Do You Have Cancer? A New Whole-Body MRI Scan Sees Everything – Dr. Raj Attariwala – #989

Dave Asprey:

You're listening to the Human Upgrade with Dave Asprey. And I'm recording this show live at the Biohacking Conference right after having had a new kind of AI-powered, whole-body MRI at Prenuvo. So, I thought, why wouldn't we spend some time sharing knowledge with you from a guy who was a PhD in biomedical engineering, and in a spare time, a medical degree in nuclear medicine and radiology? So a really smart guy who is changing the face of MRIs.

The reason I want you to know that this is possible, even though your insurance company probably won't pay for this yet, but your flexible spending account might, is that this kind of scan could detect 9 of the top 10 cancers in stage one. In other words, when they're easy to knock out. It detects about 500 other medical conditions and it tells you how your spine is doing over time as well as body composition stuff.

So this is like a new source of data in the human body and I'm exceptionally excited about this. And I wanted you to learn about it from the guy who did the hard work. His name is Dr. Raj Attariwala. And he's not related to Atari the video game, I already asked. So if you're thinking that, you can just stop. But I'm going to call him Dr. Raj. Raj, welcome to the show.

Dr. Raj Attariwala:

Thank you. Pleasure to be here. Pleasure to be here, dude.

Dave:

So we just did my scan. This is my second scan, because I met you probably four years ago, five years ago.

Raj:

2019, yeah.

Dave:

2019, okay. I'm not good at math. Three years ago.

Raj:

Sure.

Dave:

Right before the whole pandemic thing. I got my first Prenuvo scan and it was really excited. It taught me some stuff about my body that I didn't know, explained some longstanding things that I've had since I was a teenager, like weird spinal cord things related to my mom's intake of grains and lack of folic acid, or folate as the case may be. So all sorts of things like, aha, you've put pieces in the puzzle. And we didn't find any massive risks then, which is awesome, right?

Raj:

Exactly. Well, that's what we want to know. Is there anything bad going on? Any tumors or surprise tumors? That's the key thing we want to see. Do we have cancer? Yes or no? That's the biggest question

everybody wants to know. And that's the beauty of MRI, is that it allows us to look for the entire body without any radiation. It uses radio waves that are around us all the time to see what's going on in the body. And so that's what we set up as Prenuvo.

As you know, MRI scans, they typically just do little bits and pieces of your body. And so you can only look at a little window of a person, like just your brain or your pelvis. Whereas what we put together using the engineering skills as well as a lot of my colleagues in the world of MRI, we actually put together the ability to scan from head to foot and be able to see everything in one scan. And that allows it to get an incredibly powerful baseline as you had in Vancouver originally. So you can see where you are and we can see how things change.

I think when we met back in 2019 where there're a lot of new things that were surprised to you. And the thing that's really important about that is from a medical point of view, let's say heaven forbid something bad happens to you and you have to get an MRI or any kind of imaging, you have a baseline when you're healthy. So you can actually use that to compare how things change. And that's incredibly powerful because as you know, the MRI is like the best. It's the pinnacle of medical imaging. And if we want to talk about all the different kinds of imaging, I know that stuff inside out.

Dave:

Well, I mean you have a PhD in that stuff. Sorry, medical degree in that stuff. So you're definitely going to know that. I actually think it'd be great for listeners to understand that, and we'll get to it. But I wanted to address something first. Everyone's worried about EMF. And guys, you're swimming in this stuff. So worrying about EMF is actually dangerous. But EMFs themselves aren't always good for you, they can be bad for your mitochondria and all that. So I want to talk about the specific kind of EMFs that are inside an MRI machine. Can you walk me through what's going on there? You're a guy whose actually qualified to answer this.

Raj:

Definitely. And you're correct. Like EMF or radio frequencies I like to call it, is around everything. Basically your cell phone, Wi-Fi, everything runs off of EMF.

Dave:

And even if you shut all that down, there's Starlink, there's cell phone towers. You can reduce your exposure, but you're not going to be free of it. So you need to be resilient and you need to be able to manage your own health, and you can actually put signals that reverse the harm too. And there's a bunch of technologies I've covered on here that help with that. But this isn't the same as Wi-Fi, it's a different frequency. Walk me through the frequencies and how that's working.

Raj:

Exactly. So the frequency is basically we run it the same as a AM radio. So AM radios are the first type of radio ever invented, and the amount of power that it requires is quite low. And so when you go into anywhere where you get radio frequency there's a calculation called SAR, specific absorption rate, that's basically how that radio frequency energy is being absorbed. And so a long time ago, actually the calculations on how much SAR is somebody getting during one of these scans and it's actually less than talking on your cell phone for a couple of hours. So it's very little.

Now the other key thing is that when we look at a cell phone, we're typically looking at a high frequency. It's a much, much higher frequency. And if you want to meet again with the physics and E = hv in Planck's constant. But that will actually tell you the amount of energy that frequency gives you based on

the higher the frequency, the higher the energy. And so MRI is actually quite a low energy because it's again AM radio. So it's long wave length as opposed to short.

Dave:

And guys, if that went over your head, which it didn't for some listeners, for other people. Now, amplitude modulation, which is what AM is, means we change the power levels. But it doesn't happen that many times a second. It's a low frequency. And what FM or frequency modulation does is you change the frequencies and they're very high. So it happens many, many, many times a second versus a gentle wave. So I looked into this as well, because there are some scans like PET scans maybe that increase cancer risk.

I even talked to Dr. Ted Achacoso last year or the year before at the biohacking conference here. And he said, "I feel better every time I get an MRI." And he looks at it as a form of PEMF that's actually beneficial. And I feel really good having gotten mine. So I'm not convinced that there's any meaningful risk, unless you have metal implants, from an MRI. I could be wrong, you could be wrong. And if any of you have info, let me know.

But this appears to be quite safe compared to the risk of potentially getting cancer, substantial number of people do. I do not have tumors. Do not have last time, don't have them this time. I'll bet you I don't because I do all the mitochondrial stuff I talked about. But if I do, I'm going to know about it and I'm going to lick it in the bud. Actually, you don't want to lick your cancer in the bud, do you? That's kind of gross.

Raj:

No.

Dave:

No.

Raj:

That's not what you want. The whole thing with cancer is you want to detect it early.

Dave:

Yeah.

Raj:

As you like that, that's the key thing is to find cancer in stage one because the outcome is always better. And that's one of the biggest problems with the field of medicine today unfortunately, that we find cancers late. Typically, stage three or four, where the survival is much poor and that's what we want to prevent. And so that's the goal of Prenuvo, to do that, to find early cancers in addition to all the other 500 things that we can find.

Dave:

Okay. There are several companies that make large MRI machines, they're in hospitals all over the place. A lot of people have had an MRI, you have an injury or they're looking in something in your back or whatever. It's just a thing. It's a very different experience to do what you're doing at Prenuvo. And you

had to do, as a fellow engineer, just an insane amount of work in order to do what you're doing. Can you walk me through what's different about Prenuvo?

