Introduction and Speaker Background

I am Doctor Sanjeev Goyal, and I'm here with Doctor David Hussey for the Anti-Ageing and Technology Summit. Welcome. David. How are you? Sanjeev, I'm really good. Thank.

Thank you so much for having me. This is really an incredible, incredible arrangement of speakers you've pulled together here. Thank you so much. I'm so excited.

I just want to read a little bit of your bio here. Doctor who is a doctor, teacher and innovator who's deeply committed to maximizing wellness, one unique person at a time.

He received his medical training at Vanderbilt University and completed his family medicine at Mayo Clinic in Rochester. He's a board certified in family medicine and one of the first, Institute of Functional Medicine graduates.

He is founder and director of the Maxwell Clinic, established in 2003. Has two locations in Tennessee. He's co-founder of MD omics, a company that analyzes complex data sets to enable to enable more precision clinical care, as well as a not for profit that helps youths make healthier choices for their bodies in their communities.

Called the Food initiative.org. And you're also the chief medical innovation officer for Zimmer and a leading professional nutraceutical company, as well as chief medical officer of Trend Shift, which specializes in personal risk factor monitoring, health trend tracking and health care cost reduction for large employers.

And one other thing. Serves as medical advisor to evoke neuroscience. Your sought after lecturer and teachers internationally. You know, professor at University of South Florida, and I think we can keep going on and on, but, let's get started.

I specifically kind of got me excited. You're going to be tired with that. I need I need to go, but I can I kept reading, I can, I kept reading, but we want to hear more from you.

So I specifically asked you because I heard that you're you appear an expert in, what's called, plasma exchange. But, maybe you want to just kind of tell me a little bit about that, and.

And how did you even come across this, this type of, this, treatment modality that I think it's kind of this at the edge of science. Yeah, absolutely. It's certainly the edge of practice.

It's really, really exciting stuff. Well, you know, my my personal practice is actually really interesting. I take care of deep dive clients, and, and one of my clients some years ago came to me and said, he was actually a CEO at a large, a Silicon Valley firm.

And he, he said and I asked him, you know, well, what do you want to accomplish by working together? And, and he's and he said, he said, well, I want to live forever.

And, and it was the first time I'd like. Okay, I got to take this guy seriously because he's, you know, I use a product of his every day, and I need to I, you know, and I was like, Yeah.

It was a paradigm shift. So I, so I started looking down the longevity pathway in a far more intense way.

Origins of Plasma Exchange in Longevity

I took kind of a sabbatical of several months and dove into, like, well, what really holds water in this space? You know what? What is fundamental, what's safe, what is accessible.

And and I came upon, this idea of para by Oasis. And this is a studies done by Michael and Irina Convoy at the University of California, Berkeley. And they were actually able to show some longevity and age reversal, by causing mice of, their cloned mice of different ages to share a circulation for a period of time. Yes.

So it took these two mice, right? Yeah, yeah. What's that? They attach the two mice together. Is that right? An old mice and a young mouse. Right, exactly. And?

And so they took this old mouse and young mouse or clones of each other, and, and they were scurried around the cage, and after about a week of being attached to each other, the old mouse started to turn young.

You know, liver started to regenerate. Osteoporosis started to reverse, fatty liver disease reversed in the old mouse hair started to grow back in, muscle recovery to injury improved and new neurogenesis ensued.

I mean, like, what what what's going on here? And then, what is even more interesting is the young mouse became stunted. It was poisoned by exposure to old.

So and that was really remarkable. And then they watch these two mice for a while that after about a month, they split them apart. And the young mouse was healthy and happy and lived to its normal expected lifespan.

And in the few mice that they didn't sacrifice for other studies, they lived too long to closer to the lifespan of the young mouse. And so in other para bioscience studies, there has been some, some clear suggestion of longevity and an age extension that went on, which was just really interesting. Now, why that's interesting to me, especially because I'm in a for a specialist.

So one of the things I do clinically in a crisis is this, process by which you remove blood from a person, you separate it into its components, and then you either remove parts of it, modify parts of it, add things to it, and then put that new, you know, reconstituted blood back into the body.

