



Boosting Brain Neuroplasticity Through Diet and Lifestyle with Austin Perlmutter, MD

[00:00:00] **Austin Perlmutter:** Who we are, how we think, how we feel is actually being changed moment to moment by what happens in our gut. And that means that who we are, how we think, how we feel is being changed by the foods that we eat.

[00:00:17] **Ginger Hultin:** Welcome to The Good Clean Nutrition podcast. I'm your host, Ginger Hultin, an integrative registered dietitian nutritionist. Today on the show, we're learning all about brain health with Dr. Austin Perlmutter. Dr. Perlmutter is an internal medicine doctor who now focuses on helping people improve their health through better decisions, neuroscience, and lifestyle interventions.

In the first episode of this series, we'll hone in on what's happening in your brain and how diet and lifestyle factors play an important role in the health of this critical organ. But first, I had a client before I worked in my private practice when I worked in a team with a lot of different dietitians, and this person said, I will only work with somebody on this team that will specialize in brain health protocol.

In this sea of dietitians, I put my hand up and I said, I will take it on. The brain is such a complicated organ and the way that food and nutrition and diet and lifestyle interact with it is also complex. So I did a deep dive into what is the connection, where is the research, and what am I going to do with this person to really help optimize his goal of reducing the risk of developing Alzheimer's in the future.

One thing that I saw over and over again that should be a big focus was omega 3 fatty acids. Those are anti-inflammatory fats, and it's so critical to make sure that you're getting enough omega 3s from either fatty fish or plant-based sources like flax, chia, hemp, walnuts. And one thing that was really fun that we did together is we made some morning muffins.

So we had flax, we had a little chia, we chopped up walnuts, we put some whole grains in there, and some fruits, and you can even put veggies in there. You can do zucchini, you can do carrots, and then you have these really fun omega 3 rich, whole grain, high fiber, protein packed muffins that are a great start to the day.

You can also take them in your car with you on your way to work. Welcome in, Dr. Perlmutter.

[00:02:17] **Austin Perlmutter:** Thanks so much for having me. I'm thrilled to be here.

[00:02:19] **Ginger Hultin:** We're going to talk about the brain, a huge area of your expertise, and how to care for it and hopefully prevent chronic conditions in the future. Let's begin with neuroplasticity.

[00:02:31] **Austin Perlmutter:** It's an easy one in practice. The actual science of it is a little bit complicated. But what everybody needs to know is that their brains are changing with each moment of each day. That the brain you have today is different from the brain you had yesterday, is different from the brain you will wake up with tomorrow.

And how that happens is through a process called neuroplasticity. And this is a well-established aspect of neurochemistry, of neurotransmitters, of basically the rewiring of the brain. We all have agency over this process, that we get to make choices with what we eat, with how we sleep, with how we exercise, with the connections we make with nature and each other, that directly influence this brain rewiring, this neuroplasticity process.

It's actually an incredibly empowering idea because for a long time, people had this belief that kind of the brain was fixed. You had the brain in your twenties, that every time you took a drink of alcohol or did something unhealthy, you'd lose neurons and you'd never get any of that back. That it was kind of progressively being damaged.

So, um, Neuroplasticity challenges that. It tells us that we are always changing our brains and one aspect of neuroplasticity is another kind of complicated term called neurogenesis. Neurogenesis is literally the growing of new neurons in your brain. Research has shown that in a couple of areas in humans, we can grow new brain cells across the lifespan.

That means you can create more brain cells. So, instead of this concept that if you lose a brain cell, that's it. Your brain is one cell smaller, and you just progressively lose brain cells over your lifespan, that actually, you can grow new brain cells. And maybe even more importantly, you can rewire your brain to make it more effective each day.

That's neuroplasticity in action.

[00:04:21] **Ginger Hultin:** It does feel empowering and like I can do something about this and I have some control and I really appreciate you talking about how I might not have lost all my brain cells when I was in college when I was 20. Thank you.

[00:04:34] **Austin Perlmutter:** That's it. I mean, hopefully I didn't either. We all have the opportunity to do great things for our brain.

It just so happens that our brains progressively develop up until at least our kind of mid 20s, specifically a part of the brain called the prefrontal cortex. But the part of our brain that allows us to have executive functions, make healthy decisions, takes a long time to mature. And that's important because it allows us to make healthier decisions hopefully later in life.