Raj:

For sure. It is. It's quite different now. The actual technique obviously is MRIs all the same. So any part of the image, if we were to take them and break them into individual pieces, it'd be the exact same thing as you'd get in the hospital in terms of detail and resolution. But the way I look at an MRI, effectively it's a smartphone. So there's basically all these different apps and programs that you can build to run on it to make it go faster.

And one of the things that I discovered during medical school and residency is that as an engineer starting with that area, there's a lot of MRI physicists in the world who build these amazing programs, but they don't have the knowledge or language to be able to cross-pollinate into the field of medicine and talk to what doctors want.

Dave:

Because they're not doctors. Give them a marshmallow in there and they look [inaudible 00:09:18] the marshmallow. And you could put a body in there but they wouldn't interpret it. And you have the rare mind that can do both, because very few doctors make great engineers.

Raj:

Right. And vice versa.

Dave:

Yeah, exactly. So why can you do both?

Raj:

Well, I started out as an engineer. As a child, I always wanted to be an engineer. Never wanted to go into medical school at all. And then went and did my PhD in biomedical engineering at Northwestern. Did machine vision, surgical robotics, and applied physiology, working with a lot of doctors. And they tried to convince me and my colleagues to go into medical school.

So I'm the dumb one who did. And then in medical school I kind of realized, "Wow, there's a lot of things that we can understand from an engineering point of view that are really difficult to understand from medical point of view, because the mathematics or the physics is just not there in medical school." For example, in MRI, the way it works, we actually take radio waves from your body and we actually convert them using something called a Fourier transform, that then goes and creates an image.

And most physicians having a clue what a Fourier transform is, they barely actually know how to do calculus. Whereas an engineer, it's like I've done the most advanced calculus you can get at graduate school. And so as a result, I'm been able to put on one hat saying, "This is what I want the imaging to look like from a medical point of view. So all my medical colleagues can look at them and understand exactly what we're seeing."

But then from a physics point of view, I can tell the physicist, "This is how I need you to make it in order for my medical colleagues to understand and for me to understand what I'm looking at." Because medicine is, particularly radiology is and nuclear medicine, is very much you see it, you recognized, you know what it is. It's one of the things we say, "We don't know what we don't know."

And so medicine is all about pattern recognition, looking at things, understanding them. I can look at a simple lesion and say, "Okay, that's benign. Nothing to worry about." Whereas I can look at something and say, "Well, this is something to worry about." Now where did I learn that? Well that's upon the shoulders of all my medical colleagues who basically looked at this and said, "Okay, this is what this is."

Somebody sees a problem, they get it removed. And then the pathologist looks at the cells underneath the microscope and then they say, "Yep, that was a problem." And that imperative feedback trains the next generation. And that's kind of the slow cycle that is medicine.

Dave:

Yes. And it can go sideways too. If everyone thinks it's supposed to look like this and it's not, we can make really big mistakes, like believing that Alzheimer's is caused by plaques even though the original study was wrong. Or believing that depression is caused by serotonin thing. Oh sorry, that was wrong too. And that can lead us down for decades, the wrong track.

I'm excited that with AI and with data and with actual technology, that we can take the mistake curve that sometimes is 40, 50, 60 years in medicine and get it down to two years. Like, "Oh, it doesn't work." So we change it. And what you did, which is just fascinating to me, "Oh, let me just write some code." Or have your team write it, that uses the data from the MRI in a new way. And what that means is I can go there, I can spend an hour and a half kind of immobilized.

It's actually very meditative. I kind of doze off a few times. And then you can see everything and I have it on my phone. I show people. I was going to see Dr. Marcella who is doing some work inside my spine with stem cells and she's like, "Do you have an MRI?" I go, "Actually I do and it's on my phone." She's like, "What is this?" Because it's that cool.

So let me ask you this, because people are already kind of wondering. You've opened now, when I first went there you were just in Vancouver. You've now spread, you're in multiple cities, you're just opening in LA, you're in San Francisco and some other places you told me.

Raj:

Dallas.

Dave:

Dallas, okay.

Raj:

Minnesota.

Dave:

Minnesota. Of course, because there's all the testing stuff there. So what does it cost? I mean it probably varies by city, but what's an approximate number to get my MRI done?

Raj:

Yeah. So we have three studies, but the comprehensive one, which is what you got, is $2,500 for that scan.

Dave:

Okay.

Raj:

And then the most inexpensive one where we just look at the torso is $999. So $1,000.

Dave:

Okay. And it's covered in the US by flexible spending accounts, right?

Raj:

I believe so. That basically depends on the insurance. But we don't understand any insurance, that's not my focus.

Dave:

Oh, let me be straightforward. So if you have insurance, great. It's good if you get in a car accident or you have a critical thing. In the US, everything else, your insurance company's job is to bore you and waste your time and energy by saying no until you give up and go away. So it's not useful for regular stuff and there is no reason, except history that you should look to your employer to provide insurance.

It's a stupid thing from the time when there was a paternalistic, almost ownership view of companies to employees. So you shouldn't have to go begging for coverage there, you should just be able to buy it. The US is hopelessly broken. But what you can do is you can take pre-tax money and you can put it in your flexible spending account up to something like four or five grand a year, and spend it on almost whatever you want that's medical-ish.

Which that means, is that you could get a whole body head to toe, know everything that's going on, have a baseline for $2,500. Depending on what tax bracket you're in, you were going to give a thousand of that back to the government anyway. So it's a pretty good deal given that cancer detection tests, if you wanted to detect just one kind of cancer right now, what does that run?

Raj:

Well, it depends on what you're going to look at. So for example, things like ovarian cancer are very difficult to find. The best way to detect that is going to be with CT or MRI. And those can typically range from a low, low of $500 to, we've seen things as high as 3,000, $4,000 for a study.

Dave:

Okay. So you could look for one kind of cancer for at best 500 bucks, or you could look for all of the torso cancers for $1,000 and you can do it pre-tax. So I just think this is not cheap, but it is terribly inexpensive compared to five years ago. You couldn't do all this kind of cancer detection and all the other 500 things.

My advice has now changed. I tell everyone, when you're in your mid-'20s, get your hormones done, advanced hormone panels, so you know what you should have. Because your testosterone levels when you feel great, they might be different. They might be twice as high or twice as low as normal in a study. So if you don't know when you have to correct your hormones later, you won't know.

If you were to get a picture of your spine and your organs and you're 25, you have that forever. And that means when you're 40 you can say, "Oh, that's weird. I'm seeing advanced acceleration in this, I better address it." Otherwise, you just don't know. So this is one of those snapshot to stay young forever, that's Prenuvo. That's why I'm pretty excited about this.

Raj:

Yeah. Well, and as you say, that's the real power of the baseline where we can actually start to see these subtle changes that occur over time.

