Mansoor: And this is where, Dave, the concept, and I noted this to you when we first spoke, the concept of thinking of DNA truly, Dave, as a language. That was the key for me. Thus far, we were thinking of DNA as a vocabulary; in other words, the more genes you studied, 10,000, 15,000, 20,000, about 22,000... We thought we could just simply stack these genes, 22,000 of them, figure out what they do, study them in a siloed manner, and off we go.

Announcer: Bulletproof Radio: A state of high performance.

Dave: You're listening to Bulletproof Radio with Dave Asprey. Today's Cool Fact of the Day is that while I read the Cool Fact of the Day... you should watch this on the YouTube channel, because what could this noise be? Am I eating a Tootsie Roll? I don't think so. I'm about to inject some peptides. Why? Because, well, I've been doing it for a while. It's in Super Human, my new book, and it's that time of day.

I'm injecting a peptide called melanocyte-stimulating hormone, because it's the middle of the morning, and this is a peptide that makes a really big difference in tanning. Because I need to have a golden tan? No, that's not why. Because melanocyte-stimulating hormone causes you to make more melanin, and I'm not interested in melanin in my skin, although I don't mind that; what it also does that's particularly cool is it makes more melanin in your eyes and in your brain, what they used to call junk melanin.

Turns out, junk melanin is pretty darn useful in the brain because it asks as a capacitor, according to research from Mexico. But that's not even the Cool Fact of the Day. The real Cool Fact of the Day is about DNA. I'm just doing this because there's a Circadian timing... by the way, no one at the American Academy of Anti-Aging Medicine that I saw talked about the Circadian nature of MSH. So, if you're doing this stuff, you may get darker. No matter the color of your skin, it definitely can make you darker. It also, though, has the side effect... it can make you nauseous if you're not used to it. It also can make you extremely... what's the technical word for it, horny? Because [inaudible 00:02:27].

So, this is going to be a very exciting episode for me in multiple ways. Although technically, that effect doesn't come on for several hours. You guys are safe. But I'm doing this because it's good for your brain and it opposes melatonin. So, if you do this in the morning, and you have a hard time resetting your Circadian rhythm, this is something I've never talked about before, I'm going to write a blog post on it on the DaveAsprey.com webpage, but I haven't ever said this in public, but I found the studies.

You want to reset your sleep, do your melatonin, take your... pull up your sleep mode at night, but in the morning, if you want to do MSH, it's not without risk but it's also not without reward, and talk to your doctor about it, if you can find a doctor who uses peptides... Don't worry, you will. I'm talking a lot about them...

What you'll find is that you can reset your sleep cycle more easily by doing this. So, I've got a little insulin syringe here, and I drop about 75... what are these? 75 units of MSH

that I re-hydrated, and I'm going to stick it in my butt... You can put it in your arm, too, if you want. And if you guys want to see my butt, you'll have to go to my Instagram. Because I conducted a test over my holiday recently. Mansoor, did you see that?

Mansoor: Well, thankfully, I'm not seeing the butt part of it.

Dave: No.

Mansoor: But I am seeing you doing the injection.

Dave: But did you see the Instagram part?

Mansoor: No, I didn't. Sorry. [crosstalk 00:03:53]

Dave: I did a post that was mostly humorous about sunning the parts where the sun don't shine.

Mansoor: Ah! No, I did, actually. My bad, yes.

Dave: Hit the New York Post. It was completely ridiculous, but I did the Instagram test, and apparently, if you show off your butt on Instagram, you get more attention than if you don't. That's why I tried to hold a puppy, hold a pig, take off your pants... Taking off your pants, more followers, A/B-tested.

But I'm still not even to the Cool Fact of the Day! This is terrible! All right, let's do our real Cool Fact of the Day now that I've got my MSH up and running.

Turns out that I did a round-up of some things we learned in 2019 about DNA. We had this weird thing over the past 20, 30 years... Craig Venter, "I've sequenced my human DNA, it's going to change the world!", and then 20 years later, it actually has the changed the world that we can sequence DNA, but what has it given us? You know? What do we know how to do? So, there's almost a backlash where DNA, it's less interesting. Let's look at our microbiome, which is really interesting in and of itself, and we're using RNA and DNA sequencing to do that, as well.

But it turns out, because of these discoveries, now we actually can do functional genomics, and this whole swath of new knowledge has come out. And you look at what that means; here's some stuff we picked up this year just from our ability to use DNA now that we're using it at scale.

There's DNA from 5,700-year-old gum, which is a tree resin, that shows what an ancient woman may have looked like. This is chewed birch pitch. By the way, guess where xylitol comes from? Birch tree sap! So, this was the original anti-cavity chewing gum, but they actually looked at the mouth microbes, and they found hazelnut and duck DNA from a meal she'd consumed. So, almost 6,000 years ago, we were having sautéed duck with a hazelnut reduction, very clearly.

We also used DNA to figure out why screening for DNA in designer babies probably doesn't work, because we can simulate and say it's possible to predict your kid's height from looking at the embryo's DNA; when people actually do this, it's probable that... it may be epigenetics is trumping genetics here, but basically, kids aren't as tall as they want them to be. Too bad there. You're just going to have to hack your kids with growth hormone. Actually, don't do that.

Mansoor: No, don't.

Dave: Unless they're really, really short, you could just screw them up for life. That was just a bad joke. But the real truth is that if you have kids who are not tall enough because of a defect, they are able to use synthetically derived human growth hormone to give them a normal height, which is also just an incredible miracle, and if you're a four-foot fall person walking around, wishing that this had been available 40 years ago, you know exactly what I'm talking about.

I get people saying, "Dave, you're a bio-hacker. How can I make myself tall? I'm 40."

