increase impulsive behavior may increase. Violent crime decreases cognition in terms of test taking, ability even for kids.

And when we look at inflammation in terms of being a driver of behavior, some very recent data shows that mom's levels of inflammation while she is pregnant can translate into cognitive outcomes for her children ten years after they're born.

So the implications of inflammation here are so much more than a slightly higher risk of developing a brain health condition. Instead, what we're talking about here, far beyond the idea of just saying, oh, well, maybe I'll get an infection or I need to have my immune system fend off a cold, is to say that inflammation, the immune system, is a principal modulator of how we experience life.

Inflammation is really just a state of imbalance in the immune system, specifically chronic inflammation. We absolutely want inflammation as an option.

But it is really response to danger. And so to take this one step back, because I know it's easy to kind of get on this idea of, oh, all inflammation is bad.

Isn't that what he's saying? What I'm saying is inflammation is a necessary option when our bodies are faced with a danger signal. If that danger signal is, a splinter, great.

It's going to help to get that splinter out of the body, and it's going to help to kill off the bacteria. But when the danger signal is something that is pernicious, doesn't resolve, whether that's psychological stress or poor diet or gut dysfunction or even just consuming a lot of news, our body and our brains interpret that as something that is a risk to our existence, increase inflammation, and the outcome of that is worse.

Brain health is conditions like anxiety and depression. So this is absolutely a cornerstone driver of what we're seeing around the world in terms of poor brain health.

And again, I'll reemphasize this point, which is that each of us can and should absolutely should take steps right now to decrease our chances of having this exposure to chronic and damaging inflammation in our brains.

Well, thank you for that, Austin. I also love that you make the point. So something like, oh, inflammation is bad, let's get it low. And as we've learned here with the stress, with the anti-inflammatories, the answer is like, you know, ibuprofen or even taking things like, you know, vitamin C before you work out to fight inflammation.

We found that that's not how we don't want to do that. That's actually that inflammation is really important. You don't get the exercise benefits when you take a lot of anti-inflammatories.

Inflammation, Mental Health, and Real-World Risk

You, you know, the more that we look at the data on anti-inflammatory and saids, the more concern there is. So, it's a really great and nuanced point and why I wanted to have you part of the solution summit is, is really encouraging everybody to be nuanced and include more thinking about your immune status and your metabolic status as you're thinking about depression and anxiety symptoms.

It's just really, really critical. Awesome. There's so much buzz in the depression and mental health world about ketogenic diets, and I love it when you make the point that we just want to, again, take a step back and think about bringing metabolism, can you show us what does that mean?

Yeah. Well, similar to the immune system, your brain is fully integrated into your body's metabolism. And what that means is, as a reflection of the energy circulating in your body, your brain uses up around 20%, despite the fact that it's only 2 to 3 pounds of weight.

Now, beyond just that interesting statistic, your brain is not able to store large amounts of glycogen, which is kind of the standard currency of glucose and the additional form of storage of energy is in the form of fat cells or adipose tissue.

Now, when you take out the water weight, their brain is mostly made out of fat. However, that's not storage fat. That's more structural and signaling that we don't want to be burning the fat in the brain for energy.

It's horrible. It's like you get really hungry. And I'd I just forgot, eighth grade was like, that was wouldn't work. It's

exactly right. So point being here, our brains are using all the available space.

There is no extra rooms that are available to pack in fuel, and so our brains have to get fuel from somewhere. And where they get that fuel is from the bloodstream.

So the blood is a conduit for many things, but it is the principal conduit for metabolic fuel to the brain. There are two things that the brain needs in order to make use of this.

One is the glucose in the bloodstream and the other one is the oxygen in the bloodstream. So what's really interesting about the brain is you have this vascular metabolic coupling.

When we use certain parts of our brains, when we activate those neurons, it actually leads to a cascade effect where we open up blood vessels to bring more glucose and more oxygen to those parts of the brain.

And this means that the parts of our brain that we use, continue to become strengthened and continue to become activated. It's one of the pathways by which neuroplasticity seems to occur.