Yeah. Well, and as you say, that's the real power of the baseline where we can actually start to see these subtle changes that occur over time. One of the things which is really fascinating, for example, in my case I have my images of my spine over the course of 11 years. And you can actually start to see how by sitting in a chair all the time, I'm starting to get a bit more and more of what we call kyphosis and more hunched over. And as you know when you see a lot of older people, you'll see that they're quite hunched over in because of posture.

Now one of the problems with the medical system is that we basically wait until it's broken. So it's quite reactive. We don't really start to address the problem before it becomes an issue that needs surgical intervention or something bad. And that's kind of what we want to do is try and find it before it becomes a surgical problem.

Dave:

Correct.

Raj:

It's to try and find it things early. It's not just cancers, it's almost in everything where you want to find it early. Because the outcome is better and you can actually change and course correct before it becomes a problem.

Dave:

Wow. I'm of the opinion that over the next five years, Prenuvo and some other technologies coming along as well, in concert, are going to radically change our ability to spot cancer before it becomes a problem. Like cancer should be 20% of the problem it is today, in five years. If a large number of people get this kind of scan and do the other things that are coming along that they just work together.

Things like the Viome test to do oral cancers, things like a liquid biopsy. And this, you can pretty much know you don't have any of the cancers that are likely to happen. And that means you just got rid of the four killers. These are the four things from my anti-aging book. It's cardiovascular disease, cancer, diabetes, and Alzheimer's. Of those, which ones can you sense with Prenuvo?

Raj:

So we can actually see Alzheimer's. Or actually not Alzheimer's. We actually get a baseline of your brain so we can actually look and see how it changes over time. And that's really quite important because again, if you have a baseline of your brain, the goal is to basically see how it changes over time. We know that the brain volume start to shrink slowly. We've seen about a 3% per decade decline in brain volumes.

But now, for example, people with Alzheimer's, that's going to be much faster. But the whole thing is typically when we wait for amyloid plaque or something to develop, it's effectively like scar. It's too light. So the whole goal is to try and find it when you're just starting that decline. Again, the only way to do that is to have a baseline and compare over time. And that differential is far more powerful than just a single point in time when you're wondering, do I have it, do I not?

Dave:

Yeah. So the speed of change in anybody's system is a great indicator of what's happening. And if you're like me and you're saying, "Change is unacceptable unless it's in the direction I choose." That means you can take the system that's going the way you don't want and say, "Well, that's the one that needs the most attention first." So then you apply the interventions. Maybe you do something from Upgrade Labs, maybe you change how you eat, you change how you sleep, you change how your posture works with a functional movement person. There's all kinds of stuff.

But if you know, you know. So my goal is to keep everything completely level. I probably will fail at that goal, but that's okay. That's my goal. And maybe to even make it look like it used to look, except I don't know because I don't have a baseline scan from when I was in my twenties. So if I did, it probably would've been worse because I was so sick back then anyway. Do you see people improve over time when they get a scan and then they come back a year or two later?

Raj:

We do actually and I think a lot of it has to do with just knowing. The biggest question is to know what do I need to work on? What's going on under this skin? Because it's basically you can't see it. And that's where a picture's worth a thousand words where you're actually able to see what's going on, you have to understand it. And that's one of the other pieces that we do in Prenuvo is we actually put together a report that's understandable to patients and consumers.

So I don't know if you remember, but back in 2019 I was meeting with every single patient who came into the clinic in Vancouver. And as we have a lot of medical speak that can be, or jargon, you know that we used to in the field of medicine, but actually kind of learn to simplify it so that everybody can understand it. And that's really the goal.

Dave:

You can't do that.

Raj:

It's the goal.

Dave:

You realize if doctors spoke in normal language, they couldn't charge as much. I mean, come on, man.

Raj:

Well, no. The goal is that when anybody, doesn't matter what they have of a problem, we are all going to go online and search it up to try and understand it as best as we can. And people unfortunately get lost. And the whole goal is to provide them with some kind of solid background that they can actually build on to understand what's going on. Because when you're ill or a loved one is ill, there's nothing more important than trying to understand and help them.

Dave:

It's true. So people can go online, not to Google, and they can look around and they can find something. But if you've explained it to them well, they're going to know what they're seeing. And if you haven't explained it well, they haven't. So what's changed over my last appointment in this one?

Raj:

So when we actually look at things, obviously there was a surprise that, "Oh, you just have the solitary kidney." Now, one of the things which is amazing is that as you can imagine, the kidney, as we all get older, starts to change and decrease in size. Basically it's function and output starts to decrease. So one of the things that in medicine really, all we actually have is a single line or a ruler to be able to measure top to bottom. We've actually built all these AI algorithms that actually allow us to look at the volume of the kidney.

Dave:

Oh. That's important.

Raj:

The volume of the organs to see how they start to change. So in your case, looking at the kidney, it's actually looks like it's held really nice and still.

Dave:

I could tell you why.

Raj:

And more importantly, we know that because of that single kidney, your kidney is actually compensated to be larger than normal to be able to handle the amount of diuresis that the kidneys normally do.

Dave:

Got it. So I have a super mega kidney because I'm more evolved than anyone else. I was born actually with one kidney, didn't know it until I was 30 because my kidney's twice as large. What that means though for me is that if I did have a problem with my kidney, I'd want to know it early because I only have one, because I have a spare bay for another one if I needed it.

But what I want to know is if what I'm doing is keeping my kidney healthy and strong, and we know high blood pressure is destructive in kidneys, I don't have that. In fact, I have low blood pressure, which isn't a good thing either. But I have it and it's a genetic thing. I've had it for my whole life and it sucks, but I manage it. So then most people over time, like say they decline. But I think it's because they're eating kale and spinach and grains, and a bunch of other things that are nephrotoxic, including ochratoxin A, which is the primary toxin in beer and wine and coffee. Well, not the coffee I drink.

But the bottom line is, if you know your kidneys are a weak point and they're common cause of death, maybe you could protect them. There's a supplement called benfotiamine, which is a derivative of vitamin B1 that's shown to be protective of the kidney. Have I been taking that since I found out I had one kidney? Yeah, I have.

So there's stuff that you would know if you had a Prenuvo scan, and then you can take corrective action. But if you don't know something of that magnitude, well then you're just going to go out and drink the beer and the moldy coffee and whatever else, and that's what it is. Talk to me about pancreatic cancer. This is the Steve Jobs cancer.

Raj:

Right, yeah. As you know it's like one of the most deadly cancers that there are. And the reason why is, typically, again because it's found late. And the whole goal, like any of the cancer detection that we do

at Prenuvo was for early detection. And so with pancreatic cancer we're able to see the pancreas beautifully. We're actually able to see the pancreatic duct.

So as you know the pancreas, it's a gland that basically secretes enzymes into the small bowel to basically be able to digest food. And so that there's a duct that all of these I guess excrete directly into, and we can actually see and trace that duct back. And so the earliest form of cancer is where that duct will actually have a lot of branch off if that starts to become cancer or it gets blocked, and we're able to pick that out.

And now one of the keys to be able to doing that is again, if you find pancreatic cancer in stage one, there are procedures called a Whipples procedure that actually is potentially curative.