I'm like, "High heels. That's the only way you can make yourself tall. There's no hack for that. Or robot legs. One of the two."

Okay. We also know now that what the first Denisovan might have looked like, and there's a controversial technique that reconstructs a teenager's physical appearance from genetics. We now know how ancient migrations shaped South Asian languages and farming. We know that these weird whales they find in Greenland are hybrids. We know the European Neanderthal lineage lasted for 80,000 years, based on ancient cave fossils; by the way, I think I'm around four percent Neanderthal. And guys, I have to announce this, I have inherited the less back hair gene, which is one of the things that makes me exceptionally happy.

And we also found a marine parasite, named after a popular podcast radio host, it turns out, and they lack DNA, but still somehow can make energy, and they're missing their mitochondrial DNA, but... Wow, this is so cool. We're finding the very wiring of the biology of life is interesting. And we also know that maybe you can blame the man if there's been some repeat miscarriages, because we can look at DNA so much that we know sperm with damaged DNA may be a cause of some repeat miscarriages. Before throughout history, they would usually blame the woman! And based on my fertility book, I'm pretty sure, some of the time, the guy's shooting either blanks or shooting crooked, and... Well, now we can measure that.

This is just in the last year we figured all this stuff out, and more and more is coming. So, I am becoming increasingly excited about the idea of using genomics and looking at the microbiome, and looking at abiogenetics all at the same time because, let's face it, that's kind of what life is. It's a mix of those things, it's a complex system, and it's not that one is better than the other. You got to have the whole picture, and this is a part of the picture that we have a huge amount of details on. So, that's our kind of wrap-up for the year on DNA Cool Facts of the Day.

Now, if that got you all excited, whether it was the idea of injecting peptides for making yourself tan, making your brain work better, resetting your sleep or just waking up with a kick-stand, all of which I just achieved with the injection I did a little while ago, I'm already feeling all excited here, you've got to ask yourself: What the heck is Dave going to talk about? "Is he going to talk about sperm whales? Is he going to talk about... well, sperm, which he just did? Is he going to talk about DNA?" You named it, yeah. I'm going to talk about DNA today.

Because today's guest is a friend, scientist and entrepreneur in the field of genomics who's regarded, and certainly who I regard, as one of the most innovative leaders looking at personalized functional genomics. He's won a bunch of academic and industry awards, bunch of papers, and has patents in the fields of molecular diagnostics and genomics research. And he's the President and Chief Scientific Officer of the DNA Company. And full disclosure here, I was blown away by my analysis; I've been underwhelmed by my genetic analysis, historically. I have my full genome sequence and I found, "I have a 20% less chance of responding well to this medicine," and I found out about my back hair. Or lack thereof, thank you very much.

But it really wasn't very actionable; it was almost disappointing because I'd spent a lot of money in the early days to get my genome, and it was Mansoor who convinced me that there was enormous value here, completely blew me away. So, I've become an investor and advisor in the DNA Company because I'm convinced that this is one of those three big pieces that we're going to need to understand. There's a functional genomic side, you got to know what's going on in your gut bacteria, and you need to know what's going on in the world, the environment around you, which is the exposome, you could call that. And the exposome drives epigenetics, which also can only access what's in your functional genome.

So, it's like, how do you do it without knowing all three? Well, bio-hacking is about manipulating that top level, and then those other ones are just relevant and important, and this is a piece that hasn't been getting enough attention, and I think Mansoor's the best person I've found who could decode actual useful value from my DNA, and everyone I know who's seen him says the same thing.

So, welcome to the show!

Mansoor: It's a pleasure. Thank you, Dave, and I've been thoroughly enjoying the visuals that you've given me this morning, both literally and pictorially. So, that [inaudible 00:11:17] that you've got going on right now, let's just leave it be.

Dave: It's too funny, but I really want people listening... By the way, I'm doing a lot of this stuff on YouTube. There's about 500+ episodes on my YouTube channel, which is probably Dave Asprey on YouTube. You'll find it. It's not that Bulletproof channel; we've got a bunch of the Bulletproof videos around collagen and coffee and all that sort of stuff there, but the other stuff where [inaudible 00:11:42] isn't going to be selling peptides, but I am going to be talking about them, so if I'm doing something and using something, I might as well show it to you because I want you to see it, even though my labs up here

don't look like a cool studio. They look like a crazy scientist lab/coffee-hacker. I'm just going to do it, anyway.

Now, when you were at UCLA, you're credited with discovering one of two genomic pathways that define drug resistance to certain leukemia drugs, and you co-authored a Paper of the Year that discovered the role of the WNT4 gene in sex reversal. Tell me about the WNT4 gene. By the way, guys, we're not going to go this deep; I just want you to see how smart this guy is.

Mansoor: You know, when we were looking at sex reversal, at that time, most of the things that you'd see that'd effect sexual development, unsurprisingly will be found in the X and Y chromosomes, IE in man and a woman. So, what was famous, what made the WNT4 gene so important, was the first non-sex chromosome gene that, when duplicated, was responsible for complete sex reversal, this gene being on chromosome four. So, it's a few things.

It's, first, a non-sex chromosome that is involved in sexual reversal; secondly, it's a duplication. It's not what we would call a sequence mutation, and this is so, so important, Dave. You elucidated earlier, so many people, when they think about the genome and they think about mutations, they think about these sequence or letter changes, maybe these things called SNIPs, single-nucleoside polymorphisms. In this case, nothing effected the gene sequence-wise. It was just the whole gene, the whole gene was duplicated, and it was the dose equivalence of the gene, the duplication of the gene, that led to complete sex reversal.