So many people ask me questions about what can I do? I don't want to get Alzheimer's disease. What can I do to help prevent depression? Well, all of these things converge on this idea of neuroplasticity and activating it in our favor. Many of the strategies that help to promote healthy neuroplasticity are the things we're going to be talking about and diet is a very big component of that.

What we're saying here is just like you can build new stronger muscles, you can build a stronger, healthier brain. But you've got to make a choice to make that happen, because unfortunately, we find ourselves in a society, in a world, in which the majority of the decisions that are easiest are taking away from healthy neuroplasticity, taking away from brain health as a whole.

[00:05:42] **Ginger Hultin:** What are some of the things that we can do to improve brain health?

[00:05:45] **Austin Perlmutter:** Prioritizing the quality of your sleep, not only because it works to make your brain function better, but also because it feels good. You're going to feel better, your mood will be better, in addition to your brain generally functioning at a higher level.

[00:05:59] **Ginger Hultin:** Can you tell me a little bit more about what exactly it does to your brain?

[00:06:03] **Austin Perlmutter:** A number of things happen during sleep that are essential to healthy brain function. Maybe the easiest one to understand is memory. So we know that our memories are especially consolidated and improved over the course of our night of sleep.

That means that if we want to learn new information, sleep is probably the most important thing that we can do to help convert that data into memory. We see a lot of different processes within the brain get activated that relate specifically to the consolidation of memory. And if you were to test somebody on their recall before or after even a nap, they will test better after that nap.

So it doesn't mean you have to get the full night of sleep to enhance your memory, but it does mean that sleep is absolutely essential to memory on that note. It's not just short term memory. That's so important as it relates to sleep. It is long term cognitive ability, and that includes memory. So we've seen that in Alzheimer's disease, which is incredibly common affecting 6 million Americans, that sleep issues are very prevalent and that having sleep issues predisposes people to a dramatically higher risk of dementia.

of developing Alzheimer's disease. So there is this long term correlation between better quality sleep and better kind of storage of memory in the aggregate over decades. Some of the other short term cognitive benefits of getting good sleep include the fact that we have better focus, but mechanistically there are some really important processes within the brain that help to explain why it is so important to our cognition.

Also to things like mood. And these relate to the immune system. The brain's immune system and the immune system of the body get programmed by the quality of our sleep. Another system relates to metabolism. So we know that our metabolic health is in part determined by the quality of our sleep. That relates to hormones like cortisol and insulin and blood sugar levels.

But within the brain, we actually have this system called the glymphatic system that flushes out metabolic toxins that build up during the day. So, During sleep, we open up these channels by up to 60%, it flushes out metabolic buildup and that may actually have incredibly beneficial effects on the brain as it relates to our risk for metabolic dysfunction and to immune dysfunction.

The last thing that I'll just say here is the brain kind of reorganizes itself from a whole brain level neuroplastic perspective during sleep. It helps to kind of coordinate the signaling between the neurons at the scale of the entire brain. So from a neuroplasticity perspective, this is an incredible opportunity to balance the way that the brain functions.

There is good data showing that you have better emotional regulation. So a part of the brain called the amygdala turns out to be a little bit more quiet when we've had a good night of sleep. That's really important because the amygdala processes fear in addition to emotional reactivity. We also know that long term you get benefits to your memory.

So there are a number of really amazing benefits to be realized. All more reason to prioritize just the amygdala. That seven-to-nine-hour window of good sleep tonight.

[00:09:09] **Ginger Hultin:** So many of my clients come to me and they want to feel sharper or more energetic, more clear headed. And so I do talk about sleep quite a bit, but the specific reasons you're giving me are so compelling for people.

There's so much to gain from it.

[00:09:25] **Austin Perlmutter:** Absolutely. There's another one that I'd like to refer to specifically the majority of Americans now who are thinking about weight loss. And that relates specifically to what sleep does to the way we process rewards and food. So some really interesting research shows that when people are sleep deprived, they eat a substantial amount more calories the next day.

Now there is this debate, which is about, well, is it really the calories or the quality of the calories? And in this case, the data shows it's. Both. So not only do people eat several hundred more calories the next day, but they preferentially choose unhealthy foods. When you put a sleep deprived person in front of a buffet, they will go for the unhealthy foods, the added sugars, the ultra-processed foods.

So there's something that happens within the brain as a result of sleep deprivation that actually leads us to make unhealthy decisions specifically around our food choices. Now, that's not something that most people talk about. Most people talk about, well, there's willpower, right? And that's being broken down a little bit now, by the advent of these GLP 1 drugs that are showing,

well, it's not just about whether a person wants to or not, because when you change this molecule, this GLP 1 pathway, people's Perspectives and desire for food change.