It's basically doing an oil change with the engine running on, on the, on the blood. So that's what a for. This is. And I recognize it's like wow this para Bios is study.

That is clearly there's something happening in the plasma of these mice. Can we mimic this by doing a forrests and humans to reverse neurodegeneration, to extend longevity?

And to use this plasma, this plasmapheresis, in a way that is outside of its usual use, which is the reversal of very severe autoimmune disease or the reversal of very severe hypercholesterolemia or toxicity.

So this is taking a very well-established known process, medical process and saying, if we did it somewhat differently and, looked at other factors, could we could we actually reverse age?

Could we reverse stop the stop, slow, slow stop and reverse neurodegeneration? And, there's a it's a it's a very different is it very different from the procedure, let's say, for autoimmune disease, like, they've found that the people who had the plasma exchange or if has done for, let's say, rheumatoid arthritis, that they have benefits like other benefits, so that's been really interesting because the old timers in a physicist have said for a long time, they said, wow, you know, we're kind of surprised how much better people get when we do a Ferris's treatment on them for multiple sclerosis, for neuro myelitis, optica, for some of these chronic, neurologic, chronic demyelinating neuropathies.

It's it's so you're treating these very severe autoimmune diseases and they have side benefits. It's almost that they get better than they should have for just dealing with the autoimmune disease component.

And, what we realize, I think what the what's really exciting about all this is why does this work? Why did it work? What happened? And there's a couple of great studies that have come out to help us elucidate that.

Yes. So, yeah. So one of the studies go ahead, go ahead. Yeah. It. No, tell me, tell me. I'm just. Well, I think you

want to understand. Yeah. Why would it work? Yeah.

Why would it work? Right. Yeah. Yeah. It's it's very interesting. And so again, the convoys did all kinds of great follow up studies, looking at this data and to say, is it that we put in young plasma into the young plasma from this young mouse?

Into the old mouse? Is that did that help anything? Right. So they pulled plasma out of a young mouse and then just inject it into old mouse. And sure enough, there were positive benefits there.

And then they did a even harder experiment, which is they did a for rhesus on an old mouse. So they pulled the old plasma out of the old mouse and then replace that with fresh, clean albumin like a the liquid part of the blood.

And sure enough that also showed benefit. So here's this very interesting situation that along with kind of our fundamental precepts in systems medicine, that how do you heal a system?

Well, first of all, you recognize it's a system, right? You don't overly reduce things down too much.

How Plasma Exchange Works and Why It Matters

And then you either add in something that is going to promote healing, or you're going to remove something that is that is increasing degeneration. And it turns out that in this process, it appears that both sides work.

Adding in use or removing age, shifts the shifts, the phenotype of those, experimental animals. What do you think it is about the, young blood or the problem with the old blood?

That's that, that's the that's helping. That's making impact on aging. What? You what is it? And isn't it funny everybody asks that because we're we have a drug mindset, don't we?

Yeah. We think there's a secret ingredient for it. You know. You know, and like, oh, they said GDF 11 is a cloth co-factors is it. You know, you know, you can rattle off all kinds of magic molecules and the failure of all of them is that if you add in one magic molecule into a dynamic system, it's inevitable you're going to throw off a whole bunch of other stuff that isn't isn't progressing in step.

You know, if the human being is a really complex, dynamic system. So there are, when we do reductionist interventions, you know, especially with a lot of our drugs, drugs are that are our well dosed poisons.

That's why we have a license to prescribe them. Right. They have a therapeutic window. And they're, they're things that block this, inhibit that, stimulate this, and they, they push the body, and they really basically decrease the flexibility, the body's ability to adapt.

And so therefore they have kind of some unintended side effects. So when we look for like, well, what is the factor? Everybody wants to okay, what's how can I get this in a pill.

Right. And and it's not that it really is. This is a massive systems intervention. The fact the very interesting thing about when patients come to us and patients come in from all across America and the world and, and they come into the clinic to do this, plasmapheresis, the, what occurs is that we're assuming everything that is in the plasma, we're moving all the we're moving the plasma, you know, three, four liters of plasma go out and then replacement fluids will come back in.