That's the idea of the primarily restructuring of connections between neurons as a function of how much we use those neurons. Core point to all of this is to understand that to do anything with your brain, you need consistent access to fuel.

Where this becomes an issue is in the context of metabolic dysfunction, which affects roughly 90% of people based on some recent data. And so when we look at conditions like type two diabetes, which is kind of the prototypical form of metabolic dysfunction, that is driven primarily by lifestyle, we see that these are people who may have consistently high blood sugar ratings, meaning that their systemic blood sugar tends to be higher than is typical for a person without diabetes.

We measure this using a number of metrics, but the hemoglobin A1, C, which is a multi-month surrogate for blood sugar ratings, is the most common. People with a high hemoglobin A1, C are at an increased risk for developing depression and dementia.

And the reason why this connection seems to be the case is, again, this brain metabolism link. What's been really interesting for me to see, though, is that people who get low blood sugar ratings, so hypoglycemia are also at a dramatically higher risk of developing brain issues.

And some of the most recent data suggest that it's not just about high blood sugars or low blood sugars, but how much variability there is. So does your blood sugar go way up and then it does it drop way down, even if your measurement is completely normal.

Because the measurements just saying on average here is your blood sugar. If it goes up and down a lot, that can be an issue. And the reason is because your brain is dependent on blood sugar levels to maintain healthy function.

So if blood sugar is going up and down very radically, it may have access issues in terms of getting consistent fuel to the brain. So the point here that I'm making is metabolic function in the body is tightly tethered to metabolic function in the brain.

And when issues arise with metabolic health in the body, that over time correlates with worse brain health. The last point I'll make on this, which is really, really interesting, is as we get older, our brain's ability to use glucose as a fuel may decrease.

This is called cerebral hypo metabolism, and it's been primarily isolated in the context of Alzheimer's disease. But in general, as we age, our brains may be less able to get access to that fuel.

So this has led certain researchers to hypothesize that if there is an alternate way to get fuel into the brain aka ketosis or increasing ketones, which is a another fuel that our brain cells are able to use, that we may be able to

bypass this lack of consistent energy and by doing so, enhance brain function.

And so a lot of this research is being done in Alzheimer's. Some of this research is being done in mental health conditions, and it is the case here. I'll just I'll just reiterate that metabolic dysfunction correlates with higher rates of mental health issues.

With that said, and certain mental health, conditions are treated with medications that make, metabolic dysfunction more common. So there's there's some nuance to that.

What I would say, though, in terms of what we do know, is that there are things that we can do to enhance brain metabolism.

Brain Metabolism, Blood Sugar, and Ketones

And the single best studied intervention that I am aware of at this point, is looking at exercise is movement, and this targets metabolism. It targets brain immunity.

It seems like micro glial cells really enjoy exercise. But exercise has been shown in a trial with humans to improve metabolic function within the brain.

We can talk about the specifics. They used insulin that went in through the nose. But the point being that moving our body actually enhances the brain's ability to use fuel in a healthy way.

And that's just one example of how all of this ties together. Yeah, I love that shift, though. And I love you encouraging us because we're here for mental health to be like, let's not just think about the exercises, like losing weight or getting muscle or, you know, increasing our flexible body.

Like, really see it for what it is for your brain health. Yeah. From your brain's perspective of really helping the brain, do a good job, you know, metabolize all the energy it needs.

I mean, remember, it's creating human consciousness for you. It's like a big deal. It's only, like 400 and some odd calories a day. I think that's a really great deal.

It's a good investment. Doctor Perlmutter was pointing out. It's something we have to take care of in the modern world is increasingly making that challenging, for us.

And there's so much to talk about with you, but you've got some really exciting research about polyphenols at polyphenols, everybody. There goes, you know, we talk about flavonoids or sometimes they're called antioxidants, but they're the plant, the phytonutrients or molecules in plants.

There's so much more than antioxidants. And they're these powerful, interesting signaling molecules. You have some really interesting research going on about these and kind of healthy aging.