Dave:

Wow.

Raj:

Whereas quite often you find it, again, stage three where pancreatic cancer is wrapped around the blood vessels that drain all the blood from your stomach and abdomen and small bowel and feed the liver, and you can't now remove it because you're no longer able to digest food and process it through liver. So that's where stage one pancreatic cancer is really important to be able to detect in early stage.

Dave:

So you can do that for people. And that is a major killer. And like you said, it's very hard to treat. Now, back when I first started Bulletproof, I met a professor from UC San Diego named Dr. Larry Smarr. He had taken his colonoscopy data and he 3D printed his colon, because he was having colon problems and went on essentially a clean keto cyclical diet and magically fixed his colon.

But having that, all the doctors were like, "How could you possibly have a visualization like that? We see images, but we can't do it." So why I want to know, that was almost 10 years ago. In your case, how soon do we get a "honey, I shrunk the kids" kind of VR experience where I can go in and cruise through my own body and see what it looks like, because you have the data.

Raj:

We do have the data. The whole idea is that right now the data's in the regular medical format. So more importantly, if a doctor or somebody who's trying to help you needs to see it, they can look at it in a way that they can understand it. Now, can you actually go and take that data and manipulate it to make a 3D model? Sure, you could.

We don't do it now, but anybody could take that data. Because once you get a scan, you have access to your data. It's on your cell phone or it's online on the web where you get entirely able to see it, download it, do whatever you want with it, manipulate it as you want. But the whole goal of it is to give it to you, the patient, so that what you want to do with it is your choice.

Dave:

Guys, if you want to inspire a generation of biohackers, do that. Just allow a seven year old to go in and fly through their own body using VR goggles. You want to do some powerful meditation, even healing meditation. You could do crazy stuff with this level of visualization, because we just never had this before. So I'm pretty excited. And I know that what you're doing is you're saying, "Well, I'd rather see

the organ volume because that's really indicative of a medical thing, and that's just not what we're worried about." Right?

Raj:

Well, it's still the whole goal is number one, to help patients prevent. We don't want to detect cancer late, obviously, number one. But we also want to empower people to understand what's going on in their body and to be able to talk about it in a way that us in the medical profession can understand, so the communication is quick and easy. Because there's nothing more stressful than getting a diagnosis and not knowing what to do.

I'm unfortunately headed to give people those types of diagnoses where they're like, "Look, you've got stage four metastatic disease." And I ask them, "Do you have this symptom? This symptom?" And I'm stunned. They're like, "No, I feel perfectly not fine or have shoulder pain, that's why I came in." And you're just like, "Well, this..."

Dave:

Yeah, shoulder pain might be a little worse than shoulder pain, right?

Raj:

Yeah. And unfortunately, we've all seen that all too often. And that was really the impetus to start doing this with MRI because the benefit of MRIs, it's the pinnacle of imaging. We have X-ray, which is ubiquitous, which looks at bones. We have ultrasound which looks at blood flow. We have CT scan, which is a three-dimensional X-ray. But then at the very top of that is MRI. And the beauty of MRI is that there's no radiation, but you get the greatest amount of detail.

Dave:

Very cool. There's also SPECT scans and there's fMRI scans. Can you talk to me about MRI versus fMRI versus SPECT?

Raj:

For sure.

Dave:

And by the way, I'm on Dr. Amy's board of directors, so please [inaudible 00:28:11] over SPECT unless you want to, in which case I'm curious, but.

Raj:

I like SPECT.

Dave:

I think I know the answer.

Raj:

Remember I'm a nuclear medicine physician, so.

Dave:

I was assuming you would not, you re-SPECT them.

Raj:

Oh boy, that's a good one. That's really good, I like that. But no, the real power of nuclear medicine is that we actually look at functional, how things work. And that's the real power. So when we look at radiology, it's more like anatomic, like what is a structure? And so what we've done with Prenuvo is we've actually gone and take the functional imaging that's present in nuclear medicine, and we apply it to a MRI scan that radiologists understand.

So that power of synchronizing like a nuclear medicine functional type study without radiation with the radiology studies is basically incredibly powerful. And so with SPECT, what we're doing is depending on the type of radiopharmaceutical we're using, we can look at all sorts of things from brain perfusion. And so brain perfusion can be looked at multiple different ways. fMRI is effectively a similar MRI to what we do. We're just now looking at how it functions.

So SPECT and nuclear medicine, we look at how things function. And this is where the real beauty and why my fascination with MRI came about is because like I said, it's a smartphone. We can go and take a sequence that looks at functional blood flow and apply it on the machine that we have at Prenuvo. We can apply any of these things to it. It's a matter of what is the optimal balance of time for yield of information that we want to get. That's one of the things that we've made able to solve is that issue of time.

Most MRIs, if you were to try and do what we did, today it would take you well over three hours and you just get little bits and pieces like a jigsaw puzzle not put together. Whereas our scan is just under an hour and we're able to see everything with a level of detail that you would expect from any high quality hospital in the country.

Dave:

It was not a lot of time. It's like a gel cushion thing. You lay in this thing and you're required to hold still and hold your breath occasionally so you can be still. But it's just relaxing, I would say. There's some noise but you have headphones on that are blocking it out. So you just lay there and you're like, there's nothing to do. You just have to not move. So for me it's just kind of a meditative thing and then you're done. And it was very minor. I also don't have claustrophobia. What do you do if people have claustrophobia?

Raj:

Actually, I don't know if you noticed on the machine, it's like we actually have the ability to watch Netflix on the back. And so for some people-

Dave:

You didn't tell me that. Man, I could've watched Breaking Bad again.

Raj:

So for people who are claustrophobic, actually we found that with this, they really don't have much of an issue as well. The bore is a lot more open, so you can actually see out through both sides and so you don't have that sort of claustrophobic feeling. A lot of other older machines, people describe it to be like

in a coffin because of just long tube and the front of it is three inches from your face, and it's quite disconcerting.

Whereas I've had so many patients who come in and say, "I had one at a hospital and it was a frightening experience. I came here, it was like as you said, relaxing." And more importantly, they come out and they get all of this information about what is going on. And that empowerment is so valuable to patients and that's what you can get with Prenuvo.

Dave:

That's incredible. I know that we just did my scan and I'm going to be a little selfish here. So pancreatic cancer, did you look at my pancreas yet?

Raj:

I did. Looks fine.

Dave:

Oh, see? Told you so. As far as I didn't go on the zero fat Ornish diet, which is what Steve Jobs was eating. Perhaps high carb, low fat plant toxin, heavy diets, increase pancreatic cancer risk. Do you think? You don't have to answer that.

Raj:

I was going to say one of the biggest things is that we just don't know and there's this randomness to a lot of it. And this is the beauty that we can eliminate that randomness. There's nothing worse than single mother sort of dying from pancreatic cancer or any cancer, and having no idea it was there until it's too late. And that's goal of what we're doing is to prevent that kind of tragedy.

