Announcer:

Bulletproof Radio, a state of high performance.

Dave Asprey:

You're listening to Bulletproof Radio with Dave Asprey.

Dave:

Today's guest is a Vanderbilt and Mayo Clinic trained double board certified family medicine and integrative holistic medicine expert. I like to call him a very curious physician.

Dave:

He's a teacher, an innovator, who's paid a lot of attention to the root causes of illness, and he's going to talk with us today about some very new cutting age anti-aging techniques that you probably never heard of, stuff that I've actually done, some stuff that I briefly mentioned in Super Human, but we're going to go deep on how you can do things to your immune system, to your body, to your brain that you probably didn't know you could and things that we'll all be doing at some point, including young blood. I like how I said that. I'm talking about none other than Dr. David Haase.

David, welcome to the show.

David:

Great to be here. Yeah. That made me laugh when you say young blood because, yeah, it conjures up quite some amazing images, doesn't it?

Dave:

It does and just to start out the show now, you and I both have a college student chained under our beds and we're siphoning off their blood to get the young plasma because it's cleaner than our plasma, right?

David:

Mine's on strike.

Dave:

Yours on strike? I replaced mine. I mean, my son Alan, by the way, if you're watching on YouTube, he's sitting next to me. So, I mean, Alan, can I have a little bit of extra blood?

David:

Is that why he's sitting so close to you? Do you have a little pair of biosis going on?

Alan:

Yes, right through his leg, right there. It's like one of those tubes that just, yeah.

Dave:

So, he won't share his blood with me and that's probably for the best because we might not have to do that, but let's talk for a little bit because I mentioned this in the book, why in the heck would, and by the way, you're not actually an advocate of stealing blood from college students or young people and all that. I'm putting words in your mouth, but you are an expert on what's going on in the plasma of our blood. So, talk to me about why blood plasma is interesting as a source of anti-aging compounds and why it's part of the aging process.

David:

Oh, yeah. Oh, yeah. I think it's great, and you listen, saying the word young blood gets people's attention, right? Whew. Everybody would say, "Oh, that's vampire stuff," and that's really, no, not at all when I'm working on, but-

Dave:

You're disappointing me. Okay. That's it.

David:

No, no, no, but listen, what got me into functional systems medicine was do least harm, right? We should always make sure that any interventions we do are things that are really going to help people and never harm. So, doing things safely is always at the top of the list.

Dave:

You said something really important there. You said, "Do least harm," because do no harm seems like complete hypocrisy because, I'm sorry, did you stick a needle in my arm? You poked a hole in my arm. You did harm. It's okay. It was worth it, but that mindset has destroyed medicine the first, do no harm.

David:

Exactly. We're always going to be doing harm. Not doing anything is doing harm, oftentimes. I think that's the other problem. Some physicians are just plain chickens. When we have data that shows us that there may be something that can help, but it's not yet considered the standard of care, not yet something that is globally accepted, that inaction has harm unto itself.

David:

When I'm dealing with folks with Alzheimer's disease, all down to individuals with maximizing cognitive performance, and those are different classes of interventions that are appropriate for both of those groups of people. One has really nothing to lose and the other has a whole lot to lose. So, treating patients as patients really is first, patient-centered medicine, and listening, and adapting to what an individual's needs are. That's the joy of getting to do this work.

Dave:

Full agreement there. Now, I want to maximize performance and live forever, and how many college students blood do I need to do that?

David:

I don't know yet. I don't think anybody knows that yet. So, for the people, listeners who aren't available, how much have you talked about parabiosis?

Dave:

Probably not enough unless people have read the book.

David:

So, let me go back.

Dave:

Talk about the history of this, where it came from, and why we're not actually ... You don't actually do that. I just keep putting words in your mouth because it's tied to what you really do do, but let's talk about that because it's a great way to get going.

David:

I think, well, there's some fundamental principles on what creates health, which has really always been my passion, instead of let's just treat disease. There's amazing studies done both at Berkeley, Stanford, MIT, Harvard, where they took clone to mice, a young mouse and an old mouse. They're really the same genetics. They'd grown up in the same environment, and then they attached them to each other, an old mouse, a young mouse side-by-side. In about a week, an amazing thing happened.

David:

The old mouse started to turn young, new bone cells. Osteoporosis started to reverse. The liver started to function better. Skin started becoming thicker and new hair started to grow. Smell returned in these mice, and the new neurogenesis and suits, so the sprouting of new neurons and also increased synaptic density, just like what you were talking about in your intro statement, interestingly enough. So, the ability to change one's mind is actually a physical event. You actually have to increase the number of neurons and connections or decrease them, and that would happen in this week.

David:

The other thing that happened as this old mouse and young mouse were connected is that the young mouse was harmed. The young mouse was stunted by getting exposed to old because old is toxic. When you recognize this fact that there are factors inside the plasma of old mice that actually can stunt body-wide the stem cells in that young mouse, it makes you reconsider a lot.

David:

Then after about a month, those mice stay connected. The young mouse recovers. You separate them, and the young mouse lives to its normal expected lifespan. In some similar experiments with rats, and we don't have many, the older rodent lives closer to the lifespan of the young rodent. So, there may actually be age extension involved as well.

David:

So, the fascinating thing here is, oh, and then that study was followed up by, "Hey, let's just pull young plasma out of this young mouse and inject it into an old mouse." Sure enough, voila, those changes happened as well.

David:

Then some other interesting science, which we'll get to as we start talking about Alzheimer's, also showed that pulling out, just getting rid of the old plasma was tremendously beneficial in humans.

David:

So, this whole idea think that your plasma is really the interface of what creates health because your plasma is the interface in between the outside world and the inside world, right? So, everything you breathe, everything you eat, everything you put in your skin has to go through your plasma to get to your brain, your lungs, your liver. It is the great interface.

David:

So, the quality of your plasma reflects the quality of your living. You can dramatically change your plasma here and today by the choices you make and the environment you place your body in.

Dave:

When we talk about plasma for people who are less medical than you are, this is just the clear stuff that your red blood cells are floating in and your white blood cells are floating in. Good description?