And can you tell us a little like what are polyphenols? Because it feels like one of those things we could probably like, you know, we can eat some more of as we all probably need to eat some more plants.

Yeah. And I actually would recommend that for most people. But when we look at, when we look at nutrition and we specifically look at nutrition as it relates to brain health, there are a number of different ways you can slice the research.

One of the unfortunate realities of nutritional research is that there's always going to be a study to justify a nutritional perspective, because there are many nutritional studies that are either very small or are conducted in a way that allows for extrapolated conclusions that may not be all that relevant for the average person.

There are not that many RCTs randomized controlled trials, and the reason for that is simple it's hard to control all

the variables, and just look at food.

So the best data tends to be from hospitalizing patients and putting them on kind of metabolic wings. When you see what happens when you do two different dietary patterns.

But that's not a reflection of what happens in the real world. So when we look and say, what are the diet? What are the nutritional patterns of the people who do the best in terms of brain health around the world tend to eat and to some extent, and we could talk about in a moment.

There are some randomized trials, including the Smiles trial, looking at, dietary intervention for brain health, the the the data seem pretty consistent to me.

And I would say to most experts in this space, which is that the best studied diet as it relates to better brain health is one that favors, a diverse cohort of primarily plant based foods, along with, fatty fish tends to be something that comes up consistently in the Mediterranean type diet, as well as nuts, seeds, herbs, spices.

We could talk a little bit about red meat. And I think that's kind of a controversial topic. But minimally processed is kind of the aggregating theme.

It's eating foods that have been minimally messed with. So then we ask this question, are there key nutrients in these diets that may be the main drivers of these benefits?

And if you look at what is found in diets like the Mine Diet, or the Mediterranean pattern diet, the two best study diets for better brain health across the board, dementia and mental health conditions.

What we see is that they are rich in fiber. They are rich in omega three fatty acids. They're rich in polyphenols. And so polyphenols, really interesting in that by and large, when I learned about nutrition and, you know, elementary and high school and even into medical school and beyond, it was about macronutrients, fats, carbs and proteins, and it was about calories.

And then it was about avoiding micronutrient deficiencies. So don't, don't miss out on your vitamin B is don't miss out on your magnesium. But nothing about optimization.

Just don't become deficient. Polyphenols is or conversation about polyphenols is part of a larger nuance to nutrition, which tells us that there is so much more data in a food that we eat than just the macro and micronutrients, and certainly so much more than calories and polyphenols are a group of thousands of molecules in a family called phytochemicals, meaning plant chemicals.

Phyto for plant that contain names and molecules like resveratrol, which became popularized a few years ago in the context of potential anti-aging effects, found in red wine.

But polyphenols are really found in all plant based foods, and to some extent in animal based foods. And so there's really interesting research being done showing that the way that your animal that you eat is raised changes the polyphenol content of it.

Maybe one of the reasons why people should prioritize grass fed as opposed to grain fed beef. Coming back to what we know about how polyphenols operate, though, the prevailing wisdom has been that polyphenols, because of their chemical structure and anybody who's out there who's taken biochemistry, you may remember the phenol ring, which is basically a ring with a little o each group and multiples of those.

They have an antioxidant potential. So people would say, oh, well, you take polyphenols in your diet. They act as antioxidants. Oxidation is bad. Therefore polyphenols are good.

That's really never been borne out in the research. Meaning when you give people high levels of of antioxidants, whether that's a vitamin or some other, intervention, they don't necessarily do better.

And in some cases they actually do worse. So there's some data showing that high dose antioxidant actually correlates with higher levels of cancer in certain populations.

So that kind of hypothesis testing didn't really substantiate the research, showing that people who eat diets richer in polyphenols tend to have better brain health and overall health outcomes.

So with all of this as preamble, the core idea here, people who eat diets richer in polyphenols tend to do better across the board. But why? And we wanted to investigate this using some pretty cutting edge technology.