Dave:

What about aneurysms? That's another really big thing. You would never know if you're at risk for an aneurysm because it hasn't popped yet. And if you're listening, you don't know, an aneurysm is basically a thin blood vessel in the brain that could pop and is probably stretching. So how small can you see them? Walk me through the Prenuvo aneurysm story.

Raj:

Exactly. So what we do is, as I mentioned, the MRIs, it's equipment that allows you to look at all sorts of different things. And so what we do is we actually look at the blood in the brain and the blood vessels within what's called a Circle of Willis, which are the blood vessels in the center of the brain. And so if there's like a small balloon, which is what an aneurysm is, if it grows... The larger it gets, the greater risk of it rupturing.

And unfortunately, if it ruptures, more than 9 out of 10 people will die from that almost instantly. And these are the people who basically quite often will have a severe headache, they'll go in and out of hospital. And if they don't get the proper type of CT sequence called an angiogram, they might not even know it's there and then they pass away unfortunately at home.

And so with a Prenuvo scan, we can actually go on screen for that to see if there's an aneurysm. And if there is, it can be treated ahead of time to make sure that it doesn't rupture. Or if it's small, we can actually monitor it and make sure it doesn't grow.

Dave:

How often do you find those? What percentage of patients have an aneurysm that didn't know about it?

Raj:

I believe it's about 0.8%. So under 1%.

Dave:

Okay, good deal. And so I'm assuming you didn't see any big smoking aneurysms for me?

Raj:

No.

Dave:

What's the worst one you've ever found?

Raj:

The worst one was actually... And this is actually a frightening story. So we actually found a lady with a six millimeter aneurysm. And so typically, anything over five millimeters is go to surgery.

Dave:

And this is a brain one?

Raj:

In the brain. And so she had a six millimeter aneurysm. We sent the report off to her and her doctor. And then what we decided to do is follow up with all these patients, see what happened. And so we called the patient, thank goodness she answered the phone, and she said, "Oh, my doctor told me this is nothing to worry about."

Dave:

Holy crap.

Raj:

And we're just like, "Oh my God." And so we wound up sending her to a different physician who then sent her to a neurosurgeon who treated it.

Dave:

Wow.

Raj:

And it was actually quite frightening. It's just one of the things that information is power. And when people know what's going on and they understand it, they're very, I guess, empowered to know what to do. Sometimes it can be scary, but more importantly it's like the scariest part is just not knowing what's going on. And that's what we're able to provide is what is happening at a level that any patient can understand and any of the doctors can understand. And that's where we see Prenuvo being the great

equalizer in the fact that actually it helps doctors treat their patients better, because doctors don't know what's going on under the skin because the physical exam that's used unfortunately finds things late.

Dave:

If you poke someone to see if they have cancer and you feel it, it's probably pretty big, right?

Raj:

Exactly.

Dave:

That's what they're doing in an annual checkup. It's pretty much useless.

Raj:

Unfortunately, yeah. And the thing is, medicine has really not had a lot of tools to really do much beyond that. There's things like people using ultrasound to try and look around. But things like pancreatic cancer can be very difficult to see on ultrasound because ultrasound cannot penetrate through bowel gas. And so therefore, you don't see the pancreas quite often.

Dave:

Oh, so vegans are at higher risk because when you do an imaging study on them, they fart all the time. So you just can't see as much?

Raj:

Well, if somebody has a lot of bowel gas from, I don't know, whatever diet or who knows what they ate, but the whole idea is that the ultrasound beam can't pass through it.

Dave:

I'm sorry, that was the stupidest thing I've ever said, but I'm still laughing. It's my seventh grade sense of humor. But technically, it's true. But no, there's other reasons that you want to eat animals because you love Mother Nature for instance. But we won't get into that.

Raj:

I was going to say that. And this is the beauty of MRIs, that we can actually see right through all of that.

Dave:

Okay.

Raj:

Bowel gas is not-

Dave:

Do I have a lot of bowel gas?

Raj:

No, you're pretty normal. You're pretty normal.

Dave:
This is a fun interview for me anyway. Yeah.

Raj:
And that's the interesting thing with the MRI, it's like you can't hide anything.

Dave:
Exactly.

Raj:
There's no surprises.

Dave:
So what's the most embarrassing thing in my MRI?

Raj:
Wow. Asymmetric prostate gland.

Dave:
Asymmetric prostate gland. It was like one side bigger than the other?

Raj:
Yeah.

Dave:
And what was that from?

Raj:
I have no idea.

Dave:
It's not like a tumorous sort of thing?

Raj:
Nope.

Dave:
It's just probably some recreational thing.

Raj:

It's just, I guess, the way you were made, I have no idea. But it hasn't changed in three years and that's the important part.

Dave:

So I just have an unusual prostate?

Raj:

A little bit bigger on the left and the right.

Dave:

If I wanted to get the data and then make a 3D printing like a necklace of my prostate gland, could we do that?

Raj:

For sure, you could do that. We'll give you the data, what you want to do is up to you.

Dave:

This is so cool. Do you guys know how cool that is? You get a 3D print of any of your organs, even your prostate. I don't know why you'd want that. I mean, as a matter of fact, you could probably do that and I'll give it to someone as a gift.

Raj:

If you'd like to, you can do that. But it just sort of tells you about how amazing the human body is, all the different parts and bits and pieces and how we're... It's not just our fingerprint that's unique, everything inside is unique. And the Prenuvo scan allows us to see all that. And more importantly, to see how it's changing because we evolve and see how everything is evolving with time.

Dave:

It's the delta change over time. That is the holy grail for anti-aging. And I've written a big, well-received book on all the stuff for anti-aging. And the problem is, your ability to detect those four big killers. Well, diabetes, you can see blood sugar changes again over time. So if you're using continuous glucose monitoring, like my levels thing here. Or you're looking at a few things like HbA1C, you can start to see that one which is a precursor to the others. But after that, cancer is like, I don't know. And that's a massive one. And cardiovascular disease, what's the Prenuvo take on that? What could you see? What could you not see? Because that's another one you probably don't know until it's too late.

Raj:

Right. Realistically when we look at cardiovascular disease, what we're actually looking on the Prenuvo scan is more microvascular disease. So we can actually see small blockages particularly in the brain. Whereas the actual heart, the coronary arteries, the plumbing of the heart, which is what everybody's interested in for heart attack risk, that we don't see because the fact that the heart is always moving.

Dave:

Right.

Raj:

Earlier you're saying I had to hold my breath a few times. Well, that's because MRI doesn't like motion.

Dave:

You could have told me to stop my heart during that time. I would have.

Raj:

No, thanks. But that's why we get you to hold your breath so we can look at the lungs and we can actually see the detail that we need to see. Whereas in the heart, obviously it's beating during the course of the study so we can't look at the coronary artery as well. But we can see if the heart is big, we can see if there's a fluid collection around the heart. We can see if there's any aneurysm in the aorta.