So it's not like we've acted on, well, we've just amped up their willpower by giving them a GLP 1 agonist. No, it turns out that hormones like GLP 1 influence the way that we choose to eat, whether it's a healthy food, an unhealthy food, or the amount of food. But it's important to recognize it's not just about that one hormone.

That sleep by itself has this incredible effect on changing how much we want to eat and the quality of what we eat.

[00:11:05] **Ginger Hultin:** Huge ties to nutrition. And by GLP 1, we're talking about the weight loss injectable medications that are so popular right now. Another thing that's very relevant to my population, I would say, Dr. Perlmutter, is exercise. And I know that there's a big connection between brain health and exercise.

[00:11:22] **Austin Perlmutter:** The link between physical activity and brain health is one of the most profound aspects of lifestyle medicine as it relates to improving brain wellness across the lifespan. We spend so much time talking about exercise for cardiovascular disease prevention.

This is what was drilled into me in school. It's you need to go jogging, you need to get your heart rate up because it improves your heart health, and heart health is a really important outcome for your of what we're trying to optimize towards because we know that heart disease remains the top killer around the world.

I would argue the benefits of exercise for the brain are even more important because everything else is a surrogate for good brain health. Meaning, if you were to ask people what really matters to them in life, eventually they would get to the piece which is, I want to be happy. I want to feel connected.

I want to have the ability to do things in a meaningful way. Those are all directly an output of how your brain works. So any disease condition, whether it's a heart issue, pain in your foot, GI upset, it matters because it detracts from your quality of life. Quality of life is a brain health outcome. So going back to this point here, yes, we talk about exercise for cardiovascular disease prevention, and yes, it is an amazing tool in that arsenal.

However, exercise turns out to be, if not the, at least one of the top interventions for enhancing brain health now and for the rest of our lives. To give you two examples, we now know that people who exercise are at a dramatically lower risk for developing depression. We know that people who exercise are at a dramatically lower risk for developing Alzheimer's dementia, as well as Parkinson's disease, as well as a host of other brain related issues.

So exercise is absolutely invaluable as a piece of the toolkit in preventing brain health and enhancing brain health today. The reasons that exercise, and I really should say physical activity, because I don't love this idea that we're telling people you have to go out and exercise. The idea is movement.

It's simply moving your body is a good thing for your brain and for every part of your body. Evolutionarily, what is exercise telling your body? It's telling your body it needs to continue to participate in this world, right? Your body, from, again, an evolutionary perspective, likes to conserve energy. It would rather just sit there and not have to go out and hunt for food and not have to go and build a new shelter.

It is lazy in that regard. But when we exercise, when we move our body, it shunts blood flow to the brain. It increases oxygenation of the brain. It increases glucose delivery to the brain. And it enhances metabolic function, and it enhances immune function, and it actually upregulates a molecule called brain derived neurotrophic factor, or BDNF.

And all of these are signals to the brain that, hey, we need to keep participating, we need to stay focused, we need to be at our top level of function. This helps to explain why in the long run, people who exercise or people who move their bodies are at a dramatically lower risk for developing brain health issues and just generally feel better, are happier people.

And I want to reinforce this point. I'm not saying you need to go out and run a 5k. I'm not saying you need to deadlift 400 pounds. What I am saying is that is that people who walk actually close to the 10, 000 steps a day recommendation are at a dramatically lower risk for developing dementia. People who participate in yoga and even stretching are at a lower risk for developing brain health conditions.

So it's optional what type of exercise a person might want to engage in, but it's not optional if your goal is to create a healthy brain to engage in some type of movement each day. An additional point I want to make here relates to the type

of exercise if you're deciding between something like aerobic exercise, uh, versus something like anaerobic exercise.

Anaerobic exercise is what people usually think about when they get their heart rate up, jogging for example, but anaerobic exercises, these are things like weight training, resistance training. We have historically prioritized the exercises like jogging, things that get the heart rate up, and there are absolutely benefits to those, but we also need to talk about Resistance training, weightlifting.

And the reason for that is that we know that when we exercise, especially our large muscles, they release a host of molecules called myokines. These are muscle derived signaling molecules that get into our bloodstream, and it's now being recognized, we're talking just the last 10 to 20 years, that these molecules signal the brain and have effects on brain health.