Is there has to be that amount. Like I'm saying, if somebody goes, is there is there a health benefit to like, regular blood transfusions? I mean, like we're moving now.

I mean, a blood transfusion, like giving, donating blood. Could that have that happening? We know that there is a survival benefit for for men, especially that donate whole blood on a regular benefit, regular basis.

You know, that's a healthy behavior. I encourage everybody to donate blood now is and is there a benefit to donating plasma? Possibly. When you donate plasma, that's a little different of an experience because you're just putting saline in as a replacement.

But I think there's possibility that just donating plasma has some benefit as well. But you don't get anywhere near the oil change effect, of of both removal and replacing, fresh, clean albumin, which ends up acting kind of like a sponge for toxins.

And, so there's a lot of theory behind this, and even we've been studying a huge number of variables. We don't think that there is a we think there is a better way for an individual.

So the individualization of this process has been a real important strategy of ours to say, how do we do our very best at decreasing the likelihood of, of side effects?

Because and also increasing the likelihood of benefit. That's just data in time is going to tell us that we don't have a or there's not a clear answer to all of that.

Why do you think we need to like, like 3 or 4l? It sounds like a lot like, is there a particular reason why you think it needs to be that much? Like, is there is it a incremental benefit, let's say, from a lower amount to a higher amount?

So, I think that the whenever you're looking at volumes of plasma that are exchanged, you know, we we calculate this based upon, you know, what is your total blood volume and then what proportion of that blood volume is occupied by cells versus plasma.

So all the all the plasma you have in your body, we would call one blood volume. And if you if you want to remove, one blood volume or you do a full volume exchange, does that mean you remove all their plasma and replace all their plasma?

No, it doesn't, because what happens is when you first start doing the exchange, you're pulling out just their plasma. And the longer the procedure goes on, the more you're adding something.

Yeah. You're removing what you had last put in. And so and so small exchanges, small exchanges have the benefit of having, a very, almost everything you're pulling out at the beginning of an exchange is the old plasma.

So smaller exchanges may work. And, but typically the, the individuals we see are, have have a need for the full volume exchange. And so that one of the most important studies in this is the Anbar trial.

So, you know, our a large part of our justification in moving forward with treating Alzheimer's disease, dementia and other types of neurodegeneration comes out to the Anbar trial.

And the Anbar trial looked at nearly 500 patients. That with mild and moderate Alzheimer's disease. Now, this because apheresis is such a niche specialty, there's very few of us who do it.

You know, it's a pain in the ass to actually provide. There's a lot of machines. There's, you need highly trained staff and it's it's it's it's it's challenging to provide this service.

And so there's not a lot and there's also not a large call for it overall in the nation, because it's typically reserved for those people who are very sick with autoimmune disease.

So the studies that we have in, in plasmapheresis are really small. So this turns out to be like the largest study ever done in plasma for rhesus randomized, double blind, placebo controlled, multinational, multicenter trial.

And what they did is they looked at individuals with moderate to mild Alzheimer's disease. Now there's nothing in moderate to about moderate Alzheimer's disease.

It is a very severe state of neurodegeneration. The individuals often don't remember who families are. They're already institutionalized. It's a terrible thing to have moderate Alzheimer's disease.

Alzheimer's Research and Clinical Evidence

And so these individuals are randomized between getting plasma exchange done, 14 different plasma exchange. Excuse me, 18 plasma exchanges over 14 months.

And what was found in, in comparison to placebo have been the moderate Alzheimer's disease group. They had a 61% decrease in the rate of progression of their Alzheimer's disease, 61% decrease in their progression over 14 months.

Now that and that was in functional markers, in behavioral markers, and even in caregiver rating scales. Astounding. But what's even more interesting is in mild Alzheimer's disease compared to when they began, they actually showed improvement over the course of that year in cognitive function.

So not just not just better than placebo, but actually better. They were better off 14 months later than when they had started in terms of, in terms of cognitive function.