Dave:

What about calcium score for cardiovascular? That's something that I did a while ago. It was like 0.6 or something, almost like it goes from zero to a hundred or something. How does a Prenuvo scan compare to a calcium score?

Raj:

Right. The calcium score is really again looking for coronary artery calcification. So because MRI isn't looking at the coronary arteries, we're not helpful. Where we are helpful is once you get to the smaller and smaller blood vessels, particularly at the capillary or precapillary level in the brain, when any of those are blocked due to the usual-

Dave:

Soft or calcified plaque, either one.

Raj:

Mainly soft.

Dave:

Mainly soft, okay.

Raj:

We'll actually start to see the impact of those small blood vessels being blocked because we see these little white spots in the brain.

Dave:

Interesting.

Raj:

And that white spot in the brain is basically scarred or injured brain tissue. Now the question is, what is it caused by? And that's typically due to the atherosclerotic disease, so diabetes, high blood pressure, smoking. So we'll actually see that impact.

Dave:

How was my brain? Did I have lots of white spots?

Raj:

Oh, actually your brain looks good. Again, hasn't changed.

Dave:

And this is an important thing. I had toxin induced brain damage that was showing up on a SPECT scan with Dr. Amon. I had big problems there, and just really a dysfunctional brain. And to know that it looks normal, I don't have any of that stuff. And guys, I'm sort of the grass-fed butter king, you could say. I have been eating meat, grass-fed animal meat, butter. At least 50% of my calories is from fat, and 50% of my fat or more is saturated fat for about 15 plus years. And I don't know how many white spots in my brain. Clearly what I'm doing is very dangerous.

Raj:

Well, that's why it's good to have a baseline to see how it changes.

Dave:

If it was, I would change. That's also why I got a calcium score. The reason I did that, I started drinking a bunch of mineral water. Because there's studies showing mineral water's good for you, but I'm concerned about too much calcium because calcium will deposit all over the body. And that's a problem.

So I said I want to see whether what I'm doing works after two years of that. And it turns out, who would've thought that if you do vitamin DAKE, D, A, K, and E, strangely the K and the D and the A in particular work together to keep that from happening, unless you're taking a ton of calcium. So I knew that I was doing it right, but I wanted to verify. If you're sitting here watching this going, "Oh, I went plant-based because I heard someone say that eating less animal protein would lower mTOR." Guys, carbs increase mTOR more than animal protein. Let's just be straightforward.

But okay, if you do that for a year and then you get your Prenuvo before and after, let's see the data. And if you don't like what you see, then you change what you do. And for me, I was a raw vegan. I've been down these paths and just waiting until you feel like crap is hard. And I think Prenuvo offers a reasonable way to do this. And really for my next checkup, I could do just the torso one, which is under a thousand dollars. And I could do pre-tax money on that. So that's really about 600, 650 bucks depending on what state you live in.

Okay, that's in range with the most blood work that I do. And it's kind of neat, so I'm pretty stoked on that. And you're doing one in Dallas, I moved to Austin. So it's not a two hour drive. I could do that.

Raj:

Right. And I was just going to step back and talk about the calcification.

Dave:

Yeah, tell me about that.

Raj:

MRI doesn't see calcification. Because basically when we think of an MRI, it's a hydrogen imager. So basically, we're looking at water and fat, and interplay between those. Whereas calcification that you would see-

Dave:

It's invisible.

Raj:

It's invisible.

Dave:

It's an empty spot, right?

Raj:

Exactly. So we see a black hole. Now, this is where a CT or X-ray, what they excel at. They actually excel at looking at calcification. That's why X-ray sees bone, we see the calcium in the bone. And CT is a three-dimensional X-ray so it picks up that calcium really well. And the benefit of a CT, for example, is to look at the coronary artery calcification because it's so fast.

But again, the faster you go the more radiation you need. So it's a risk balance. And it's the type of thing that we know that to screen with something like CT is not a good idea just because of the radiation involved, plus you don't get the level of soft tissue detail that you get with MRI. So as a result, in the past a lot of people were screening with CT, which is a very bad idea.

Dave:

Lots of radiation. Right.

Raj:

Lots of radiation. Lots of false positives. You had no idea what you're looking at because you don't have the tissue contrast. And that's where we're able to reduce our false positives because we're combining four main function, the radiology and the nuclear medicine. And that really allows us to be very, very specific about what we're finding, which is quite unique to what we do.

Dave:

Okay. That's really cool. And I would say, from what I understand about imaging, which is nowhere near as much as you. But as a biohacker, I think your baseline regular stuff is actually electrical. Heart rate variability, you could do that pretty cheap. Come into an Upgrade Labs and we've got some very high tech stuff to look at mitochondrial function from an electrical perspective. It's awesome. But the resolution of that data can tell us a lot metabolically. But it has no bearing, unless you're very, very sick, on any of the 500 plus things that you can spot.

So those are basic. If your heart rate variability is going down and down and down, look for some kind of disease, maybe do a Prenuvo. Something isn't right. So you can detect that. But then what else you going to do? You need to do your thyroid and your sex hormones on a regular basis. And given the cost now, if you're on the type of program where you're saying, "I'm going to spend a few thousand dollars a year on your health."

Now, you could hear that and go, "Screw you, Dave. How dare you do that?" I can also tell you that there's tons of people who are willing to do it. For much of my life when I didn't make a lot of money, I spent 20% of my income on my health because I was so sick from toxic mold. It was actually a fixed budgetary item. So I just want you to understand this is what it costs now. Do you think this will be cheaper in 10 years?

Raj:

I hope so.

Dave:

Well, do you think this will be broadly available?

Raj:

I think it will. And what's actually starting to happen in particularly overseas in Europe, it's becoming the new physical exam. There's a group in Italy as well as UK that are actually now starting to bring this into the forefront. Because again, as we talked about the clinical exam where you're going and pressing on different organs, is this too late? And by detecting things early with MRI, we're able to find things earlier. And that's the movement that's starting in Europe.

Dave:

So you're looking at taking the Prenuvo software and actually using it in Europe. That's what they're using?

Raj:

At some point, yeah. The analysis software. The analysis right now is still done their traditional radiology way where we look at the images and we go through every single detail. But the goal is to actually get AI to start to look at those subtle changes like volume changes and organ changes over time that the eye is not good at, whereas imaging is very good to reproduce.

And so that's what we're bringing in is what we call quantitative reproducibility, where we can actually start to see these subtle changes over time. Like for example on your study, we were looking at the curvature of your spine. Now normally in medicine, we wait till there's a problem where we never really worry about it. Whereas in yours, we were looking at your thoracic curvature, what we call the kyphosis, was like 30 degrees. We're looking at your lumbar lordosis, it was 35 degrees.

Dave:

So how do those rank according to normal?

Raj:

Perfectly normal.

Dave:

Okay.

Raj:

But the whole idea is that now we have these numbers that we can actually start to track and start to see when they change.

Dave:

So if I go to 32 and I'm hunching, you're going to see it and then you're going to tell me.