David:

Exactly. So, your blood is a mixture of cells, and particles, and fluids, and the plasma is a protein dense fluid, the yellow stuff that floats around, but it contains a whole lot more. This is also where you contain your exosomes. This is where you contain nutrients, hormones, signaling markers, the degenerated chunks of DNA and RNA that have come off of cells that have died recently. It's both the garbage truck and grocery delivery van.

David:

The plasma is incredibly important, and that's why when we draw blood, most of the time what we're looking at is not your blood, we're looking at your plasma. We've been assessing plasma from the very early days of medicine.

Dave:

So, when we look at something like, "Oh, your blood is clotting too quickly," or something, we're looking at fibrinogen and thrombin. These are proteins in your plasma, not actually the red blood cells themselves.

David:

Right. Right.

Dave:

So, you're saying that young people appear to have some good stuff in their plasma or maybe it's a lack of bad stuff, and old people have more bad stuff in their plasma.

David:

Yeah. I think that's really the question. So, is there some magic formula? You mentioned a bunch of great things in your book, Superbeing, sorry, Super Human. I have to tell you, great job on the book.

Dave:

Oh, thank you.

David:

No, really, because I don't usually like popular press books because they're full of fluff usually. Usually, it's blah, blah, blah, blah, tiny bit of information packed in a bunch of story. You made it enjoyable to read, but also it's dense and-

Dave:

There's a lot of stuff in there.

David:

There's a lot of stuff in there and that's great because this is not a simple process. If anybody wants to think that there is a single magic ingredient, I think they're going to be disappointed. Klotho is a great example of that. That holds incredible promise as a single ingredient that comes out of plasma represented in young people, but it may not be the only factor that's going on.

Dave:

It is. In fact, it's funny. I write about the youth encouraging factors that are documented to be present in young people, things like thymic proteins and GHK that we can introduce for cheap to our own plasma, and then there's a bunch of bad stuff that's in there. Then klotho, the protein, a good friend of mine, Jim, is working on synthesizing this stuff in a bioreactor. It's just too sticky right now. So, once he gets that out of the lab, I'm going to get it in my veins and I think a lot of anti-aging people, as well as people with kidney failure will.

David:

Right. Right. Stays in Australia. Yeah. Yeah.

Dave:

I'm encouraged, though, to know that young people also have klotho. So, if you get a plasma from a young person, you could do that, but maybe there's a better way. What-

David:

Let's go back into the plasma and what do we know so far, okay? So, think of this. So, I am a certified apheresis specialist. So, I have been trained on how to hook up a person to a machine. Apheresis is the process by which you pull blood out, you mix it with an anticoagulant, it goes through a centrifuge. Then the plasma gets pulled off to one side and discarded. The cells are then mixed with a replacement fluid of some sort, and that fluid contains-

Dave:

I like that Coca-Cola for myself.

David:

Yeah. I think that would be great for ... I think that's really the Bulletproof plan right there.

Dave:

The replacement fluid is obviously just more to the point. It's a replacement artificial plasma.

David:

Correct. Most often, what's used is albumin. So, albumin is a protein that's usually in this replacement fluid, immunoglobulin, so IVIG. Those are other components that get done in this. So, that replacement fluid joins your cells, and that then goes back into the body. So, what you're doing is you're removing the old plasma and putting in some fresh replacement of some sort.

David:

Now, there's a remarkably large study that's been completed and it's called the AMBAR trial. This is looking at actually treating Alzheimer's disease with the process of this plasma exchange that's going on. So, they took approximately 500 Alzheimer's patients, mild to moderate Alzheimer's disease, and they did this process of removing their blood, separating it out, and replacing all of their old plasma with albumin. Some remarkable findings came out.

David:

In people with moderate dementia, they had a 60% decrease in the rate of progression over 14 months, 60%. In individuals with mild Alzheimer's disease, there were actually improvements over those same 14 months. They had improvements in executive functioning and memory.

David:

So, what we saw here was a large randomized, double blind, placebo-controlled, multinational, multicenter, academic trial. Has not been published yet. It's been presented at three major international meetings, which I attended. This has been extensively debated already, but it's just amazing that the world doesn't know about this. That process of just doing therapeutic plasma exchange and removing the old and replacing it with a very benign, very safe substance like albumin or immunoglobulins, that's astounding. That's a standard of care for treating many severe autoimmune diseases.

David:

So, we can treat multiple sclerosis, neuromyelitis optica, and some other horrible diseases using this plasma exchange process, but we have data now to show that this could be useful for Alzheimer's. So, that is just, I would say removing the bad, okay? That's one side, removing the bad.

Dave:

In fact, from a nutritional perspective, it's the same thing, "Oh, eat this because it's high in some kind of vitamin." Stop it. If it has a cyanide pill on top of it, it doesn't matter if it's full of vitamins. You got to stop the bad and then accelerate the good. It feels like in the practice of medicine, we've sometimes just, we've just missed that point here.

Dave:

So, your idea, "Hey, let's get rid of the stuff that's causing the problem before we start adding additional things like antibiotics or whatever else," I just could not agree more.

David:

Yeah. Yeah. Then the whole aspect of that, what you've been asking is what happens when you add in, right? That's where all the energy is because those are what I'm talking about, removing the bad. That's a procedure. I mean, you're dependent upon a procedure to pull out the bad and the old right now. I think we're working on some cool technology. I think there's so many things coming forward, but for right now, that's a procedure, but if you want to add something in, be it exosomes, peptides, all these things that you have been using and working on for a long period of time, those things, there's a lot of magic there. The whole young blood idea is what started this process moving forward.

Dave:

It did start the process. To be clear, people, if you're listening to this and you've read Super Human, you know this, but otherwise, there were no studies of the company that was doing young blood where you can spend $6,000 or $8,000 to get ... I thought it was overpriced, and I was concerned also about maybe the level of testing of what was going on in the plasma he would get. All I know is what I did in college and I don't know that I would want in my blood from back then. Anyway, just saying.