[00:15:56] **Ginger Hultin:** I've been talking to my clients a lot about strength training for healthy aging, menopause, perimenopause, we've been talking about on the Good Clean Nutrition podcast, bone health, there's so many benefits. I didn't quite realize that when the muscle's getting broken down that it's talking to your brain so much.

[00:16:13] **Austin Perlmutter:** Some of these molecules, for example, interleukin 6, have been historically seen as inflammatory. And in fact, if you were to measure inflammation in a person's bloodstream after an acute round of exercise, you would find that it had been increased. And so we'd say, wait, That's not good. The goal is to decrease chronic inflammation, not increase it.

But what seems to be the case is that when we release these molecules from muscle, they're in a different configuration than the ones that might be released from immune cells. Because of the way these molecules are released in the aggregate, they actually lower inflammation in the bloodstream. So it's a net benefit.

Now, the caveat to all of this is to say, everything has to be taken in balance. So if your goal is to live the longest, healthiest life possible and to support your immune system, for example, and not have too much inflammation, ultra marathoning may not be the best bet. You go over this threshold and then you start to actually create damage that persists.

So by definition, when you're exercising and using your muscles, you are damaging them. But they build back stronger the second time. It tells the body,

Hey, I need to build some muscle. We're using this for some reason. It's actually one of the reasons I think brain exercises are so important. You need to tell your body, Hey, we're using this.

We need to continue to keep this active, but in the spectrum. While it's great to do some stretches, it's probably a bit better to do around 30 minutes of moderate intensity exercise. And while it's great to do that moderate intensity exercise, it's probably not as helpful to do four hours worth of really intense exercise.

It's really about finding that balance. I will say, as you know well, it's all about what works for the person. So for one person, an exercise like high intensity interval training might be fantastic. For another person with joint issues and who hasn't been doing a lot of exercise, that's a disaster.

They're going to hurt themselves, it's going to be painful, and then they'll stop exercising altogether. So if you're trying to incorporate more movement into your day, my recommendation is to find something small, sustainable, and enjoyable. And that might be going around the block with your dog once a day.

That might be getting into a yoga class with some friends that might be signing up for a pickleball course. It doesn't necessarily matter the specifics of what it is from a general perspective. What matters is. What you enjoy and you can stick to.

[00:18:40] **Ginger Hultin:** Orgain's all-in-one nutrition shakes are formulated for everyday nutrition and cater to a variety of health needs and conditions. Available in dairy and plant-based options, these shakes have been carefully crafted to deliver 16 grams of high quality protein along with up to 22 essential vitamins and minerals and a wholesome blend of organic fruits and veggies.

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Ginger Hultin: Well, you mentioned neuro pathways, and I'm wondering if you can define neurotransmitters in simple terms.

[00:19:29] **Austin Perlmutter:** In essence, neurotransmitters are simply signals that convey data between neurons. And there are names that people are familiar

with, like serotonin, dopamine, norepinephrine, epinephrine, GABA. Some of these are more neuromodulators than neurotransmitters.

I think that change in definition is a little bit academic for these purposes, but the point is to understand that data is transmitted between neurons, and each person has something like 80 billion neurons, and each neuron can have thousands of connections with other neurons, which means you have trillions and trillions of connections and opportunities for data to transfer from one neuron to another.

Now, I know that people want to kind of pigeonhole neurotransmitters into a specific function. The best example here might be serotonin. People will say, Oh, your serotonin is high. You must be happy. Serotonin is low. You must be unhappy. That is not in any way the way our brains actually work. So stay with serotonin here for just one second.

Serotonin is a molecule that is produced through a pathway where it starts with tryptophan. and gets converted into serotonin. Serotonin is involved with mood, but it's not just a question of that molecule being high or low, because there are tons of different serotonin transporters or receptors. So depending on what receptor serotonin binds to, it can completely change the pathway that is activated downstream of it.

We also know from a study that was just published two years ago, that levels of serotonin in the body, in the brain, can Don't really correlate with depression and maybe are not the mechanism by which antidepressants work. This big umbrella review, in essence, looked at all the data on this serotonin hypothesis of depression and it concluded that It's not really what's going wrong, meaning it's not low serotonin levels in the brain that's causing depression.

It's not increasing serotonin in the brain that is curing depression. So it gets us to, again, a little bit more of this nuance because the majority of your serotonin in your body is actually produced in your gut and it's used in your immune system because it is present in platelets where it helps with aggregation of clotting.