Raj:

Exactly.

Dave:

Okay.

Raj:

And so for example, in my case of 11 years of scanning, we built this AI algorithm that we're able to then apply to my data. And you can see that over the course of the past few years by sitting more, that my curvature is actually getting worse and worse. And what's that going to do? It's going to start to induce things like abnormal shear. Abnormal shear can now start to possibly induce arthritis. And I think arthritis is one of the fascinating things. It's so ubiquitous, but we have no idea how it develops.

Dave:

Most of it I think is autoimmune, to be honest. I think there are people who would be arguing about that, but it's interesting how it gets turned on by certain foods and other things.

Raj:

Well, but the thing is, it's so common. When we talk about getting older in the 60s, 70s, 80s type of thing, it's kind of, "Oh, well that's normal for age." Well, if we want to live older and healthier, we don't want that to be there in our 60s, 70s, and 80s.

Dave:

I don't believe anything is normal for age. It's all pathological for age.

Raj:

Right. Well, yeah. And that's the goal. With imaging, we can actually understand where we are and kind of see what triggers change. And that's the beauty. It's like kindergarten. It's like show and tell. We can see what's going on, we can explain it with a single picture, and we can understand, "Oh, well, this is what changed. Why did it change? Oh, was I sitting too much? Was I not exercising? Was I getting too fat?" Who knows what?

Dave:

Eating fake meat. I mean, who knows?

Raj:

Is my visceral fat increasing? As you know, that's the more of the deadly fat. And so that's typically very difficult to measure. Whereas with our AI algorithms, we can actually now go and pull out all the visceral fat.

Dave:

How was my visceral fat?

Raj:

It looked pretty good. It looked really good.

Dave:

Okay.

Raj:

I don't have the number because [inaudible 00:48:35].

Dave:

You have the number yet because just downloading it. Okay.

Raj:

Yeah.

Dave:

Now, are you doing it in volume or pounds? I guess, volume of fat. Okay, just fine. But you could correlate that because it's the same density. Well, it's slightly less dense than to eat more omega-6, but not enough to matter, right? It's like a 1% difference.

Raj:

Yeah. Well, the whole idea is right now nobody has a real measure of it. So the goal is to basically start to pull out something as a volume and then say, "Well, here it is. How has it changed?" So let's say you decide to change your diet. How is it going to impact your visceral fat, your muscle mass? What's going to happen?

Dave:

We track it electrically via a pretty accurate algorithm at Upgrade Labs. When people come in, we're looking at some people who are skinny fat, "Oh, it looks so good." You're like, "You don't look good inside." And that's why we can track on a daily or whenever you come in basis, which is really cool. But the level of accuracy, is it all around the kidneys or is it all around the liver? You're going to see so much more from a Prenuvo.

But I like knowing when I go in, whether if mine shifted by 5 or 10%, I would know. Because every time I come in I get a little graph and it says, "How do you rank?" And right now I have slightly below average visceral fat for an 18 year old. Good. That's where I want to be. And that's on that scan. But if you'd have told me it was really high in Prenuvo, then I'm like, "Okay, were my feet dirty when I did my electrical scan or what's going on?"

But this is, for me, more curiosity. And for people listening, visceral fat, it's fat around your organs. It's super dangerous that you can't see. So how would you know? Well, you actually wouldn't unless you did an analysis in detail at Prenuvo. And we'd give you a pretty good directional number at Upgrade Labs. But we're not going to do anywhere near as a level of detail you get from a full whole body MRI. And I think that's normal and healthy just to get a baseline number.

Same thing electrically. If you're getting your heart rate variability, it's not the same as getting your heart rate all day long from a chest strap, which is different than getting an EKG, a portable EKG, which you can do. In fact, I worked... Geez. At a company called Corventis many years ago, which was the first portable take home works over the internet. Portable EKG I guess is really cool.

So we're getting better and better, but none of that is going to do what an MRI does. But I think it all works together to give you this picture that says, "Holy crap, I'm doing really well." Or, "Let's pinpoint this one spot that's the most important and let's work on that." Now that's my question for you. Given what you've seen in my MRI, if you were to tell me to work on one thing, what would it be?

Raj:

Actually, I'd have to look at the analysis today, but from last year you had asymmetry in your left and right leg muscles of your iliopsoas.

Dave:

Yep, that's right. In fact, I'm dealing with a psoas issue right now. So some functional movement. That's probably related to a foot injury that I had repaired last year. I did a document on how to heal fast from surgery. Daveasprey.com/heal, if you guys didn't see it. All the tech that I used to recover super-fast. So maybe that helped, but I know I still have functional movement and retraining to do. So it's cool that you can spot that. It's actually really fascinating.

Raj:

And that's again the benefit of the AI, where AI is actually able to go and track your muscles. And again, those subtle changes, look at asymmetry left to right. Then me as a radiologist looking at it be like, "Well, that's just you and don't worry about it because not a real medical issue to worry about." and so we just pass over it. But the AI can actually go through all these things and start to quantify these different pieces of muscles, fat, organs, everything to see how it changes. And that's the real power of ai.

And I think to earlier question, will the price of MRI come down? Well, it's really going to be when it becomes better technologically enabled to extract more and more of this information, and that that'll bring the cost down. As the scans get faster and as the analysis gets quicker, that'll bring the cost.

Dave:

Or as you get nicer. Because you actually, for listeners... And as you know, any time someone comes on this show who's running a company, I'm like, "Come on, share with listeners." So he is giving you $300 off a whole body scan at Prenuvo. Go to Prenuvo, P-R-E-N-U-V-O.com/dave. And it's $2,199 instead of $2,500 bucks. And you can still use your FSA if you're in the US.

And what that means is you can get a baseline. And yeah, it's not cheap but it's also very cheap compared to just cancer diagnostics for each of those things to see if you have something. So it's the bargain of a lifetime, if you were going to go out and spend $20,000 on other stuff. So it's crazy effective. It's huge amounts of data. But there you go, 300 bucks off, thank you for the savings. That's

super cool. And it's good through March 10th, 2023, SIX locations in the US and Canada and some more coming around after that.

So I think you're going to see a good number of listeners who are saying, "I'm going to prioritize this in my annual spend because it just removes so many uncertainties." Like dozens and dozens of them where you just don't know. Knowing more means you're more relaxed. And you just don't have to pay attention to that.

And when your attention on your health is dispersed as a biohacker, I don't know. What should I do? Should I sleep? Should I eat? Should I exercise? What about this? And you can fall into this, it's a FOMO thing. I'm missing out on something I know. This is going to remove 50 things from your... Should I think about that list so you can focus on doing the stuff that matters most to you?

And I'm going to say, so do your Prenuvo scan. I'm also going to say come into Upgrade Labs. Let our intake survey work with you on that, and we'll help to prioritize the results you want to get and we'll tell you the interventions to do to get there the fastest. So one with Prenuvo is let's remove medical risk by knowing what you have and so you just don't have to think about it anymore. And then the other side of things is, "Hey, what should I do first?"