David:

So, plasma, but let me say this that that can be done better, I'm convinced, okay? I'm absolutely convinced because there are facilities that can age and sex segregate plasma, that can do additional testing, can quarantine plasma for a long period of time. You should get your plasma from single donors, not these mixed donors. It should be tracked. There's so many things if you're going to use plasma as a therapeutic, especially as somebody like you, right? If you're young and vibrant, the unknown unknowns are the things you really have to watch out for. In medicine, we have to have a great deal of humility.

David:

However, if there's an individual with Alzheimer's disease and they have no future, literally, their family is only seeing more torture ahead with the increasing loss of capacity, and memory, and function, now, one has to always come back to what is the risk benefit ratio of interventions of those types.

David:

I do think that there should be these opportunities to dive in more extensively utilizing young plasma as a therapeutic under good controlled circumstances in good doctor-patient relationship environments, but it's not a one size fits all here's this miracle elixir that should be pumped in. I wouldn't go there.

Dave:

Now, I have not tried plasma phoresis, although I would like to do it once every six months just to get rid of the gunk that builds up, but what I have done is I've done a dialysis with a special filter that washes out all, not all, but many of the proteins from my own plasma, which is a step towards what you're doing. So, I sit there for a couple of hours, anticoagulant, but instead of a centrifuge, we're basically running my blood through a big filter, and then you get a big container full of weird foam that was all the proteins.

Dave:

For things like autoimmunity, generalized inflammatory molecules, cytokines, stuff like that, it seems like a really good idea. For added measure, I add some ozone to it as well, which is going to kill whatever's left. So, I do feel really good after I do a treatment like that, and I'm also hungrier than anyone's business, which is something that happens from dialysis.

David:

I think that is a great thing. I mean, I think removing the bad can be done very safely, and the idea of ozone, and all of that on top, I'm copacetic. Those are things that I think are amazing and that we should be thinking forward in those domains. That's good.

Dave:

So, now, we have a bit of a problem here, though, because we just got hundreds of thousands of people listening to this going, "I want a blood wash." I know that the ozone dialysis I do takes a couple hours. You have to have specialized equipment and a special filter, and there's different kinds of filters, and you can have drops in blood pressure, so you need good nurses or a doctor, and all that kind of stuff. It's probably even a bigger deal with the centrifuge when you're doing a plasmapheresis.

David:

Actually, it's less of a big deal. So, centrifuges are very stable, the filters often, and filters are amazing technology. I see them really being the future. It's just what type of filter, how are they utilized, but with a centrifuge, we can separate all kinds of cells or plasma or platelets, et cetera, but, yeah.

Dave:

So, if someone wanted to go do this, there are almost no clinics. I was going to fly to Germany to go do it before I found out there's a few people doing it. I settled on doing the dialysis with the special filter instead of traveling to Germany, but how expensive is getting plasmapheresis for the average person?

David:

Yeah. It really all depends on, A, how big that person is, how much replacement fluids are there.

Dave:

Discriminating against tall people. I swear.

David:

Not tall, total body volume.

Dave:

Against fat people. Oh, that's not even legal. I'm totally teasing you.

David:

You can actually move your right and left arm and that can give you a discount right there.

Dave:

There you go.

David:

So, it's really height. No, but the price can range anywhere from major medical centers when they're doing the same procedure can be upwards of 14,000 per procedure. So, taking this into the outpatient

realm and assuring safety on this can drastically decrease the price down, but we're still looking around $5,000 for most of the time for the actual procedure.

David:

Now, there are many procedures and volume is going to be important because doing this well is going to be done better at scale, and that's going to decrease cost. So, right now, it is challenging, especially for people with Alzheimer's disease.

David:

The study that was completed was that there was one exchange done once a week for six weeks and then once a month thereafter. So, this is not a one and done operation for that particular component, but it is. So, this is where we have a lot of questions of balancing resources, and where ... Listen, as this becomes more popular and I'm looking forward to teaching physicians on how to do this because I think that that is going to become, once we have a better idea of what is the best way, there's no question in my mind.

David:

Listen. This goes back to core of functional medicine. How do you create health? Well, either you abide by the law of the tax, right? If you're sitting on a tack, you understand it takes a lot of aspirin to feel better. So, you want to get rid of the tack. So, you get rid of the bad or you add in the good. Removing the plasma is just one additional way of detoxing things that couldn't come out any other way or the body isn't able to remove it in any other way. So, I think this is a fundamental principle, how it is going to continue to express itself. We're going to see a lot of changes over the course of time.

Dave:

All right. So, what I am translating that to is that it will get cheaper over time.

David:

Absolutely.

Dave:

So, this is a big concern. A lot of people say, "Oh, this anti-aging stuff, it's for rich old people," right? Frankly, rich old White people because, well, there's a lot more rich, old White people for all sorts of reasons than there are people of other races, at least in the US. The deal is that changing the environment around you and inside of you to make your body do what you want, that's everyone's game. It's called living and just being responsible as much as you can, and just knowing what to do.

Dave:

So, I look at something like this and I say, "All right. Our job would be to make people know how impactful it is and then compare it to the cost of a long-term care facility for someone with Alzheimer's disease," and say, "Oh, if you can avoid two years or five years or 10 years of long-term care, which is hundreds of thousands of dollars a year, this is actually a bargain," right? It is. That's where we start, right?

David:

That's exactly correct, especially if you go to Alzheimer's disease. Any memory care center that you get is going to be $65,000 to $95,000 upwards 150. It all depends on how nice of a memory care center you want. So, you can have a year of apheresis, especially in individuals with mild Alzheimer's disease, seeing them maintain a level of function. They can be at home. They know their kids' names. They're not incontinent yet. They can express their wisdom.

David:

I want to tell you, Dave, I stayed away from Alzheimer's. I mean, I love the biohacking world. I like people who are sick that get better. Alzheimer's is an incredibly hard place to be and work. I fled it for a long time. The thing that changed for me, and you actually mentioned this in your first chapter as well, and it touched me because I have a deep passion for wisdom. I think wisdom is what our world needs more of. The tragedy of seeing a brain degenerate is that all that life experience that has been filtered and curated that is needed in the world goes away.