So, several lessons there about knowing what are the type of things that effect genomic behavior; it's not just sequence or mutation changes, there are copy number changes, there are [inaudible 00:13:43] changes, meaning just a little part of the gene was deleted or duplicated, or all of the gene was deleted or duplicated. And an intelligent look at the genome has to look at all of these changes for us to truly appreciate what is happening in the individual.

Dave: You also, and this fascinates me, you contributed greatly to the creation of the ability to do comparative genetic screenings. You helped to create some of that machinery early in your career. But they asked you to speak at the 50th anniversary of the discovery of DNA at the Human Genome Organization. This is going back to 2003.

I got to ask you something here. You don't look like you're old enough to have done that, but clearly, you're doing some kind of anti-aging thing here, and I'm not going to ask you how old you are, I'm just going to say, what got you into DNA so early? I remember, I was helping to build some of the data center infrastructure to hold Craig Venter's DNA. It was a company called Double Twist, and we had a whole floor of a data center, back when I was in the tech world. But that was 1999! And so, even before we could store the whole human genome in a data center, which now, I probably have it on my phone, it's amazing...

Mansoor: Indeed.

Dave: So, why? Why DNA, of all the things you could have done?

Mansoor: Actually, I'm classically trained as a molecular immunologist. My goal... I had the double-major PhD, but my primary focus was, what? Producing human antibodies. And so, this was the heady days of constructing what we would call chimeric antibodies, or master-designed antibodies, these smart bullets, as we'd call it, and we needed a place to produce these antibodies.

So, you had classic models. You had, for example, trying to take the genes for human-designed antibodies, and putting it into what we'd call bioreactors, IE animal models. We would, for example, try to create a transgenic bovine model so we can get the milk of that cow to contain the human antibodies.

I took a slightly different approach. Chickens, believe it or not, and we're not going to get too far down this rabbit hole, but chickens are so much easier, from a farm growth perspective, you can grow hundreds of chickens in the space that you can grow or raise just a couple cows, number one. Number two, the egg of a hen contains, gram for gram, more antibodies than any other milk or vehicle in nature. So, the egg, that egg yolk, is rich with antibodies.

So, what did we do? We made transgenic chickens. We took human antibody genes, transfected them into hens, and we allowed the hens to make these human antibodies which can be easily isolated from the yolk or the albumin of the egg. Now, where did this lead to the DNA? Two things.

We were doing it purely for the producing antibody. That was my goal. And by the way, this has led now to the whole concept of the [inaudible 00:16:33], and all of the smart biologic therapies of antibodies and oncologic diagnostics and treatments. But back then, we didn't know how good we could or would get at this. But where did the DNA come in? The DNA came in with when I started taking these human genes, and transfecting them into non-human models, in this case avian, hens, we started realizing what happens when you splice the genes into the existing genome, it started telling us something about this structure of the genome, that you couldn't just willy-nilly take a gene, even though it was a full, functional unit, put it into an existing system, not even displace the genes within the existing system, and we would see some interesting things happen.

And this is where, Dave, the concept, and I noted this to you when we first spoke, the concept of thinking of DNA truly, Dave, as a language. That was the key for me. Thus far, we were thinking of DNA as a vocabulary. In other words, the more genes you studied, 10,000, 15,000, 20,000, about 22,000, we thought we could just simply stack these genes, 22,000 of them, figure out what they do, study them in a siloed manner, and off we go.

No. Not at all. And this is the birth of functional genomics.

Functional genomics is about understanding the DNA behaves in every definition like a language. It has vocabulary, IE the genes. But it also has grammar, sentence structure, syntax, nuances. You've got to be able to read genetic structure at the holistic level. A gene on page two of your manuscript impacts the gene on page 15 of your manuscript. Until and unless you begin to read DNA in that intelligent, language-based modality, you're not coming close to really deriving the jewels within DNA. So, that was the real impetus.

Dave: So, it's sort of like if you were to take a book and say, "I'm just going to search the entire book for the word The," and look at how many there are, you're probably not going to find what's going on. Likewise, you could use a lot of the old medical diagnostic technology and say, "Oh, I lit whatever it was on fire and I looked at the smoke to see what was going on." It's kind of hard to get the original structure of that, but that would be the electronic microscope I'm talking about, for looking at living tissues. Right?

Okay. So, you realized this, and I think by now, people listening have figured out, "This guy has a brain that's larger than average." Do you have genes that say that your brain is extra-special?

Mansoor: My wife would probably disagree, so I would leave it there and take her word for it. But, no, you know, Dave, when you see something and you truly fall in love with something, honestly, my love has now become my greatest Achilles' Heel. What is my greatest Achilles' Heel? The nausea, the nauseating sense I get when I read the over-simplistic evaluation of genetics. I just cannot bring myself to read some of the reports that are out there that treats something as marvelous and miraculous as the human genome in these bite-sized, gimmicky, one-gene little blurbs.

You know, I think that probably there's a time and place for it, but... To your point, this is a love, this is a passion of mine, and my goal and my ambition is to really reeducate individuals, Dave, as to what attention people should be paying to their genomic makeup, to their microbiome makeup, and obviously to the epigenetic factors that impinge upon not just the genome, by the way, but the epigenetic factors that impinge on the microbiome. They're both impinge-able by one's environment, nutrition, and lifestyle, and we'll probably get a couple cute, little, sweet points. You know what? I can't help it, Dave. Let's just put this as a starting point. Really, just one of those little factoids.

Listen to a brilliant medical scientist, Dr. [inaudible 00:20:35], at McGill University. Israeli scientist, MD, practicing in Montreal at McGill but also a researcher. Not getting into his work except one little note he made. He said, "You know, Dave..." Sorry, he said to the audience... 80%, Dave, and this is what blew me away, "80% of the metabolites circulating in the human body, you would think they come from your cellular reactions, the human cell metabolites. 80% of the metabolites circulating in human blood come from the microbiome."