Specifically, it's looking at epigenetics, which is the study of how, markings on top of our DNA change, the way the DNA is being used. Okay. For me, a lot of people.

Have heard more and more people think have heard of this, but it's such an exciting idea because, you know, a lot of times we get described as, you know, we think about our genes as though we got like a bad, bad gene.

Polyphenols, Diet, and Epigenetics

And it's a really hopeful concept because epigenetics really speaks about how we turn genes on and we turn genes off. We do that in different ways, in different periods of our life, but it's a very cool way of thinking and very hopeful way of thinking about interventions, because it means when we're struggling and we think about as, hey, we get a shift genetic expression a little bit, that's it.

Yeah. Again, coming back to things I learned that were not quite accurate. I learned by and large that our destiny was driven by nature, nurture, and that when it came to our DNA, we got half from our mom, half from our dad, and those were kind of things that were relatively fixed.

It's not that we didn't learn about epigenetics when I was in training. It's just the relative value of epigenetics was pretty much untapped. Epigenetics got its start in terms of clinical medicine, primarily in the, the cancer, oncology department, because it was understood that certain malignancies were associated with epigenetic modifications.

But what we're now understanding is beyond just chemotherapies that we know work on epigenetic modulation or modification, that certain diets, as well as other lifestyle modifications, may change epigenetics.

And so unlike, let's say, a chemotherapy where, you know, you take this for a month or two and absolutely, there is an effect. Diet is more subtle, which we want.

We don't want a person to, eat a piece of or go to something from your, your history to eat a piece of kale and then find themselves the next day with every pathway in their body modified.

And they've, you know, grown a new hand or something. That's exactly what happens with care lost in, you know, this medically shown. And I've, I've seen the studies.

So the point being when you eat food you want things to change for the better, but you don't want it to happen immediately because unless you eat foxglove, which I do not recommend, it's toxic.

Or if you were to consume, let's say, certain types of mushrooms, you're not going to anticipate an immediate effect on your physiology. So foxglove contains the Johnson, which is a potent cardiac medication.

Certain mushrooms, as many people are aware, it can contain psilocybin, which is a potent, neuro active drug. Most foods have much more subtle effects.

And so we interrogated, the effects of a specific food called Himalayan tartrate buckwheat, which is a it's basically a food that's been grown for millennia, but it is a grain free varietal of buckwheat.

On, people's epigenetics, we looked at specifically a concentrate of the polyphenols and nutrients found in this

plant and then analyzed pre and post 90 days of this intervention.

And what I really love about this study, is that we didn't go into it with our hypothesis that, you know, this was going to have a dramatic anti-inflammatory effect on epigenetics, or it would program this metabolic pathway.

We came in with the hypothesis of saying, we know that people who consume these molecules tend to have better outcomes, but we don't know exactly why that's the case.

And so we did an analysis of 850,000 epigenetic sites per person pre and post. So, you know, 1.7 million, locations over the course of the study. And what we found is a number of pathways and kind of aging clocks were changed.

And go to the ancient clocks in seconds. But a number of pathways were changed in a statistically significant format. So these are things that, are related to molecules like ceramide kinase, which is an enzyme, Cop nine, which is a pathway that is involved in plant, health as well as in human health.

And it's technical stuff. Right. But we found over 800, actually 887 different sites that were statistically significant at a p value of 0.001 or less, from the start to the end of the study, when we looked at this population as an aggregate.

So while we're getting technical here, I think the point to understand is that food does more than just act as calories. There are nutrients, there are molecules within our food that speak to us either through the gut microbiome, through our metabolism, through our immune system, and that these subtle changes, when compounded over time, actually are meaningful.

So you can't just extract from food and say, well, I ate this many calories from fat today and this many calories from protein and therefore great nutrition.

And so, you know, it gets a little bit complicated if a person wants to go there. But the bottom line is that eating a diverse cohort of nutrients from real foods is what has been most clinically studied as beneficial to mental health.