David:

So, treating Alzheimer's is really the protection of our resource of wisdom. So, it's not just what is the cost economics. Having a grandfather that can still speak into your life in a way that is meaningful and loving, these are amazing resources. Sorry. That gets me a little choked up because I think it's a moral issue, really.

Dave:

It is a moral issue. It's one thing if, "Okay. It was time to die. It was time to die," but it's the last 20 years where you're not able to do what you're supposed to do when you're old, which is share your wisdom and learning with the next generation right when you're supposed to have energy and time to do that. The world needs our elders. Really, we do need that wisdom. That was one of the reasons I wrote Super Human as well.

Dave:

It's also why I'm willing and able to, thankfully, to go out and spend $5,000 twice a year to get my blood washed. Frankly, my car is eight years old, and I probably could buy a new car, but I'd rather take that extra resource and put it in to my body because that's way more useful and interesting to me.

Dave:

I look at what's going to happen five years from now and if this show does what it's supposed to do and you do what you're supposed to do, you train a bunch of doctors, we'll be able to go out there and say, "Oh, this is now a $1,000 procedure," and a thousand bucks is still a lot of money, but compared to a lot of the other costs that come with aging, it's in the realm of starting to get accessible, and you need it more as you're older.

Dave:

I feel like maybe insurance companies will start to cover it, and that it's something that's possible, but I want to offer. Okay. I want to offer something. My whole reason, not reason, my whole structure for writing Super Human was very, very clear. It was this is how the body works for aging. This is what crazy billionaires are doing. I held up my hand and I did every single thing I could find and afford that a crazy billionaire would do given that I'm not a billionaire. Not that I'm complaining. I'm doing all right, but

there's some things where you're going, "They want a quarter million dollars for that. I don't think I could do that right now. That's out of my pay grade."

Dave:

So, I went and I did all that, but then I look at, "Okay. This is the super expensive and then this, it's not going to cost very much, but it's the same pathway, and then here's the free that's a similar pathway." So, everything is entry-level no cost. In terms of plasma exchange, look, if you're not going to be able to do this, you could do what I think that the old Greeks were into like, "Oh, let's do some bleeding." You can actually donate blood.

David:

Oh, absolutely. Just donating blood has survival benefit. So, you're actually getting rid of your plasma one unit at a time, and you're helping somebody else. So, I'm glad you brought that up because I think that is one of the things that I think plasma exchange can really bring forth is this understanding that we can help a lot of people in the world by just detoxing ourselves or having a good bleeding.

Dave:

Yeah. Now, think about this. If you were to donate blood, you can do it, what, five times a year safely?

David:

Oh, more than that, usually.

Dave:

So, we'll just say five times a year because it takes a bit of time and all that. That means you pretty much got one full plasma exchange. You got rid of an entire body's worth of plasma, right? I'm assuming you'll have about five-

David:

No, about a half, about a half a bottle.

Dave:

Half a bottle? Because then you have about five quarts.

David:

You have about five liters going on in there, right? Only half of each one of your donations is plasma.

Dave:

So, you have to do 10 donations to do ... Okay. So, 10 donations is worth $5,000 of medical costs right now because that's what you'd pay for one blood wash, right? So, 10 donations can help a lot of people, but 10 donations, you can't do that in one year. You're going to be really tired and hungry all the time and you're going to need a lot of steak if you do that and egg yolks, but over the course of two years, you actually can do something like this and some places will pay you for a blood donation or, certainly, it won't cost you anything. So, that's one thing.

Dave:

The other thing to think about here and, by the way, I'm just validating my thought process with-

David:

Donating plasma as well. So, I mean you can donate much more plasma than you can give. Give whole blood, absolutely.

Dave:

Just be a plasma donor. Okay. So, there's your cheap version. Just donate plasma all day long and then you're happy as a clown. It didn't cost you anything.

David:

Yup. Absolutely.

Dave:

Okay. Well, there we go. That's a way to do it, and then your body just generates its own plasma where they would give you glucose, 5% dextrose or something.

David:

It doesn't take much. I mean, they're not pulling out a lot at that time.

Dave:

Okay. So, that's cool. Then the other thing you could do, and this is something that I've been doing for a long time, is I take a lot of proteolytic. These are protein-degrading enzymes on an empty stomach before bed, serrapeptase. By the way, all of this is in Super Human, and there will be show notes for this. There's a transcript on daveasprey.com, so you don't have to stress about pulling over and taking notes right now if you're listening to this in your car.

Dave:

I take serrapeptase, and some other protein-eating things. What those do is those eat up the stuff that's in your blood, those extra proteins floating around, so you can have less of those molecules. We now that this works because it markedly lowers fibrinogen levels, for instance, and thrombin levels.

Dave:

Also, when I did my ozone dialysis, what we found in the filter was they looked at that and they said, "Wow. You have the least amount of foam of anyone who's ever come through for a first time dialysis using a filter." Foam is a measure of protein there.

Dave:

So, you can keep the plasma cleaner with protein enzymes, and they're talking 50 bucks a month, maybe a hundred because I take handfuls of the things because, well, I do a lot or free, but blood or plasma donations.

Dave:

So, I want people listening to understand you're at the cutting edge, "How do we do a medical intervention? How do we deal with this stuff?" There's ways that everyone can access this mechanism of cleaning the blood. What am I missing?

David:

Mostly, well, you just don't pollute it in the first place.

Dave:

Oh, come on.

David:

So, one of the supplements I know that you sell is, I can't remember the name of it, but it's a prebiotic mixture.

Dave:

Oh, yeah, Inner Fuel.

David:

I chuckled when I looked at the ingredients because I have been encouraging people to eat sticks and twigs for about 15 years because these complex fibers that cause the growth of healthy bacteria in the gut, we need to have large arabinogalactan. That comes from a large tree. So, there's so many interesting things that we can do by changing the health of our microbiome, and that's going to change the quality of our plasma.