Dave: Yeah.

Mansoor: Come from the microbiome. So, I mean, how could we hope to even understand optimal human function if we don't hope to understand the microbiome? But here's the point: it can't just be the microbiome, because then how the body responds to all that stuff coming from the microbiome then returns to the innate genetics of the person. So, you so beautifully... I could not have kick-started this better than the way you did. It's a triangulation. It's a triangulation, and until we maturely put these three things together, we're not close to solving the problem.

Dave: It is going to happen. It's going to happen probably over the next 10 years, I would say.

Mansoor: Yeah.

Dave: It's not even a long timeframe, where we just start getting more and more information, and companies start sharing information, and researchers share information, and we have more machine learning, and all of the sudden, we realize, "Wow, there's these amazing patterns, and you can walk through these things."

What I'm less confident about is getting data on the exposome, which is the set of all the environmental factors that you're exposed to over the course of your life, because they're limitless. It's like having a life-sized map of California. It wouldn't be very useful because when you unroll it, it'd be as big as the state, and probably have more potholes.

But the thing is, we're going to get enough there that you can very reliably have that roadmap that says, "Okay, if you generally avoid these lifestyle situations, you're going to win, but someone else, you're going to do just fine in those situations." So, we'll be able to tune our environment and tune our microbiome by tuning our diet, and look at our genetics and then, even tune our medications and other things like that, and we're going to end up with an amazing way for someone who would have probably died of Alzheimer's Disease at 70 to just say, "I'm walking around feeling great, and feeling grateful, and I'm way older than 70," just because we avoided hitting those potholes.

Mansoor: Indeed.

Dave: Okay. Now, I want to also dig in on this, and I promised in the title of this show that we would talk about functional genomics, you know? What the difference between that and just regular genomics, which I think we just hit on there. I wanted to dig in specifically on women, because so much research, you know... Craig Venter is actually a guy, first human genome is done on a white guy, and I'm not picking on Craig at all; I'm also a white guy. However, there has been a historical lack of research on women. And this, if you look back in medicine, the most common guinea pigs are actually college students, and until the last 30 or so years, there were way more men college students than women, so that was the sample size. You get young, healthy, white dudes. It was pretty much that.

And I'm pretty sure our genes might be a little bit different, because despite me injecting melanocyte-stimulating hormone, you have more melanin than I do! Because... I don't, actually, know where you're from. Where are you from?

Mansoor: I'm a Caribbean mutt. I'm originally from Trinidad, but as with all Caribbean islands or many Caribbean islands, we're a mixture of so many forefathers. So, I am a classic genetic mutt. Largely, having said that, though, more of my genetic lineage with my... South Asian, Southeast Asian.

Dave: Okay.

Mansoor: Largely.

Dave: So, you've got a darker skin palette than I do, which means you handle the Caribbean way better than I do. Although, I like it! I just get sunburned all the time.

But that whole difference there can drive all sorts of interesting things, and there's less Southeast Asian data in all of the... not just genetic, but all of the databases, including to do antibiotics work and all that. But if you say, "Well, let's look at Southeast women in there," it's going to be even lower! So, I wanted us to talk here, and we're going to do a couple interviews, but I wanted us to talk specifically about women and what you've learned about women and genetics so we can help to correct that balance.

Mansoor: Well, to pivot on what you just said, I had the absolute fortune... A young woman that I would love to introduce you to, Dr. Georgie Bruinvels, British scientist from a company called Orico, and I just had the fortune of listening to her. We co-presented at a conference in California just about a week ago, and she specializes on female health, she works with a lot of the top female athletes in the world. And again, just one point, she said, "You know, 80%, eight-zero, 80% of the recall for drugs in the pharmaceutic space, 80% of drugs that are recalled are due to poor initial trials on women."

So, in other words, just to re-emphasize that at every level of our medical system, we have shortchanged the 50-plus percent of the human species. Okay? So, when you take this into consideration, number one. Number two, when you take into consideration that the females, for the large part of it, at least, are charged with carrying the next generation, whatever we may choose to believe in, ultimately, it is still going to be that female body that carries the child, if she chooses to do so, for the next generation.

So, hold on. We've got mothers, females, carrying the next generation, and yet the emphasis we've placed on the health of woman has been so deplorable. This is why we chose, at the DNA Company, to make the Female Health Initiative our first coming-out party, Dave, number one. Number two, the insights one can get from the very point of an intelligent, functional preview, for example, of the sex hormones, that very bedrock upon which defines the male and female body and everything in between, but that defines the health of the female body in so many ways more than just breast development, hip flare, thigh development. So, we've done the following.

We've chosen female health as our coming-out, as our primary initial focus, and more specifically, taking a functional genomics' view of the mechanisms that drive hormone health in women. Why? One more piece of data, Dave. In North America, and we believe that this is going to be rapidly the case across the world, 85% of young women,

by the age of 25, 85% of women in North America by the age of 25, has either been on the pill or is on the pill. In other words, they are on an external hormonal, and think about this for a moment. And you know something that Georgie, Dr. Bruinvels, pointed out?

More and more women on the pill are now being led to believe that they can take the pill back-to-back without even any breakthrough bleeding. So, these are women who have not even had a breakthrough cycle for years on end, and somehow, we perceive as though that is still going to be consistent with health, and what Dr. Bruinvels, and I really give her the kudos for this, what she pointed out, she says, "What we are sowing right now, this whole generation of women that are on incessant use of the pill," which, of course, I'm not anti-pill, I'm just saying, its use in the way that we've deployed it, "We are going to be seeing a health nightmare in about 10 years to come."