We're just trying to understand the why, and that's where this research really came into play. Well, it's a great, great note for us to remember that as we're thinking about food, we really need to expand our knowledge beyond just macros, vitamins, minerals, beyond thinking, oh, it's all about taking a magnesium supplement and realize there's a lot of information.

Our food. We've all heard that phrase, the heard food is medicine. But to think about plants and you know, this is what's behind that recommendation. Everyone's heard for me, and I've heard from all of us in the space or Eat the Rainbow.

It's just such a, you know, kind of basic way to look at your plate. But when you're seeing colors, you're seeing these phytochemicals, these phytonutrients, more colors, means of a more diverse palette of these messengers and these, you know, ideas or the idea behind this being, is Austin and his team are showing this research really can shift genetic expression and shift inflammatory, pathways.

Austin, I just want to get a few kind of tips for you. You know, everyone watching is thinking about depression, thinking about anxiety. It's something you've thought so much about.

And I find some of your just concrete tips, along with food, really refreshing. Can you show us a little bit as we're just kind of thinking about our everyday lives, some of the habits that you really see making a big difference for people with depression and anxiety.

Yeah. Let's go back to this topic of neuroinflammation or brain inflammation, because this is where I've spent a lot of my time. I published some peer reviewed, research on this topic.

The the idea here is that each of us have within our grasp the ability to modulate brain inflammation and specifically

to decrease our exposure to factors that increase neuroinflammation, chronic inflammation, and two factors, that could have the opposite effect.

So we get to make choices. There are six signals that I really focus on, that a person can modulate each day. That can help to improve their brains neuro immune state.

So let's go through these six. The first one is smoke. Why smoke and why do I say smoke? Well smoke has been found to correlate with higher rates of depression, dementia, anxiety specifically.

Daily Habits to Reduce Neuroinflammation

It's the particulate matter of the PM 2.5. And so what can you do about this. Well, it's to decrease your exposure to smoke and other airborne pollutants.

How do you do this? I think the best things that an average person can do is, number one, to look at how much air pollution they're producing through cooking, through burning things in their home, to a lesser extent, through things they bring into their home that off gas.

So these are VOCs, volatile organic compounds. But I would really look at anything in your home that is generating smoke is a source of air pollution and a risk for your brain health.

The flip side of this is to purify your air. Hvac air purifiers are great solutions. So again decreasing your exposure to smoke. Number two. So first one is smoke.

The second one is going to be sugar. Obviously everyone that's kind of opposed to sugar. But I think that the the underlying message here, which few people say is that whether conventional or integrative or alternative, all of these doctors, all of these experts agree that added sugar is something that is no real benefit to most people, and specifically the best studied food that correlates with worse mental health and brain health outcomes as it relates to added sugar is sugar sweetened beverages.

So I am a huge proponent of if you're going to cut one thing from your diet, it is sugary beverages that includes energy drinks, coffee drinks, fruit, sweetened juices that often have added sugars, as well as just anything where you find yourself adding sugar to, a drink.

We know that people who consume more sugary drinks have higher levels of inflammatory markers. You know, they have lower levels of a marker called brain drive neurotrophic factor, at least in people with diabetes, which is correlated with higher rates of depression.

Next up is sedentary behavior. This one simple any form of movement is great, but now we're learning that things that activate large muscle groups may be preferentially beneficial for the brain because it releases molecules called myocytes that regulate metabolism and the immune system.

Regular exercise, as you know well, drew, decreases risk for developing mental health conditions as well as cognitive dysfunction. Dancer. Dancer. Be a dancer.

That's what you say. Be a good dancer today. Who? Wherever you are, someone who doesn't want to. Just try it. Maybe just watch yourself. Favorite song?

Throw it on, see what happens. But yeah, big fan of the dance. Or just get you. I mean that's it's not necessarily advocacy that people need this, but if you're spending your time working at a desk, getting a treadmill on a standing desk, it's a little bit of an upfront investment.

But it is an amazing way to get movement into your day or just building in every hour or so. Ten minutes of moving your body around doesn't have to be a whole thing, just something that activates your muscles and reminds your body that you're not fixed to the ground.