And then also, the the people who ran a study that a brilliant job. I think there was a fancy Seminole Seminole study. Somebody should get a Nobel Prize for this.

And, I think that there is a, and then what they did is they looked at the CSF biomarkers. So they actually were able to show also that in the plasma exchange, there was a normalization of the CSF biomarkers of A-Beta 42 and phosphorylated tau, which are two of these, misfolded proteins that are that we think are both cause and perpetuate of Alzheimer's disease.

In some ways. And so and then they also looked at FDG, Pet scans. So an FDG Pet scan is looking at what's the metabolism of the brain and how well does that metabolize.

And anyway, and so in comparison to placebo, the individuals who have that plasma exchange had less cellular death over that course of time, as measured by FDG, Pet, they were able to retain more neurons.

So the real question is right. Real question is wow. If that we saw that happen in mild Alzheimer's disease, when would that actually be beneficial to start?

You know, if you want to keep your brain, you don't want to wait until you have mild Alzheimer's disease so you can stay at mild Alzheimer's disease. That can be optional, optional, optimal either.

But at what point in time is this individual starting to slip having cognitive impairment? Should this become part of our our treatment paradigm? Anyway, that that that takes us into really talking about this in the realm of longevity.

So yeah, I'm just I'm just curious, though, that, was there any any patients who had ApoE4? Did they look at that because the patients had any different?

No, they didn't. And and also, there's a little criticism in the study that they probably didn't didn't do as good a job as they should to confirm the diagnosis of classic Alzheimer's disease in these patients, which actually, in my mind, makes it a stronger study because, yeah, I don't think that this is not something special about Alzheimer's disease.

We have, we've been observing in our own practice, benefit with individuals with Parkinson's disease. And we're, we're scratching our heads because Parkinson's disease has a very high placebo rate for any intervention that you do.

So we're we're we're continuing to track people longitudinally. But I think that any of the diseases that have misfolded proteins as a, as a cause, or that have increased oxidative stress, inflammation, and I just kind of named

all chronic disease, right?

I think here here's an interesting thing to you, Sanjiv. Right. Think of plasma. What is plasma? Plasma is the grand interface between the outside world and your innermost parts.

We talk about, you know, we talk about gut function and how important the gut is. Well, the gut only gets to the cells via the plasma. We talk about what we breathe.

The stuff we breathe dissolves in the plasma and red blood cells. And the things we put on our skin end up in our plasma before they get to our inner organs. It is the grand interface.

So if we were able to when we live cleanly, when we make great decisions about what we breathe, what we put on our skin, what we eat, that cleans our own plasma.

So this is a great, I think, a wonderful, affirmation of the prime importance of lifestyle medicine, living cleanly and and how all of those things matter because do you want to poison your own plasma?

You have you have influence over that in your daily life. And so, as opposed to thinking that this is the only way that, that this is going to help longevity, I think it gives us great credence that all of these other facets have incredible power.

We have incredible power to, you know, to purify our own plasma right by by the choices that we make in a day. And that's really good news. Yeah. No, that's that's pretty.

I never thought of it like that, but I think it's like one of the. It's like it's a whole, plasma is something the great unknown still. And in fact, we don't really understand it.

And, and we're just by cleaning out and this big works changing it has made such a huge impact. And that's such a big learning. I think it's a big. Yeah. Think of it like that.

Yeah. So that, Yeah. Somebody who's, let's say, in their 40s or, you know, having no, no Alzheimer's, but they may have a family member or a father mother who has it.

You think that this will have some impact as well, like this, this type of treatment or the thinking about, cleaning out plasma could have impact on on their longevity?

Yeah, I do, so if we go back to basic science again. Right. You know, what do we see? What do we see? And everybody that works with stem cells or cell cultures, the media makes a difference, doesn't it.

Right. That the the, the the fluid in which a cell lives greatly determines how healthy that cell is going to be? And the same thing happens for our own cells.

You know, the media makes a difference, and the media is our own plasma. So in cell culture experiments, we know we can pull out stem cells from old mice.