So serotonin does more in the gut than it does in the brain as it relates to the amount that's produced, as it relates to some of these peripheral effects within the brain. In addition, just to add a little color to this pathway, when you start with tryptophan, it can be converted either into serotonin or it can go down a different pathway called the kynurenine pathway.

And the kynurenine pathway can produce molecules that are neurotoxic or beneficial to the nervous system. So the point here being, it's great to start with a neurotransmitter, it's great to understand that these signals are transmitted through the brain, but it's not the end all be all as it relates to interventions like diet, as it relates to interventions like exercise, and their beneficial effects on the brain.

We shouldn't get stuck on, well, it boosts serotonin, or it boosts dopamine, because that's not really the way these things work. Instead, we need to think about multiple pathways. So neurotransmitters are one, but we also have the brain's immune system. We also have metabolism within the brain. So, we know, for example, that insulin plays an incredible role in neuroplasticity and neurogenesis.

It's not just about blood glucose getting into the brain, although that's part of the equation. Neuroplasticity, it's kind of a standalone conversation as to what's happening. We've already discussed that to some extent. We know that the vascular system in the brain, whether the brain is getting access to oxygen and fuel from the bloodstream, plays a huge role in a number of brain related outcomes.

And why all of that matters is, the more we try to pigeonhole something in and saying, well, this does this, the harder it's going to be to actually get to the reality of what's happening. One last thing I'd like to bring up. We're all going to still be thinking about serotonin and mood disorders for a long time.

In the context of serotonin going wrong, meaning a condition like serotonin syndrome, where serotonin levels go way up in the brain, people are nowhere near happy. They actually develop kind of a psychosis. They develop a number of other issues. You can have a serotonin producing tumor in your body. These are not happy people.

It's not as though the molecule levels directly relate to happiness. So. The brain is, of course, one of the most complicated things in the body, and we need to start talking about it from a more holistic perspective, rather than simply saying, well, if I just increase my serotonin, I can check this box and call it a day.

And this isn't to say that we shouldn't use pharmaceuticals for conditions like depression. It is to say that we're probably not right in just saying, well, serotonin reuptake inhibitor, or Elevate serotonin, and that was your issue. Let's call it a day. We need to have more conversations about nuance around mental

health, cognitive health, and it all relates to these different pathways in the brain.

[00:24:02] **Ginger Hultin:** As you're talking about serotonin, of course, I'm thinking about the brain gut connection. So I'd love to hear more about how those are connected and what you know about that.

[00:24:11] **Austin Perlmutter:** Let's start with the general aspects of what is the gut brain connection or the gut brain. People have known that what happens in the gut influences the brain for a long time, but it's really only been in the last several decades that it's become such a massive area, not only of academic research, but also consumer interest.

We've reached an inflection point where the average person, the consumer, knows about gut health, that those terms are not foreign to them. There are many reasons why people care about their gut. GI distress is probably the most common symptom that people experience. So people are paying attention to it from that perspective.

They're saying, well, what can I do to improve this? And so then it brings in, well, what's actually happening in my GI tract? And then we start layering in, well, it turns out there's a microbiome, right? Meaning that there are healthy bacteria. and unhealthy bacteria that live in the gut, and maybe they're involved.

And then we learn there's an immune system in the gut, and actually the majority of the immune system in the body is located in the gut. And then we understand that there is signaling between the immune system in the gut and the microbiome in the gut. So now there's all of these different aspects of science that we can get involved with and start saying, what does diet do to this?

But as it relates to the brain, It's kind of a strange idea that what happens down in the GI tract, you know, this 25 foot long tract that runs from your mouth to your bottom is influencing what happens within the walls of your cranial vault, meaning inside your skull. But it turns out that is absolutely the case.

And a huge theme here that I perpetually am surprised by is how much What happens in the body influences the brain. And we've got to come back to this from an evolutionary perspective again, because the brain is tasked with, in essence, synthesizing a signal out of all of the data that the body is collecting, and then making choices that are best in line with protecting the body.

the survivability of the cells of the body, or basically keeping you alive. That is kind of the goal of the brain. It's not to have you be happy. It's not for you to live a fulfilled life. It's not for you to have amazing social connections. It's for you to survive. And from that perspective, of course, the brain needs to pay attention to every danger signal or other signal coming in through the body.