David:

Let's remove the foods that we happen to be sensitive to. Guess what? We're going to have fewer antibodies that are causing inflammation. It goes on and on. So, the fundamentals are always the fundamentals. I spend my time ... The other thing is I've been working on is a computer program, a software package to help doctors assess complex neurodegeneration cases, so that they can assess people through standard labs, start at the basics, start at the foundations, a good questionnaire, a good lab, and then layer on additional investigations that are needed to understand that person or what they may need to do.

David:

Oftentimes, we're missing the foundations. You just remove dairy out of somebody's life, and it can be a massive transformative effect.

Dave:

Dairy protein, dairy sugar or dairy fat?

David:

All of the above for this particular individual, but I would say it's dairy protein and sugars for most individuals.

Dave:

Yeah. It seems like protein is number one, sugar is number two, and fat is number three, and fat for a lot of people is beneficial.

David:

Absolutely. Absolutely. The way people eat dairy, usually, are not making those important distinctions.

Dave:

The pizza problem.

David:

Yeah. So, plasma is really a metaphor for how are we living our lives, what are we exposing ourselves to, how are we cleaning up, and then what environment are we placing ourselves into. Let's come back to the plasma thing because there is a nice little study done on Alzheimer's disease that came out of Stanford, the safety tolerability and feasibility of young plasma for the Alzheimer's symptom amelioration. That was the plasma study.

David:

They took a group of about 13 patients and infused these Alzheimer's patients with young plasma. There was a very small amount of intervention that was done. They had some symptomatic improvement. Now, all of these phase one trials are initially just to understand safety, but plasma, as a therapeutic is something we've been doing for a very, very long time. We've been using fresh frozen plasma. This is nothing that is out there as anything new in the world, but understanding the quality of the plasma is something that we've been understanding.

David:

So, it is not just what we're taking out of the plasma, but what we're putting into the plasma that does matter. It's astounding how much effort we have, and also when we exercise. We exercise, then we are going to turn on our mitochondrial cascade, and we're going to increase our blood flow, we're going to drain our brain or the glymphatics in the brain tissue are going to dump more, and we're actually going to be able to remove more of the toxins and the nastiness that is present. So, it's always out with the old, in with the good as a fundamental understanding of how do we turn around this freight train of destruction that is dementia.

Dave:

Well, I love it that you're focusing on dementia. It's so painful for families who go through it, and it's one of the reasons that last year I was the largest supporter of the Women's Alzheimer's Movement that's run by Maria Shriver. It also hits women more than men. I wanted to ask you about that. Given that you're working on Alzheimer's and you're looking at this plasma stuff, does plasma in women different than plasma in men? Does plasma in women different than plasma in men?

David:

Yes, it is.

Dave:

What's going on that's different there that might be-

David:

Well, let's come back to Alzheimer's in women greater than men to begin with. I call Alzheimer's the failure of our success, right? We've actually done a good job of decreasing heart disease deaths and cancer deaths, and the end of stage or end of life chronic degenerative diseases and many other categories, but people are living longer, so that we're actually having more opportunities to develop late stage Alzheimer's disease.

David:

I do believe there are immune differences that are tremendous between women and men, especially as it regards T-cell function, and just as women have a higher propensity towards autoimmune disease. I think this is connected to their likelihood of developing Alzheimer's disease.

David:

So, as we age, one of the biggest problems is thymic involution, so the thymus gets smaller and the thymus makes a large part of our cell-mediated immunity. Both these cells that are told to be natural killer cells and go kill cancer cells, but also cells that are the regulators that say, "Whoa! Enough there, big boy. Don't go over inflamed." So, they are both our gas pedal and our brake.

David:

As we get older, the thymus continues to involute, and you have more and more fat replacement inside that organ, and you produce fewer naïve T-cells, so that they cannot regulate the immune system effectively.

David:

I would actually pause it that we should get rid of the term Alzheimer's disease, and we should call it age-associated immunodementia because the primary defect that I see going on is an immunoregulatory imbalance, and there's listed on a systems medicine doc. So, I think everything matters, but what is that one thing that really kicks us in the pants? Our thymus involuting is a big deal.

David:

Recently, there's a cool study done that actually looked at what happens if individuals were given metformin, DHEA, and injections of growth hormone. They were actually able to show not just a change in the DNA methylation clock, one of Horvath's earlier clocks, but they were also able to show that the thymus regrew to a very substantial amount, and there was new naïve T-cells capacity. So, this is incredible.

Dave:

That was from which intervention or was it two that-

David:

Well, I talked with the study authors. So, it was metformin, DHEA, and growth hormone injections.

Dave:

Oh, the one with growth hormone also. Okay. Got it. That's a good study.

David:

There really wasn't a lot of effect from metformin and DHEA looking at the DNA methylation clock before that. So, I think growth hormone-releasing peptides, I think, I like interventions that the longer you use them, either the less you need them, right? That's the mark of a great intervention like neurofeedback. Neurofeedback goes for that category, right?

Dave:

Sure does. There's 40 years in.

David:

That's right, baby. I've been doing neurofeedback clinically for over 12 years. Love, love, love that. I think it's transformative for people's lives. If it can't actually heal, the longer you use it, the less you need it, at least it should not impair future function. So, I think the growth hormone-releasing peptides have an advantage over a growth hormone in that if you stop using them, you're probably not worse off than when you started. You take growth hormone yourself, and you're going to have a challenge in kicking back your own production in some cases.

David:

So, anyway, I go off on a tangent there, but the point is growth hormone is very much associated with youth. It creates a cascade of regenerative processes. One of the fascinating things we've gotten to observe here is a massive effect on immunoregulation. So, I think these individuals in the study or studies like it will show a lower incidence of Alzheimer's down the road because they have higher immunocompetence. So, yeah, there's my not so short answer to why do women have Alzheimer's more than men.

Dave:

All right. It's super complex. No one knows to be perfectly clear, but when you do systems medicine or, frankly, biohacking, it's like you turn a gear, another gear has to turn even if you don't know everything about it. So, you can make intelligent assessments that are more likely to be corrected then not, and that's a thing that is almost discouraged in medical school today, where it's like, "We know this. We know this. We know this," but, well, there's all these gray areas we don't know, but from an insurance perspective, if you go into a gray area that might save someone's life, but then they don't live like, "Oh, you just got sued," or "You lost your license," whereas a healer in the old times would say, "Well, this person is clearly dying. Let's see what might work here, and maybe we can save them."