When the children of these women, or these women, enter into their menopausal years, pre-menopausal years, we are facing down the barrel of one of the largest health concerns, from a population perspective, and it's going to be focused on women.

Dave: I love that we're talking about that, because I just did a podcast a couple weeks ago specifically about the birth control pill and how it's wrecking us, and I've been aware of that... Wrecking us as a species, actually, in this one, but going back to 2001, there's a book called Sex, Lies and Menopause, from a woman whose work I actually reference in Super Human. And the idea there is, we've known about a lot of this stuff, but we're manipulating the epigenetics and even the behavior patterns of our species with the birth control pills, and what you're saying is we didn't have enough medical data. And you're saying this from a position of really deep knowledge.

Mansoor: 100%.

Dave: So, let's talk about... the DNA Company has this thing called the Female Health Initiative, which is one of the first sets of tests that you're coming out with even though you do a full, functional genomics analysis. You explained to me why I need sunlight even though my skin is so pale, because it's my Vitamin D receptors. It was a very personalized thing. I remember you said, "Dave, you pretty much could be living on a Pacific island from the way your body handles Vitamin D..."

Mansoor: Yes.

Dave: "But you're not, so here's how you can adjust the timing and quantity of your intake to get the results you want." No one has ever been able to tell me that kind of stuff, but you could have easily said that to a man versus a woman who had a similar Vitamin D receptor, genetics, the way I do. What are you looking at specifically genetically that's for women?

Mansoor: So, I'm going to... I might have spoken about this towards the end. I'm actually going to mention it here now because of the way you introduced this entire topic... One minute. This is the work of Dr. Hamed Khalili from Harvard. Dr. Hamed Khalili, he's an MD,

brilliant researcher, gastroenterologist specialist at Harvard, and what he was looking at was, and he has confirmed this...

When a young woman goes on the pill, the use of the pill... I don't know if he's defined how long this needs to take place for, but it's not those women, years and years; in other words, just a normal use of the pill dramatically effects, and here it comes, Dave... Being on the pill conclusively, this is word coming out of Harvard, Dr. Hamed Khalili's lab...

Being on the pill conclusively, absolutely impacts the permeability of the gut membrane. In other words, it increases the permeability of the gut and the intestines.

Dave: Wow.

Mansoor: Being on the pill. Okay? Now, think of this. How many young women stay on the pill, it's becoming more and more of a practice, that you're on the pill in your birth control years, then you come off the pill more often than not, in time for, quote-unquote, now thinking of conceiving.

So, you've got a young woman, she's been on the pill for however long she's been, she's unwittingly impacting the permeability of her gut. Of course, if we impact the permeability of the gut, we impact what is getting across the gut intestinal membrane into the bloodstream. In other words, things are making their way into the blood supply that never should have been in the blood supply, things that are immune-activating and showing off Dr. Khalili showed exactly this is what is happening. Now, this is what that young woman is doing, going right into deciding to become pregnant or to conceive.

So, now she's conceiving at a time in which her gut permeability is effected, God alone knows if her microbiome is healthy or not, and then we've got to enter into, what is her innate ability to address that inflammatory atmosphere within her body? Literally, because of the gut permeability. What is her ability to address the hormonal Circadian rhythm in her body? So, I just wanted to introduce the fact, this is not just about innate genetics and again, somewhat seer-like, which is classic Dave, you introduced this topic, you could not have introduced it better, because this is exactly...

Dave: I didn't plan it that way.

Mansoor: I know, but you just really, as you often do, you just nailed it. So, think about this. We were going to talk about the pill from the perspective of, how does the woman's innate genetics effect the way she deals with estrogens? By what we just introduced, it's not just that innate genetics, it's not just how her body metabolizes estrogens, but look what is happening to the body. And then we're going to ask the question, how does this embryo developing in this uterus within a woman, for whom there are all sorts of dysregulated immune functions or potentially so because of everything we've just said, can we expect as optimal embryonic development? And the answer anyone intelligent in this viewpoint would say, certainly, we are not starting off on the best foot possible.

So, coming back to what we're now doing, it's this.

Dave: We got to pause before we go there. Number one, you may hear that and say, "Oh, great. These guys are against the pill." Look, listen to the interview with Dr. Sarah Hill. I just did a whole hour talking about the systemic effects on our species, and how it's actually harming women at multiple, multiple levels. So, full support of everyone's ability to have kids when and if they want.

Mansoor: Absolutely.

Dave: I just don't want to mess with people's brains. There's anxiety, there's depression, and you are going to talk specifically about what is happening genetically from the pill here. So, just to be really clear, this isn't a call to say you're a bad person if you use the pill; there can be reasons and times you do want to use it...

Mansoor: Absolutely.

Dave: Just other birth control methods might make you live longer, and feel better along the way.

Mansoor: Indeed. It is, again, just beautiful summary, Dave. Take it, but at least take it with the intelligence of knowing, what are the implications? And then, you make an informed decision. And I think this is what has been deprived of the public, the ability to make that informed decision. So, now let's get to the, okay, what sort of genetics are we talking about here?

First things first, Dave, I think the average listener has to understand that men and women, the way in which we make our sex steroidal hormones, our progesterones, our androgens, our estrogens are remarkably similar. The cascade... in other words, men, we have no monopoly over androgens. Women, you can't make estrogens, your estradiol and your estrone, two primary estrogens; of course, estriol when you're pregnant, you can't make your estrogens until you first make your androgens.

So, the first point here is everything we're about to say, Dave, is as equally applicable to men as it is to women, or to women as it is to men. Number one. Number two, very quickly, our readers, our listeners need to understand that the human body makes these hormones, and let's now focus back on women, in a Circadian rhythm. Why is this so important, Dave? Because the average young woman does not realize that her estrogen levels are not the same every single day of her cycle. The female body was not designed to be constantly under the influence of the same level of estrogens every day of her cycle.