And, and they will act old. You pull out stem cells from young mice. They act young, until you put them into a different environment. If you put old stem cells into a young niche, into a young habitat of young plasma, they start to behave young and the same way with young stem cells.

You put them into an old habitat, they start to behave old. I mean, I always think of, like, Betty White and George Burns here, right?

Plasma, Stem Cells, and Biological Aging

They all hang out with young people and so therefore they act young. Right. And and the same thing with our age

stem cells, our age stem cells kind of act the, the age of their environment, you know, and and so if we can, if we can put our, our stem cells that are in our body in a younger environment, they start to act younger.

And, and so this has been shown very clearly and as we clean out the body, that's what the rat studies then showed, is that there was reversal of fatty liver disease of of muscle in muscle in sarcopenia and neurodegeneration.

When the environment was unfolded. Right? It was, you know, cleaned out in that way. Now, how does this apply to, you know, the biohacking community in longevity?

You know, we deal with a lot of these individuals that are really focused on maximizing both of their total vitality and the number of years they get to enjoy that vitality.

And and I think there's a tremendous opportunity here. We've been tracking marker, a whole bunch of aged markers with some of these patients and, like, for instance, and we have we have modifications on our what we call regenerative plasma exchange because, how do you maximize the potential benefit?

And we just got some studies back that we had over a four year reduction in the, whole in the whole methylation age marker, after one of these, modified regenerative plasma.

I just about to ask about the seemingly epigenetic aging, the DNA methylation. Yeah. Yeah, yeah, yeah. So so we use, we use the, test from true age. And that looks at over 850,000 different CPG methylation sites.

And then that's mapped across, and it's really remarkable. They're starting to do some expansions of that data set that help us understand, what parts of, your, yeah.

How fast are different parts of your physiology aging. So we'll be able to track, you know, how quickly is your insulin regulation system aging? How rapidly is your cytokine, you know, balance, aging.

And I think you test don't guess. Right. And what is it? What are the real results for this human being? And I'll tell you that results vary and results vary because that individual doesn't come to, this is not a magic procedure.

I mean, it has to be put in the context of whole person care and understanding, I think. And, that's at least what we found. So the patients who are, best prep for this have the most benefit.

So I'm just curious. So absolutely, I you I think this is absolutely going to be fundamental. All of the anti-aging, if you can improve your internal environment, it's going to make all these other interventions most more useful.

I have two questions. One is, you touched on stem cells, and I'm just curious, like, you know, people are, you know, getting stem cell infusions and stem cell injections.

Do you think it it matters or people are using their own stem cells versus, you know, but like a cord, blood stem cells. Do you think because you're talking about young and old stem cells, do you think that there's this is, going to have an impact?

I mean, and also, is it how how does it compare, like, say, stem cell, the stem cell treatment versus, let's say, plasma exchange. So I think it's a great example, and I think that there's probably many other speakers who will do a whole lot more, speaking about the different types of stem cells and what should be used.

But I think what's really important is it's always better for your own stem cells to be doing the work, but not just your own stem cells that are grown in a vial.

The stem cells you actually want to do the repair, or the stem cells that are resident in your tissue. The, you know, so the satellite cells that are in your liver, you want those satellite cells to activate and start doing the job of repair.

You don't want to have to get an injection of expanded nice and calm ourselves and hope they go to the right place and do the right things. You know, what you really want is for your native, regenerative processes to be reminded that they can do the job of repairing where they are.

And and I think that's the real advantage of, looking at this from a plasma exchange standpoint. We're going to see and we are have really good initial data of that.

There is a there's a shift in, cellular behavior. And what we know in the, in the, basic science is that stem cell function is improved with regard as long as we improve the cellular habitat.

So but absolutely, we're, we are, forging way and with appropriate, understandings of these compounds, exosomes, stem cells. I think that, you know, the combinations of these processes and research is really profound.

I think that they could be synergistic using these could be synergistic treatments that can add to each other. Well, is that a I mean, it's it's a it's a system, right?

Yeah. It's a system. So and the question is when is it synergistic and for whom and in what dose and at what timing and how frequently and all that. So, you know, having the database of, of looking into these things is, is, part of our work.