Next up is going to be substances. So I focus in particular on alcohol. Here's a couple of interesting things. So one is the intensity of a person's hangover directly correlates with inflammatory markers in their bloodstream, specifically interleukin six tumor necrosis factor alpha and CRP.

And so the amount that you are feeling after you drink hungover, that your brain is in a bad spot is actually telling you that your brain is at risk of neuro inflammatory issues.

Hangover is an indicator that you are at risk. In addition to blackouts, brownouts, all indicators that you're doing something that your brain does not like. So neuroinflammation is linked to substance consumption, specifically alcohol.

There are others like methamphetamine, I think a little bit less relevant to most people who are watching this, but still important to mention. But coming back to the alcohol, I think if you're trying to improve brain health, if you're trying to decrease risk of brain inflammation, limiting alcohol consumption is absolutely a good idea.

And specific to alcohol and to smoking, which is obviously one exposure to smoke. Highly, highly recommend that if there's any degree of you that feels like you may have trouble quitting or getting off, you talk to your health care practitioner.

There are a number of really effective ways to help people to come off of these molecules, off of these chemicals. It's not something you have to do on your own.

The last two, just to go over stress, something that I'm sure many speakers will be addressing. So stress increases neuroinflammation through a variety of mechanisms.

There's lots you can do to decrease stress. You can't get rid of stress. And I would always be remiss if I told you just get rid of stress. That's ridiculous.

But there are things we can do to mitigate our risk from chronic stress, not the least of which is, again, if you're really struggling, don't get all of your advice from social media.

Please find a qualified practitioner who can help you to manage that. And the final of the, six S's that I look at here is sleep. So sleep deficit, is rampant.

There are a number of reasons why people develop sleep deficit, but having, less than seven hours of sleep a night predicts higher risk for a number of brain health, mental health conditions, as well as more metabolic dysfunction, more inflammatory dysfunction.

What can you do about this basic stuff is just to wind down before bed. So don't eat right before bed. Don't watch bright lights right before bed. Don't have stressful conversations before bed.

Cool down your room. Don't be exposed to too much light in your bedroom. All fine. What I would say here is if you're still struggling, which many people are, is consider being evaluated for obstructive sleep apnea.

Obstructive sleep apnea is associated with a 400% increased risk for developing depression in women, and a 300% in men over a follow up study that was published in 2019, in Jama.

So this is a strong correlation with worse mental health, and it's something that is absolutely treatable. So just to recap here, the six S's we said number one decrease exposure to smoke.

Number two decrease exposure to sugar. Specifically added sugar in the form of sugar sweetened beverages. Three move your body decrease sedentary behavior four is decrease exposure to substances, five is to work on stress and six is to work on improving sleep.

If you do those things, you'll be in so much better shape. Boy, that's just such a great list, such a great focus. I love

your clarity and I really appreciate you blending in some of this new science.

Everywhere. We've been talking about inflammation with just some of that basic common SOS recommendation. Hey folks, if you have depression, if you're snoring like you haven't gotten checked out for obstructive sleep apnea, please do that right away.

There's so much kind of new going on in terms of the assessment, in terms of the treatment of that, but you heard those numbers. It's just shocking. And so, so often I see in our clinical practice people sometimes, you know, chasing obscure things or worried about maybe something in their diet or something in their metabolism, you know, they're just not getting enough oxygen at night.

They have horrible sleep apnea. That is an amazing, set of S's for us to think about. Everybody, this has been another great episode as we're thinking about solutions for depression and anxiety with the wonderful doctor.

Doctor Austin Perlmutter. He's a big, bold health. He's got a wonderful podcast. He's got great books out around brain health, including, most recently, brainwash and Drop Acid.

I think, and we will link to all of his content so you can get deeper into brain metabolism, brain inflammation and everything he's doing to educate us about that.

Doctor Austin Perlmutter, thanks so much. Medicine a treat having you here on Doc Talks. Thanks for having me.