So where do these signals come from? Well, we know we're getting a ton of sensory data directly into the brain through what we smell, through what we hear, and through what we see, right? So if you watch a scary movie, you're going to raise your cortisol. That is the brain responding to what it perceives as a threat.

If you hear something, a noise of something crunching, While you're walking through a dark forest, you will similarly produce more of these stress hormones because the brain wants to respond to that, and certain smells can actually have interesting effects on the brain. But it turns out that the data that comes in through other parts of our body also have a direct impact on how our brain functions.

And as an example here, if a person eats a food, that food is going to fill up their belly, and make them feel full. How does that happen? Well, you produce molecules in the GI tract that tell you to feel full. So leptin being one example. This is a response to having that food come through. We also know that taste receptors throughout our GI tract can actually sample food and can tell the brain about what is happening here.

One interesting example is that taste receptors in the lower GI tract can produce GLP 1, can actually act on those pathways. So it's another way that satiety may get to the brain, even though we're not consciously aware of that happening. The convergence of this research for me is really around what happens in the conversation between the gut microbiome, the immune system, and the brain.

Because what we understand now is that changes in the composition of the gut microbiome, the different species that are involved in our gut, and just as a note, we have probably about a thousand different species, but we've got roughly 30 trillion bacteria living in our GI tract right now. Something like the same number that we have human cells in our body that.

The composition of these cells. correlates with brain health conditions. So we see people with Alzheimer's have a different makeup of their gut microbiome. We see people with depression have a different makeup in their gut

microbiome. We also know that what happens in the gut immune system relates to the systemic immune system.

And we know that people who have higher levels of inflammation are at a higher risk for developing depression, developing Alzheimer's disease, or Parkinson's disease, and a host of other brain related conditions. And the majority of your immune cells are located in your GI tract in your gut. The idea of this brain axis also requires us to talk about this so called second brain, which is the enteric nervous system.

Because after the brain and the spinal cord, the second largest population of neurons in our body is located in the GI tract. And the underlying theme to all of this is basically that the brain is constantly receiving data from the GI tract and that changes how it works. It changes how we behave, it changes how we think and changes how we feel.

And It's a little bit challenging to get our hands around because I think most people want to believe that they are consciously directing those aspects of their lives. So if they make a choice as to one food or another food, that's because they weighed the pros and cons and they made that choice. But the reality is, Probably the majority of what drives our decision making, how we feel, and even who we are, is a reflection of these unconscious inputs into our brain, of which the gut microbiome is probably one of the single biggest reservoirs of data that we are responding to.

By way of the gut immune system, by way of signals that get transmitted from the vagus nerve, which basically has nerve endings in the gut and takes that data to the brain, by way of the bloodstream, uh, which carries signals from the gut microbiome, from the gut immune system, and even from our food to our brain.

And what this means in aggregate is that is that who we are, how we think, how we feel is actually being changed moment to moment by what happens in our gut. And that means that who we are, how we think, how we feel is being changed by the foods that we eat. And if you kind of play this out to the logical end, you realize that the sense we have of what makes me, me, what makes me Austin is actually a reflection of these gut microbes, of these gut immune cells.

And they have a say in who we are, and we have a say in who they are. So, you eventually realize how powerful our decisions are, and that our decisions aren't all being based in what kind of we want. There's a lot of different ways you can approach the subject, but the fundamental end of it all is you've got to look out for your gut microbiome, because otherwise it won't look out for you.

You've got to look out for your gut health, because otherwise your overall health and your brain health may suffer.

[00:30:58] **Ginger Hultin:** It's such an incredible connection. And you mentioned a couple times the immune system. So I'm wondering about the connection between gut health, brain, immune system, inflammation. It's this big web.

[00:31:10] **Austin Perlmutter:** It really is. And it's one of these things where you can get into it at any stage and be amazed at how much complexity there is. One of my main roles right now is at a company called Big Bold Health, and our goal is to help people disentangle the complexities of the immune system and specifically to get people to understand that the immune system is so much more than just a defense mechanism.

We have these overly simplified common explanations of all these different systems in the body. The problem is when these overly simplified explanations of these systems in the body lead to people making choices that are That take away from their wellness. So as it relates to the immune system, we still think about this as a population, as a defense system.

The immune system kicks in when it detects some sort of, let's say, microbial danger, it ramps up production of a host of different molecules and cells, hopefully if things go well, it fights off the microbe, it seals off the wound, and we go back to a relative state of low immune activation. If you buy into this, and it's not untrue, it's just not the entirety of the equation, then we talk about boosting the immune system.