So, because the whole question is what works and whom when. Right. That's, it's, you know, we shouldn't be treating anybody, as a cookie cutter, process instead.

How do we how do we understand that we can have engaged therapies that have the least likelihood of causing harm, and the most likelihood of causing benefit, and and for for that person at that time and, and and, you know, that's that frankly, is not a great business model.

Right. So personalized personalized health care. Personalized health care takes time and effort and understand, and and I think everybody's looking for the one quick fix.

But I think this is an amazing tool in the context of of understanding, human physiology.

Future Directions and Closing Remarks

I think this is giving us great opportunity for reversing neurodegenerative disease, slowing stopping, reversing the neurodegenerative disease. I think this is giving us great opportunity for, age extension for, decreasing tissue and in Oregon injury.

And I think and, and also, it's classical indications of severe autoimmune disease and hyper cholesterol. Amia I think this, this therapy is underused even in those circumstances.

Because, it can be quite life life changing. What what makes sites what's the next year look like? What's exciting you about this field. What do you think that's going to.

What do you think's going to happen this coming year. And under the understanding of plasma. Well you know Covid threw a big, threw a big monkey wrench in in our development.

You know, we were really the first, group that started to provide this, you know, and looking at this in the whole longevity space and neurodegenerative space and, but what we're really interested in and looking forward to is how do we standardize processes and continue to gather data and, you know, and help train other clinicians in this process and understand, understand more fully, you know, how does it work and in whom does it work?

And how can we make that? How can we deliver that in the most, in the safest and most cost effective fashion, you know, so lot a lot to learn here. But what a fun what a fun thing to get to be in the center right action.

Science fictions come to life. This is. Oh, it's it's just crazy. I mean, it's all all the all the bad jokes are here, right? It's like, you like getting your own priors, but, boy, you know, I mean, I'll tell you all the all the bad jokes are here, but the funny thing is that there's always been power in the blood.

You know, it's it's fascinating. Throughout all of human history and health, you know, we've recognized that there's this vital force and, you know, and in Chinese medicine, you know, the the vital force.

And you, you always want to work on the blood first in the traditional Chinese medicine, environment. Right. You know, we we know these things to be true and, and and go like, It may actually be the it could actually be that simple, which is really, really exciting.

Okay, so where should I go ahead? Sorry. We were we were just. No, no. Go ahead, go ahead. I'm just going to say, where should our, our listeners and viewers go for more information like, oh, absolutely.

Yeah. Our, advocate go to our clinic website, Maxwell Clinic. Com you know, that's really where I kind of put us that the centerpiece of our information?

Yeah. Maxwell clinic. So our clinic means it's for maximizing wellness. We've been. And, a functional integrative medicine clinic near for nearly 20 years now.

I've been around, and we are, leading the charge in personalized systems medicine. It's, it's a it's been a it's a real joy to get to play in the sandbox of how do humans heal.

And, I, I love patients, I mean, I love seeing people get better, and, and I also love, seeing clinicians get joy back in their hearts by getting to practice medicine as they intended to when they went to medical school. Right.

And it's a good thing most it's a good thing most of us are idiots as to how medicine really works, when we go to medical school, right. Because some of us wouldn't necessarily sign on, like, really the way works and but I, I love, I love my medical colleagues, you know, where it takes, it takes, everybody to help move, health forward.

So. Yeah. So it's Maxwell clinic.com and and to start there and we've got resources to learn more. I'm so glad we took this time today. And you are really a pioneer and and I'm looking we're all looking forward to the work you're doing because it's going to revolutionize medicine. So thank you again David.

It's been a pleasure. Thank you. Thank you for having me. And you know, it's all of us together. All of us together are doing this work. So I'm going to be coming out.

We're just I'm just going to do my part. Yeah. We're in Nashville, Tennessee. Yeah. So come on. Come on down. I'm coming to Nashville, for sure. I heard Nashville used to be.

Now it's it's a that's a great place to be in the US. Yeah yeah yeah yeah. Okay. So what's it like? Take care. All right. Bye bye.