The origin, the innate rhythm, Circadian rhythm, is one in which, here's what happens: the female body goes through a Circadian rhythm where she produces progesterones, pregnenolone that is converted into androgens, DHEA, androstenedione, androstenediol, testosterone, and then we convert the testosterone into estradiol. Now, quickly, you can imagine that if we understand that there's this Circadian rhythm

in which some days, the estrogens are higher, very small window in which your estrogens are elevated, and then for the most part of the rest of your cycle, your estrogens are not elevated. Compare and contrast as to what happens when you go on a hormone replacement. Again, just something to be mindful of.

Now, the real point that we want to make to the public per our initiative and per our test is this: different women respond to estrogens, their innate estrogens, not even being on the pill, just innate estrogens, differently. You see, Dave, and then just one more minute of this, every estrogen molecule in the female body has to be metabolized. Your estrogens of today's month, this month, ladies out there, are not the same estrogens from your previous month. In the previous month, you made estrogens, you produced it, you metabolized it, assuming you did not conceive, and you hit Repeat.

When you break down your estrogens, your body is going to break down estrogens into three byproducts: two-hydroxy, four-hydroxy, 16-[inaudible 00:37:06] hydroxy estrogens. Every young woman is going to do so. The question is, to what degree do you do each of these? Because each of these metabolites are not created equally. Four-hydroxy estrogen, one of the three metabolites of estrogen, is extremely inflammatory and has all sorts of repercussions to the human body. One might ask, why are we even making it?

But it is what it is. Every young woman makes all three. The question that she has to ask is, innately, genetically predisposed... is she more predisposed to producing more two-hydroxy versus four-hydroxy, more four-hydroxy versus two-hydroxy? And this is something, Dave, so let's conclude on this...

One, women metabolize estrogens differently one woman to the next. Two, those metabolisms, which path she chooses is largely genetically predetermined; environment, food, lifestyle can impact that, but it's largely genetically determined. And then, the outcome of that metabolism: are you two-hydroxy-dominant, four-hydroxy-dominant, has completely different health outcomes.

Dave: Wow.

Mansoor: So now, we're just going to ask a simple question. We're just going to ask, did you know which of the two pathways or three pathways you're dominant for? And if you don't, why not? And if you don't, how can you be interacting with your body without even knowing this basic factoid? That's what we're trying to change.

Dave: Okay. Now, when I did my genetic testing with you, I had my genomes I did a while back, I had a couple of the consumer things, but you had me spit in a vial, and send some of my DNA in to use specifically. Is this kind of information something you can get from existing tests, or is this stuff that you basically have to send in?

Mansoor: Short answer, you can get most of this information from existing tests, but not all. And it returns to the fact, Dave, that current most rank-and-file good tests, including 23AndMe's, and so on and so forth, they are only looking at the spelling differences, the

SNIPs. However, to construct the entire intelligent understanding of the steroidal cascade, there are genes for which you're not just looking at SNIPs, you're looking at CNVs, complete deletions or duplications of genes, and those bits of information, you aren't going to get from the rank-and-file tests that are out there.

Dave: Okay. So, the traditional tests are going to tell you whether you spell F-I-B-E-R or F-I-B-R-E.

Mansoor: Indeed.

Dave: But they're not going to tell you whether you put the fiber in before you put the estrogen in. Am I getting it right?

Mansoor: Beautiful. Beautiful, wonderful analogy, yes.

Dave: Okay. By the way, it's spelled E-R. Yes, I live in Canada, but seriously! Anyway. I don't have any anger there.

But if we do this, it can be really profound. Right now, my wife, Dr. Lana, does fertility work for people around the globe. You know, very high-touch, one call a week kind of stuff, so she has a few clients. But the UK is spending hundreds and hundreds of millions of pounds just on perimenopause, because they're finding out that they're losing billions of dollars a year in productivity.

And women get migraines, they get all kinds of really ruinous symptoms that can last for only five to seven years. You know, right as the kids are getting out of school... It's not a good thing.

Mansoor: No.

Dave: And a lot of this comes down to how they handle the estrogens.

Mansoor: Absolutely.

Dave: But we don't have the knowledge, so people just run around trying all sorts of different things, and, "Is it a progesterone issue? Do I need more estrogen? Do I need less?" And then they think they've solved it, but then the hormones change cyclically throughout the month, so, "Oh, it worked last week, and this week I feel like I'm hungover, but I didn't get to drink."

So, is this something that you can get that much visibility in on just by looking at the story of DNA?

Mansoor: Not in every biologic system can we say the insights are as profound as they are in the sex steroidal cascade. So, the answer is yes, we can, and the reason it's a Yes, We Can is because it is very much... It's probably one of the best examples of a biologic cascade, and again, you just hit it on the head. You see, how many young women... You talk to

them peri- or post-menopausally, they're on a BHRT schedule, they're taking progesterones, they're taking androgens and estrogens, in other words, and many of these young women, the doctors are trying... it's a little bit of a touch and feel, but they're taking each of these three hormones assuming that somehow, magically, these three classes of hormones are independent of each other.

And something as simple as, hold on, the progesterones that you're taking, by the way, internally are going to produce androgens. And by the way, the androgens you're taking are also independently internally going to be produced into estrogens. So, when you take a cocktail, you better know, what is the balance you're hoping to attain? And by the way, what's your innate faucet control? How quickly are you converting the progesterones into the androgens, and then the androgens into the estrogens?