Dave:

So, it's that systems thinking that says, "All right." From my perspective, look, I'm relatively young and way healthier than I ever was, but had I not gone into the gray zone, I would be profoundly unhealthy right now. So, the ROI was there, and it's always about the ROI for the individual, not for the insurance company.

David:

The nice thing, Dave, I see is a massive transformation happening in my colleagues. Physicians are some wonderful people, and the community of physicians really do desire healing in their patients. What I see is a great dissatisfaction with the name it, blame it, tame it methodology. Medical students now are so

curious. There's so much information available, and exceedingly informed patients. It's so different than when I went to medical school, and I was the fount of knowledge, right?

David:

Now, my job is not being the person who knows more. Now, my job is the person who knows what to pay attention to. It's what to ignore becomes a much more important job. What I think the difference between biohacking and systems medicine is biohacking, you're often dealing with somebody who's maybe not as critically ill. So, I'm dealing with people with very challenging problems and they commit to diving as deep as necessary to figure out underlying causation, and it is a joy.

David:

I mean, my book is Curiosity Heals The Human, the shameless plug there, but-

Dave:

Oh, yeah. I should have mentioned that earlier, by the way.

David:

No, it's okay. No, that's fine. No, but curiosity, I think, is really what should drive us, and when we have that, the universe opens up to the potential that can be there. So, better questions are the first step, and maybe better answers will follow, but the humility there is ... I can't imagine how you couldn't be humble practicing medicine because there's so much we don't know, but also so much we can do that we have available.

Dave:

Most of the doctors I know got into medicine for one of three reasons. One is they really wanted to heal and help people. Two is their parents made them do it through some combination of shame and financial manipulation, and then the third one is they just wanted to get rich, but they were bad at doing research because modern doctors, they do all right, but it's not a road to the gravy train the way it was 35-40 years ago. So, it's an honorable profession.

Dave:

So, what it comes down to is the ones who were forced into it and they didn't want to do it, they usually leave the professions because they just get tired of it because it's actually hard work, right? Then the people who want to be healers, they focus on healing, get frustrated when insurance companies stop them from doing what they want to do that's in the patient's best interest. So, then there's stress there, but it's that healer thing that's just so terribly important. So, I think you hit that really well.

Dave:

Your curiosity, in a way that I feel is similar to mine, has led you to go down other roads. One of the other things that you write about and you talk about is transcriptomics. Can you tell our listeners what that is and why we need to pay attention to it?

David:

Absolutely. Well, the transcriptome is all the RNA that your cells may make. So, we have the genome. That's your DNA. We have the proteome, and that's the protein, but how do you get from DNA to

protein? You have to go through a step called RNA. So, your DNA, your book of life gets read. Basically, a copy gets made of the original blueprint. That copy of the blueprint gets shuttled out of the nucleus, and to the cell. It interacts with this big protein machine called a ribosome, and the blueprint nudges up against and amino acid after amino acid after amino acid come up, get linked in to a long chain. That chain then spontaneously folds into a three-dimensional structure, and voila. You have a protein.

David:

The proteins are the machines that run the cell. They're the ones that have all this capacity for building, and destroying, and regulating. Protein is super important. So, if you want to know what DNA has turned on, what you want to measure is how much RNA is present for any particular gene.

David:

So, the number of copies of RNA gives you an idea of what is the body telling that genome to do at this time? What kind of messages are coming in from the cell to say, "Hey, we need more coagulation proteins made." Okay. Well, the gene for coagulation opens up, gets read. A whole bunch of copy blueprints go out and now we see a massive production of fibrinogen, as you mentioned earlier.

David:

So, it's such an interesting shortcut to ask, "What is the body really doing?" Instead of looking at the downstream products, which would be your metabolomics, all the small molecules that are floating around in the system, this is really saying, "Okay. What is central intelligence telling the body we need to do?"

David:

So, we utilize a transcriptomic panel or practice for individuals with complex chronic illness to understand, "Are their mitochondria functioning well? Is the body turning on the proteins that are necessary to produce mitochondria? Is the body making proteins to make ribosomes, so that the body can make other proteins? Is coagulation turned on? Is apoptosis turned on or necroptosis or any of the other tosises? Then what is the flavor of the immune activation?"

David:

So, differential studies of various conditions are being published now. So, there's a pattern for an acute Lyme exposure. There's a pattern for a treated Lyme exposure. There's patterns of individuals that have been exposed to water damaged buildings. So, those are some real opportunities. They're not easy to interpret. They take a long time to learn. You're having to learn an entire different language, frankly. What is the language of gene expression?

David:

I was driven to this because how do you assess what the cells are doing. There's so much chatter that goes on. If there's not good nutrition, well, is that inhibiting the cellular function? If there's not good signaling, that can inhibit cellular function. So, you need to look at all of those different components when we're not getting the results that we should.

David:

Oh, and you've often speak of NAD. Well, I should be publishing a paper here pretty soon talking about how transcriptomics can help us understand whom may benefit more in those circumstances, and what are the changes that go on in transcriptomics with that. I need more case studies. My conclusions are not solid enough, but the point is we should be looking at before and after results because the only thing that matters are results. Period. End of story.

David:

I don't care what philosophy people have. My favorite days are the days I change my mind. If I have to give up a prior belief that was inaccurate, that's a great day. I like being challenged, but transcriptomics has really opened my eyes to just how much potential there is for the body to heal.

David:

It's a new science, and the problem is RNA is a mess to collect. So, when you want to do a blood draw for transcriptomics, you have to draw the blood. It has to sit for a certain amount of time for four hours upright, and then it needs to be frozen exactly in a certain way. It needs to be shipped on dry ice. So, there's a whole bunch of barriers present to doing these deep dive measurements, this investigative medicine.