You take a high dose of vitamin C, you boost the immune system, it's better able to fight off microbes, and you're better off than if you didn't take the vitamin C. That is not even half what the immune system does. Because getting back to the central theme about how does the brain respond to what's happening in the body?

Well, the immune system is a principal conduit of data from the body to the brain. So one of the major roles of the immune system that most people are completely unaware of is that it changes the way that we think, changes the way that we feel, because it is communicating to us, here's what's happening in the outside world.

And to give you a couple of examples of how powerful this is, what we know is, as I've already said, Higher levels of inflammation predisposes to higher risk for

depression and, specifically, treatment resistant depression. If you induce inflammation in a healthy person by injecting them with a molecule called lipopolysaccharide or LPS, which is a piece of a gram negative bacterium, they will pretty reliably start to experience depressed symptoms.

So you're, in essence, creating depression de novo or from scratch by increasing inflammation. We know that higher inflammation predicts risk of heart disease, diabetes, obesity, and Alzheimer's disease. And this speaks to the fact that inflammation does a whole lot more than just defend against microbes, that it is communicating with every organ in our body, and communicating in particular with our brain.

Beyond this, we know that within our brain about 15 percent of our brain cells are actually immune cells. They're called micro glial cells. And I know I'm putting out a whole bunch of kind of seemingly random scientific facts, but we all operate with these myths, which is our brain is full of neurons and there's nothing we can do about them.

They kind of are what they are. That is just not the case because actually half of the cells in our brains are not neurons at all. There are these glial cells of which these micro glial immune cells are a huge percentage. And. The brain's immune system is listening to what's happening in the body's immune system.

The brain's immune system is listening to what you take in through your eyes and through your ears. And it's certainly listening to what comes up through the gut. So to put all of this together, there are so many systems at play. So we could talk about the endocrine system and hormones. We could talk about metabolism, the immune system, the microbiome.

The bottom line is we are each miraculous individuals with incredibly unique and complicated brains that make us who we are. But those change every moment, right? Depending on what happens in the rest of our bodies. So this is all the more reason to start paying attention to the simple decisions we make every day because they impact each of these systems.

A bite of food that you eat changes your metabolism, changes your endocrine function, changes your immune function, changes your microbiome, changes the makeup of your gut immune cells just as it changes the makeup of your gut cells, and the aggregate effect of all of this is that it impacts your brain function.

[00:35:18] **Ginger Hultin:** You talk in your research and communication a lot about the Mediterranean diet. We know sleep is critically important, exercise,

especially strength training, and moving your body. Tell me about diet. This is my biggest passion.

[00:35:32] **Austin Perlmutter:** Diet is the most interesting conversation for most people as it relates to improving their health.

And what's challenging about diet is you have two people with five opinions about the best diet. What I would recommend people do is that they do their own work, right? So learn about, is this a peer reviewed, evidence based dietary plan? And talk to your practitioner about what works for you. As we're looking at the best diets for brain health, the Mediterranean diet is the number one, and the variant of the Mediterranean diet, which is the Mediterranean DASH intervention for neurodegenerative delay, right?

which is a mouthful, but it's the MIND diet. M I N D. And time and time again what we have seen is that people who adhere to a Mediterranean pattern diet are at lower risk of neurodegenerative diseases, so Parkinson's, Alzheimer's disease, and mental health conditions like depression. In the spectrum of dietary interventions, this is the one that has been best studied and best substantiated.

Now, I know that people have a number of opinions on this, and I will just say as a caveat, it's not going to be right for every person. Some people may have intolerance to some aspect of the Mediterranean diet. Feta cheese is sometimes on the Mediterranean diet. Not everybody's going to handle that.

Similarly, whole grains are part of the Mediterranean pattern diet. Not everybody is going to handle that, but by and large, the Mediterranean pattern diet is one that emphasizes the consumption of minimally processed foods. And I think that is the best place to start with. What I tell people is, eat the foods that people have messed with the least.

The more a human has messed with the food, the lower the chances are that it's going to be adding a significant amount of value to you. I want to put in a caveat here. I've been challenged on this before, and I think it's important. There is absolutely a benefit to the fortification of foods. So if you were to eat a bowl of cereal, it's been fortified with vitamins and minerals, so you don't get a deficiency.