Because you might be a young woman that is innately estro-dominant, you innately tend to cascade from progesterones, pregnenolones into testosterone into estrogens, estradiol, much faster than the average female. And here you are, going on a hormone replacement that includes all three, and you're wondering why you can't lose weight. You're wondering why you're water-retending. You're wondering why, "Wait a minute. All of a sudden, my cycle kicks back in after two years of being menopausal."

These deep, deep insights are something that we are working on strongly, and the ways we can stratify the population are remarkable.

Dave: So, this means that if you had a chance to look with your DNA analysis at a woman's hormone cascade... This is not an epigenetic thing. This isn't a matter of turning a gene on or off, that they either have the ability to do this or they don't, you would then recommend tuning the types and timing of the estrogens that they were taking.

Mansoor: Absolutely.

Dave: Wow.

Mansoor: And let's take one of the most simple examples of this, and you've spoken about this, and again, really, hats off to you. Let's take something like the average young woman, she's menstruating, and she's going about, she's trying to lead a healthy lifestyle, she's read about some of the dangers of estro-dominance and/or estra-toxicity, and what does she do? She comes across this remarkable nutrient, DIM, Diindolylmethane. Okay? And she's read that DIM is a estro-quencher, IE it suppresses the activity of the CYP19A1 gene, otherwise known as the aromatase gene.

So, by suppressing that gene, what does that gene do, and its enzyme? That is the gene that encodes the enzyme that aromatizes, that converts testosterone into estradiol. So, she reads that by taking some DIM, she can quench, she can reduce her estrogen load; whether that's beneficial to her or not is a different discussion. But here's what happens.

She goes to the [inaudible 00:44:27] company, she buys that DIM, and here it comes... she's menstruating. She takes that DIM at the same level every single day as though she's taking a regular supplement, without realizing that the rhythm with which she produces the estrogen in the first place behaves by a Circadian rhythm, so when she takes that DIM on day eight of her cycle, day nine of her cycle versus days 15, 21, 23, 25, the effect of the DIM on her body is completely different.

This level of understanding, Dave, which is really where it's at, this is where it's at in really giving optimal health, is completely being brushed over.

Dave: Now, I think a lot of people who'd hear this would go, "That is so overwhelming. I'm just... I'm not going to take DIM. It's just not worth the trouble." Are you in a position, with the panels that you're running now for women, to be able to say, "Okay, based on your genetics, you should take these types of supplements on these types of days"?

Mansoor: That's exactly what we're getting at, that's exactly what we're doing. First determine the estro-dominance of the young woman, or andro-dominance. And by the way, ladies out there, when you hear terms estro-dominance, andro-dominance, if you've ever wondered... the 22 version of yourself with your roommates at college, and you've got four young women, you're all 22, you all eat at the same dorm, you all sleep together, exercise together; why does one of you have... You're the smaller-breasted, six-pack, seems to be able to just develop lean muscle mass without even doing half the work as the other roommates, and then why another one of you...

And you all swear by the fact that your caloric intake is the same, you're eating the same foods, you're exercising at the same levels. This returns to the phenomena of whether you're an andro-dominant, estro-dominant, balanced young women. And these things do turn to your genetics. So, Dave, yes. Once we determine the category of the innate genetic predisposition of the woman... and you've seen me do this many times, Dave.

Dave: Oh, yeah.

Mansoor: I could take a look at a person, without knowing their genetics, and I can tell them, "Your CYP17A1, the single gene that converts pregnenolone into testosterone, is fast, but your aromatase that converts... CYP19A1 that converts testosterone into estrogen is slow." And by the way, this comes from thousands upon thousands of profiles that with do. So, to conclude and answer your question, that is what we're doing.

We first determine the profile, we determine the estro-dominance, andro-dominance balance. We determine the degree of estro-toxicity versus not, and then we personalized with the clinician, with the clinician, help that clinician to better tweak what might be the supplements, what might be the best BHRT routine? That's what we're doing.

Dave: You said together with the physician, so it works, someone orders... they send you their spit, they order the thing from the DNA Company. Obviously, I haven't done a female health panel. When you and I did this, it was actually kind of funny. Your business

partner, Cash, caught me at a conference and it was like, thrust a kit. He's like, "Spit in this, spit in this!"

And I'm like, "Okay. I have no idea whether these guys are going to try and clone me or not," but when I got on the phone with you, it was like, "Oh, this guy's like Neo from the Matrix who sees zeroes and ones but you see that with genes just when people walk around."

So, I didn't go through the formal process, but do you give... a lab test, do you give it to the person's doctor? Do you give it to them directly? What if they don't want to go to the doctor? How does that work?

Mansoor: We largely work with healthcare providers, because we always want to make sure that at least at some point, there is someone overlooking the bigger picture of the person. So, just to be clear, consumers can come directly to us, but what do we have? We then have a whole battalion of internal trained clinicians. So, you either work with your clinician, and there's several categories of clinicians that we work with, or our internal clinicians, when we make decisions such as profound decisions... what version of the pill? Again, not about whether you are or aren't, but maybe what version of the pill that you should be on. BHRT; what tweak would be better for you?

So, with those things, we work directly, either our internal clinicians or the clinician involved with the individual.

Dave: Okay, so, there are tens of thousands of physicians who listen to Bulletproof Radio. I was just at the American Academy of Anti-Aging Medicine, and yeah, there's a lot of fans. We'll put it that way. It was neat, just to kind of walk down the hallway and meet some of them.

Mansoor: Brilliant.

Dave: So, doctors can reach out directly to the DNA Company if they want to have this, and it's essentially another lab test they could order?

Mansoor: Mm-hmm (affirmative).

Dave: Okay, got it.

Mansoor: It's another lab test, but we really do a training, because the key here is to show these-

Dave: Oh, you train them. Okay.

Mansoor: We train them directly.