David:

Again, as technology gets better, we're able to put more of these things on microfluidic chips. We're able to stabilize RNA more effectively. This is going to become utilized more widely, which will be good for all of us.

Dave:

Timeline. How soon can I do broad transcriptomics?

David:

I think two, three months.

Dave:

Okay. Wow. That's fast.

David:

They're already here, but not in a way that's translatable easily, but your question was actually different than that. Your question was, "When can I do broad scale transcriptomics?" The panel I'm talking about is only about 200 RNA, 200 genes. I don't consider that broad scale. A broad scale is when we're looking at all 20,000 gene expression patterns. That's just done in a research lab. It's a different technology for stabilizing, reproducing, and measuring the RNA.

David:

So, again, the details of how do you make something that is cutting edge mainstream, there's a lot of hurdles. There's a reason these things are not yet mainstream because they're a pain in the arse to collect. They're a pain in the arse to interpret, and you usually need to do them repeatedly so you can see, "Is what I'm doing working?"

Dave:

That is the biggest problem with a lot of biohacking is the track it to hack it perspective from game changers. You can track all sorts of crap, but tracking requires multiple measurements. That's why I like my Oura Ring. That's why like continuous glucose monitoring, stuff you need to do. There you go. We're both wearing one. Stuff like that is really important, okay? That makes good sense.

Dave:

Your book talks about in a similar way to Super Human. Some of the cool things that are happening out there just in the world of medicine, things that you're curious about, things that people don't know about like washing your blood and looking at transcriptome. Looking at mitochondrial assessment is the other thing because people listen to the show for any period of time have heard me talk about mitochondria as being way more important anyone thinks at the New York Times Science bestseller list with my mitochondria book, but at the end of that, the best assessment I could find after looking at every blood test, this is a couple of years ago, was actually a technology that we got for Upgrade Labs, one of the companies I started that's down in LA.

Dave:

We can measure the oxygen that comes off your body and use that to tell how, this is different than a VO2 max test, but in the same universe, we can tell how good your mitochondria are doing. That's a pain. Do you have a new mitochondrial assessment test or a recommendation for one? Tell me what you're looking at.

David:

Yeah, and you may know that I do most of the mitochondrial teaching for industry for functional medicine. So, that's my jam.

Dave:

Yeah. You're a big deal on mitochondria.

David:

That's my jam, baby. Love my mitos because they are so fascinating. We just keep learning more and more and having to forget so much of the things that we used to know about them like a recent great paper was that these cristae, the folds in the inside of the mitochondria, they migrate extensively. Every three minutes, they're shifting around. It's just a constantly mobile internal environment in the mitochondria, but that's not what you asked, but I'm just geeking out. Sorry about that.

Dave:

We can always geek out on mitochondria on this show. If people don't like it, they go to the next episode. It's okay.

David:

Yeah, yeah. So, in the mitochondria, I think you have to look at assessment in levels. So, think of mitochondria as the mountain, and every assessment tool is literally an observer around the base of that mountain, and they're going to have a different perspective on what happens. So, measuring your CoQ10 level is a super important measurement to take. The likelihood of sudden cardiac death in

individuals with a CoQ10 less than 0.71 if they have heart disease, heart failure is incredibly high. I measured one of my staff members who's a young, healthy woman, and her CoQ10 level was 0.3.

Dave:

Wow.

David:

I just dropped my jaw and like, "What's going on here?" So, let's not forget the fundamentals first of all. So, CoQ10 can give you a lot of information. ALT, AST, GGT, LDH, these are all common blood tests that are done. They are usually called liver test. They're not liver test. They're mitochondrial function test. They're involved in how the mitochondria ... So, when those go up, say somebody takes a statin or is exposed to a toxin and those levels go up, it's a sign of mitochondria stress that's going on. So, that can let you know the need for treatment.

David:

I think earlier in your intro talking about the ability for these mice to forget after they have been shocked, well, magnesium enables that process to occur, magnesium threonate, specifically. Magnesium threonate is important because it complexes with ATP. ATP is actually a salt of magnesium. Don't have magnesium. Hard to have stable ATP.

Dave:

Guess what I take before bed? A handful of magnesium threonate, and I take the other forms in the morning.

David:

So, you're a life shock therapy. You've been able to forget that. That's really a good thing for you. So, the more advanced techniques and starting to look at organic acid analysis, which I think is really useful, but that takes some interpretation skill, and you have to prepare people well. I also am liking mitoswab. It's a new test. It's actually quantifying the levels of the complex one through four and citrate synthase in a buccal swab, and then we do mitomics, so mitochondrial whole genome analysis because you first of all sequence the mitochondrial DNA, but then there's over 1,000 genes from the nuclear genome that are informing and enabling that mitochondria to function.

David:

For people with severe fatigue and queasiness, headaches, muscle pain, thought problems, brain fog, a lot of those end up having a genetic basis. One of the utility of knowing what kind of genetic basis is going on, it's just how hard are you going to have to work at this and for how long.

David:

The mitochondria is not something you can switch on and off. You need to nurture these little critters, and you got to love on them for a long time and a lot of ways to help them come back to a state of robust health.

David:

Then I've already mentioned transcriptomics. I think transcriptomics is going to be an excellent way of helping us understand, especially the nuclear mitome. Which genes are turned on at any time? Is our body believe that it's okay to actually grow new cellular materials? Is it going to make the energy for repair and regeneration?

David:

So, that's not a simple answer on that because at the core, every function of our body is dependent upon mitochondrial function. Everything is dependent on energy. Period. End of story. So, everybody wants a simple answer on this. I'm looking for that simple answer. Now, your test is actually measuring the whole body capacity, right? You're measuring the final total output.

Dave:

It's how's the system of the mitochondria doing because when you can pull a couple of mitochondria out, unfortunately, red blood cells don't have mitochondria, so you've got to get other kinds of cells, but then, okay, your skin mitochondria is doing something totally different than your brain mitochondria, and since mitochondria all talk to each other and share information with each other in a complex system, I feel like, ultimately, the gold standard is going to be how good are you turning air and food into electrons and heat. If you can do that, well, we know, but it doesn't tell us what's wrong, "Oh, something's broken."