I don't want you to sit around going, "Biohacking is overwhelming." It's not. What you want to do is get rid of the big fluffy cloud of not knowing, and then pick something and go do it. And what you learned in this interview, you can actually do both of those. And it's remarkably cool. You just got to know Raj. Raj is a true nerd. The PhD engineering guys, they're always nerds. I'm only a bachelor's degree in computer science, so I don't really count. Actually, I'm a super nerd.

But on top of that, the medical doctor side. So this is just a unique time when you can take the data and you can take the doctor of brain and do it. But now it's the hard kind of closer question for you. The history of radiology is mostly guys or women trained to look at pictures and say, "That's a good one, that's a bad one." And then write up a report that's expensive. But that's kind of what it is.

So about 10, 15 years ago, insurance companies are like, "Wait a minute. What if I took the X-ray here and I sent it to anywhere in the world?" There's a radiologist who can look at this picture, I'll just email it to them essentially. Isn't AI going to put all those guys out of jobs?

Raj:

It's actually a great question because that was sort of the assumption, that AI will actually put them out of jobs. But it is much harder than that. I think actually AI's going to make us better radiologists because of the ability to bring in this quantitative reproducibility so that we can actually take the best from one institution and apply it to everybody. Because one of the problems with medicine unfortunately is that there's a lot of siloing.

And that siloing, it's great for one institution to say, "Yeah, we're the best at this." PR another institution to say, "We're the best at this." But the goal is to really take the best of all that and give it to everybody. That's why we all go into medicine, is to really help people. And so one of the key goals of Prenuvo is to basically take the best from everywhere there is, apply it to the MRI scan to show people what's going on to be able to help them. And so it becomes the great equalizer, sort of eliminating that reactive medicine that we have and turning it into active patient-engaged and patient-focused healthcare.

Dave:

I like that. It was very well-scripted, politically correct answer.

Raj:

It was no script. That's what we do.

Dave:

I'm messing with you.

Raj:

Right.

Dave:

I do think there probably will be the baseline boring work of a radiologist that goes away, the very simple screening stuff, and that's not a bad thing. Drudgery. And I've talked to radiologists who are like, "God." Sometimes I'm looking at these images all day long and it's just boring. So if we can get rid of drudgery, that's what AI ought to be doing for humanity. And leaving us look, "That one's juicy, what's going on here?" And then to pay more attention to that and to let us focus our time in a better way. So I'm hopeful that it goes in that direction.

Raj:

Exactly. That's the goal of what we have, is to basically eliminate that drudgery, that boring stuff, the hard stuff that basically can be... Not hard, but the stuff that's kind of gets in the way of actually doing the tough diagnostic detective work. And so that's exactly what our AI team is doing. It's getting rid of all the repeat, repeat, repeat stuff that waste our time and that allows us to focus more on what matters.

Dave:

It absolutely does. And I'm very excited. Just even the last three years, the change in Prenuvo since I did my first scan, I'm like, "This is kind of interesting, but I'm just going to wait and see." And to see how you've expanded the number of locations and the capabilities and you go in and I feel like that old game... It was Operation or Operator.

Raj:

Operation, right.

Dave:

Yeah, Operation you have the tweezers and it buzzes if you don't pick things up. You see a picture of your own body. Do you have one up on the screen or it turn off?

Raj:

I can bring it up, yeah.

Dave:

You see a picture of your own body and everything's outlined by AI. So here's all the vertebra, here's all the organs. And I'm like, "I want to custom Operation. I could just go in and have my own actual organs taken out." So I want to gamify MRIs so the kids will be more interested in the human body. Because it's so hackable, it's so interesting.

Raj:

Well, with Prenuvo you get all the data and you can do what you want with it.

Dave:

I do have a 3D printer sitting there. All right.

Raj:

Like I said, the goal is to empower you to do whatever you want with the data, but most importantly understand it.

Dave:

You're probably the only person who might be able to answer this offhand. Is there a portable data format to take the MRI data you have and get it into Blender?

Raj:

You can. Yeah.

Dave:

Guys, Blender's what you do for 3D modeling, for 3D printing. I'm going to make my 13 year old son do that.

Raj:

And interesting, we've actually tried it.

Dave:

It works?

Raj:

It does work, yeah. There's a little bit of image pixelation, which you can actually completely smooth out. But it works quite well.

Dave:

Oh my God.

Raj:

And it works really well with the brain. Take the volumetric brain data and you can basically take your brain, print it out and rotate it around.

Dave:

So I could 3D print my own brain?

Raj:

Correct.

Dave:

What color would it be?

Raj:

Whatever color you'd like.

Dave:

I always try to throw you the sideways questions and you're like, "I am an engineer. I am not laughed until..." It is pretty good, Raj.

Raj:

But one of the other really cool ones is actually to go and take the Circle of Willis, the arteries inside the brain. So these are the main arteries that feed the brain. And you can actually go and print those out, and you can see how they all connect together. And what's really amazing is just the uniqueness that the body brings. I don't know if you're a real engineering kind of person like myself who just sits there and looks at your hand, and looks at all the creases in your palm and see how they change.

Dave:

It's amazing.

Raj:

It is. And as an engineer in medicine, it's like that's why I went into medicine from engineering is because the body's the ultimate engineered device. But most of our tools are not great to understand it or analyze it.

Dave:

Okay.

Raj:

That's the benefit of the Prenuvo scan is that a picture's worth a thousand words. You can see it, you can understand it, and that's the power of imagery.

Dave:

Well, now we're getting into art. And there's those old, kind of a little bit disturbing museum pieces. I think they're fascinating. But where they take a human body and they'll stick it in plastic and do thin slices of it. What's it called? Body image or something. You know what I'm talking about? It was in Vancouver for a while.

Raj:

Body Works.

Dave:

Body Works. Thank you. Right. Well, you can get your own version of that without having to be dead, which is nice. And so there will be art based on this. I'm already thinking, not that I'm a very good artist, I'm not. And I'm also an entrepreneur with six companies. That's my art. But I want to print out my own

Circle of Willis and then have it gold plated or something, and I want to name it "what you talking about".

Raj:

All right.

Dave:

Okay, there you go.

Raj:

You Could do that.

Dave:

So everyone my age understands "What you talking about, Willis" is a famous line from some old TV show. I forgot which was.

Raj:

Different Strokes.

Dave:

Different Strokes. Thank you very much. So anyway, there we go. There's my absolute engineering sense of humor, but you got it. So that means you are definitely a nerd.

Raj:

Thank you.

Dave:

Raj, prenuvo.com is your company. The code, prenuvo.com/dave or just mention my name on the phone, they'll give you a good discount. This is cool stuff. And if it's within reach for you, I think it's worthy. Even if you only did it once every 10 years, it's still worthy because the original scan is gold and you'll never get it again. You only get that shot the first time you have it and you're changed from there. So consider it as a biohacker. And if it's not there for you yet, put it on your bucket list and it'll happen.