And I think in the right context, that's really important, but let's talk about why that is the case. It's fortified because the actual food itself doesn't have the nutrients that you need. And so the further we get from a real food that you

could point to on the grocery store shelf and say, that is. One word, you get one word, you know, that is kale.

That is salmon. That is an almond. Once you start, get to enriched white almond processed flour, not the same thing. So what that looks like in practice is eating lots of diverse fruits and vegetables, nuts and seeds, herbs and spices. It's eating in the Mediterranean pattern. More on the seafood side. If you choose to eat meat and meat-based products and it's eating some poultry and less red meat, it's definitely not eating a lot of sugary foods and there is an overwhelming scientific consensus that nobody needs to be eating sugar sweetened foods or beverages.

They serve almost no purpose. There's a very small subset of people who might benefit from them if they are very intense exercising, but for most people, I would say that. Just avoid anything with added sugar. It's providing no benefits for you. As it relates to some specific foods, there's some decent data suggesting that olive oil consumption can help to prevent certain cognitive issues.

Olive oil may actually help to enhance the quality of the blood brain barrier, which keeps out things from the outside of the body that you don't want getting inside the brain. One of the variables that's been found time and time again in diets like the Mediterranean diet is that they're very high in molecules called polyphenols.

It's what gives fruits and vegetables their color, and these are kind of plant defense molecules, because plants, unlike humans, aren't able to pull up their roots and just run away if there's a pest. So they have to produce molecules that fight off things like bacteria, fungi, and the environment.

Polyphenols, though, when humans consume them, linked to a host of wellness benefits, brain health benefits, gut health benefits, and so one of the reasons why researchers have suggested the Mediterranean diet is so valuable to overall and to brain health is because it's especially high in these polyphenols.

The richest sources of polyphenols for the average American is probably coffee and maybe some red wine, but It should be things like herbs and spices because these are incredibly concentrated in polyphenols. So even black pepper, turmeric, rosemary, sage, they're very rich in these molecules that have been shown to have all these potential benefits to our immune health, our metabolic health, and in doing so, improving the state of our brains.

Disclaimer, I'm not saying there is one diet that is best for everyone, but I am saying As it relates to long term brain health, this is the best studied dietary pattern. And yes, it is one that emphasizes a bunch of plant-based foods. It is one that emphasizes if you choose to eat meat, more seafood as opposed to red meat.

And there's some contention around whether we should be consuming red wine in this diet. As it relates to the brain, alcohol is toxic. If you choose to drink wine or alcohol, make sure it's moderate level as opposed to going over the top because high levels of alcohol are absolutely toxic to the brain.

[00:40:33] **Ginger Hultin:** I've done a lot of work in the anti-inflammatory space, but honestly, as you're talking about the Mediterranean diet and defining it, I see every similarity. There's not one specific diet. You know, I have 50 clients right now. They're all on their own path. It does need to be personalized, but still there's evidence that shows so clearly that some foods are helpful for us.

[00:40:53] **Austin Perlmutter:** I think that's true. One other thing I'd like to say here too, is I think there's always the ability for certain people to say, look, it has to be organic. You have to source it from this one farmer I know at the end of the street, otherwise it's not even worth eating the food. This is just like exercise, a question of better, not perfect.

I try to eat organic as much as I can, not 100 percent of the time, especially not when I'm traveling. And so there's so much that any of us can do to improve a little bit. And so that might mean for most people, cutting back on sugary beverages, and it might mean for most people, not necessarily saying, I'm going to only eat kale salad with organic walnuts for dinner with mackerels three times a week.

Many people don't like that, but you could sub out white flour for something with more polyphenols. Or you could say, instead of bringing a bag of Oreos to the office, I will put some nuts into a bag and that will be my snack. It's really just finding the small ways to go from a D grade to a C grade, and then you can start talking about what does it take to get to a B and to a B The important thing there for everyone to understand is you really want to have this be coming from within, you're generating it for your own benefit, and you don't have to solve for these issues overnight.

This is the process of a life to try to get to a state of more equilibrium through diet, through exercise, through mindfulness, through better sleep, and you really

want to have people around you that are supportive of that iterative model as opposed to either you're doing it or you're not.

[00:42:18] **Ginger Hultin:** Oh, a hundred percent. Working with experts like yourself and registered dietitians, that is really how you make the progress, not perfection. And you were talking about the farmer's market, which made me think about getting outside and that connection to health. So we're going to talk about that in our next episode. I'm so excited to learn from you.

[00:42:35] **Austin Perlmutter:** Can't wait.

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