Dave:

If you can say, "Oh, your citric cycle, the step five of making electrons is where you're leaking, and that's why you have muffin top and that's why you have Alzheimer's," that's happening. That's going to happen. It's just a real pain in the ass. I can say ass because I don't have a medical license. You have to say arse. So, I totally see the difference.

David:

No. It is, actually, yeah. It's a Canadian-South Dakota thing. I think you bring up one other point is that it's messy. It's messy. Systems medicine is messy. Biohacking is messy. When you're actually dealing with reality, it's messy. If you're going to deal with a made up idea like an ICD-10 code, "Oh, you have type two diabetes," and "Oh, that happens to be a particular ICD-10 code for billing purposes," and if you stop there, diabetes is diabetes is diabetes, you can't start ferreting out, "Well, how did you get to this place?"

David:

The closer you try to get to understanding the multi-causation of a diagnosis, the more uncertainty you actually have to be honest about. I think that's actually a challenge. It's a philosophical challenge not just with medicine, but with humans. We love certainty. We don't like things to be cloudy, messy. We don't like probabilities. We want certainty.

David:

The bottom line is reality is filled with uncertainty and probabilities. When we accept that, we have so much more power. We then can start dealing with multifactorial analysis and multidimensional plans like they call it a lifestyle, and get huge benefit out of that stuff, but it's not this one magic ingredient that we all want to believe is happening.

Dave:

I very much appreciate that perspective. Like you said, it's messy. Hacking mitochondria is tough, but you said something really straightforward, Coenzyme Q10. It's not that expensive to go get some CoQ10. I've been taking relatively high doses of it for many, many years, and the data is out there that says it's a good idea.

David:

Data is out there. Also, it's just crazy how many upstream things that are possible. We don't have to do everything to do things that are very meaningful. Start where you are with what you have now.

Dave:

That's probably the most important thing that you said in the interview. We don't have to do everything. I worry when I write books. I'm like, "I want to complete Universe, but, man, if you try to do everything in Super Human, you better be willing to write a seriously big check." I know I didn't or to even do the research for the book, but also the check that you write is in time. You're going to have to fly around and do a bunch of weird stuff and take a handful of supplements. I don't do everything I talk about. I think that [inaudible 01:06:14] the herb, even though it might be good for you, it tastes like crap, and it ruins my coffee if I put it in there.

Dave:

So, I'm like, "Man, it's on my counter, but I might not put it in because it's gross. What am I going to do about that?" So, there are limits in that perfection and all. That will actually make you old. It will probably give you Alzheimer's, too. So, it's like, "Yeah. Pick something. If you improve, great. If you didn't, stop doing it." That goes for Bulletproof Coffee, too. Hey, if you don't feel better when you drink it, then don't drink it. It's okay. It just happens to work for most people just like Coenzyme Q10 work for most people. It's one of those things.

David:

Yeah.

Dave:

Well, I do have to recommend your book because a lot of people listening to the show, they get it that I'm very future-oriented, I'm seeing things before they happen, and have a track record of doing that. I don't like to be called a futurist, but a lot of what I do is that, "What's it going to look like in a while?" and I somehow know and position things for that.

Dave:

I think you have that same thing, that same mindset in your book. So, for someone listening to the show, you're listening and you're saying, "All right. Is it worth my time to read it?" Look, if you get excited about knowing what's happening in the future and maybe being one of the first people to live way longer than all of your friends, the ones who didn't do what you told them to do, I think this is a good book for you to read. How's that for a dark intro for a book?

David:

That's good. I like a dark intro. I want to be really clear. I wrote this book for only a few people. I wanted the people who are really curious. I wanted the people who wanted to solve their own questions and start that process of if you're stuck, where do you go from here? The number of answers that are within us are of infinite number.

Dave:

Your book is called Curiosity Heals the Human. You're definitely a knowledge expert in the field, is too for functional medicine, is a major training ground for the functional medicine doctors who I've been recommending since even before I started Bulletproof. So, you're the guy who trains them on mitochondria and you're very deep on some of these other very cutting edge things like washing your blood and people today learned from you, here's the free version and here's the $5,000 version, and if you're in the hospital, the $14,000 version. That $14,000, that's just for the Band-Aid when they're done. The procedure is even more.

Dave:

On that note, David, I really appreciate you taking the time to be on the show and just the work you're doing. You're saying, "Look, I'm a doctor, and I'm going to make people better regardless of the way the system is set up, and I'm going to do it with hard numbers and science and understanding of complexity," and that your curiosity is serving you and millions of others. So, thank you.

David:

Dave, thank you for having me on. Everything I do is about how do we create health, how can we maximize wellness, and it may seem like I am involved in these disparate things, but at the end of the day, it's about individual humans being able to live into the lives that they deserve and can achieve. It's an incredible opportunity to engage that mystery and to work within it. So, thanks for having me on. I really appreciate it.

Dave:

You got it. Your website is DavidHaase, that's H-A-A-S-E md.com.

David:

You got it. You got it. We'll have an assessment on there just what is your best way for Super Humanizing. There's been a ball. Thank you for the work you're doing in the world, Dave.

Dave:

You got it. Now, if you liked today's episode, definitely read David's book, read any book that you think is going to provide more back to you than the time you spent reading it. If you make a hypothesis, you test your hypothesis by reading or listening to a book, and you are correct, what you do is you go to Amazon and you say, "I achieved victory." That's a five-star review. If you're like, "This book was a total waste of my time. Why did they kill a tree to print it?" then what you do is you go and you say, "You know what? Here's what was wrong with it," so the author can know, and you don't give them a five-star review, but we have to have feedback. You track it to hack it.

Dave:

As authors, we care greatly whether our book was worth your time or not because if we spent 2,000 or 10,000 hours and had blood taken out and did all sorts of weird tapping into our bone marrow to write a book for you, just let me know if it was worth it. Let David know if it was worth it. So, thank you for reviewing the books you read, and thank you for reading because reading makes you a better human.

Dave:

Have an awesome day, and I'll see you on the next episode.