Dave: I should have asked you all this before the show so I could just say it, but anyway. And then, for a woman who wants to order the test, or men can order the other stuff on the site, but specifically to this panel, a woman's going to order it, she orders it directly, she

can take the results into her own physician if she wants to, or she can work with a physician that you have on staff that essentially does an analysis like you do. These are people you've trained to understand, what's the story of DNA versus what's the words in it?

Mansoor: Exactly.

Dave: Okay.

Mansoor: Exactly.

Dave: Now, let's talk about those three types of women. You had blondes, brunettes, and redhead. Oh, I'm sorry. I had...

You were talking about balanced versus estrogen... I want to go into a little bit more detail there, because I think that's profound. Let's talk about the androgen-dominant women. You talked about her in college. Eats whatever she wants, lean, ripped, and her friends are jealous of her. What's the downside of being that women? What do those hormones do to you when they're not working in your favor?

Mansoor: Indeed. So, of course, it's a spectrum, and so, the more she goes toward that andro-dominance, what is happening here? She's the young woman that her Circadian rhythm, she efficiently converts her pregnenolone, progesterone into androgens because of the speed of her CYP17A1. She also converts her testosterone because of SRD5A2 into DHT that... oh, that one molecule of DHT is worth six molecules of testosterone.

So, she's lighting up on the androgen side of the scale, but she has the slow conversion of testosterone into estrogen... So, it's not that she's not a young woman, it's just that the balance, she is skewed to androgen-dominance, and it is overtly noticeable in her phenotype up to and including, Dave, simple things. These andro-dominant women are the women that go through their entire lives... I don't want to be pedestrian, but they're important things; she'll almost never have cellulite. She will not suffer, largely speaking, from stretch marks.

Dave: [crosstalk 00:51:16]... Oh, sorry.

Mansoor: Because...

Dave: I only say that because I have stretch marks!

Mansoor: So, you know. And women ask me, "How do you know that about me?", and I explain this. Okay, so, the benefits, the benefits as they are. The ill or the counters, these young women, because they are already so andro-dominant, mild stresses in life, whether it be athleticism or actual emotional stresses, can quickly put these andro-dominant women into missing their cycle. Why? Because they are already not generally creating much of this Circadian arc to estrogen production, because they're andro-dominant, and by the way, that all-important progesterone that produces testosterone also produces cortisol.

So, when this young woman introduces anything that is cortisol-inducing, she's further draining away from the P-to-T-to-E, progesterone to testosterone to estrogen, you will find that these andro-dominant females, many of whom would be athletic, many of these female athletes can go months without having a cycle. And so, these are some of the downfalls.

Another downfall is this, the prolonged predominance of DHT, dihydrotestosterone, which men and women produce; that's that testosterone on testosterone, seems to be one of the confounding factors in predisposing young women to polycystic ovarian syndrome. So, there are a couple of things that we have to watch out for.

Dave: So, fixing Circadian rhythm, not too much stress, and obviously, there's a lot of nutritional and environments things-

Mansoor: Hugely, hugely.

Dave: Lana had PCOS when I met her. She was infertile, and that was why I wrote The Better Baby Book with her and did all that research for it, and did all the cooking for it, is because... I know you can reverse that stuff epigenetically.

Mansoor: Indeed.

Dave: At least in some cases. And, okay, what is that phenotype going to do at menopause?

Mansoor: Couple of things. These young women, by the way, tend to not have, and woe that any man should ever tell a woman they know what menopause is like, but all things equal, these young women do not have the overt menopause as many others. Because what is menopause, at the end of the day? It is that drop between what was normative cyclical estrogen to the then post-menopausal estrogen. These women, their delta value's already quite low, and it's just a... We can learn by societies.

Look at the Han Chinese population. More Han Chinese, both men and women, are more andro-dominant, that classic phenotype of the Han Chinese young woman who is... phenotype is, we don't really have to describe them, but I think everyone understands that smaller-breasted, leaner body type, and amongst that population, the concept of a really debilitating menopause is rare. It's rare because that delta drops. So, in other words, let's summarize.

A young woman who is andro-dominant tends to have a much less... they don't have the menopause that ate New York City versus the previously estro-dominant woman. She's lived her life with high levels of Circadian monthly estrogens, menopause comes along, her estrogen plummets, and now she's dealing with that adjustment. So, yes, you can always predict, you can quite nicely predict, what menopause and the symptoms of menopause will be for these young women.

Dave: Okay, let's talk about someone who's at the opposite end of the spectrum, someone who's more of an estrogen-dominant. What is she like in college? She's the one who's puffiest the most, I'm guessing?

Mansoor: You know, she's classically the more curvaceous young woman, and she can be absolutely healthy, absolutely strong, absolutely healthy body weight, but she will observe the body type. Dave, let's back up a little. It surprises me... not you, obviously, and not your community, likely, but how many people don't even know what estrogens do.

Estrogens, and actually the sex hormones, are one of the most potent DNA transcription molecules or agents in the body. Estrogens bind to cells through the estrogen receptor, that complex then moves from the cell membrane through the cytoplasm, into the nucleus, and turns on and off genes. In other words, estrogens impact the way cells behave.

So, when you take that young woman... when she was eight years old, all four of these roommates, they all looked similarly. No breast development, they looked... you know, boys, girls, same body type. Now, if you had a magic scanner, Dave, and you scanned these young women for where are their estrogen receptors, and the density of estrogen receptors, the tissues in their body that are more estrogen-sensitive, you put that in a scale of white, pink, to red...

What you would find in the young woman's body at the age of eight is her whole body is pink, in other words, all of the cells of her body are estrogen-sensitive, but certain zones in her body are redder, IE the breast zone, the hip zone, the back of the thighs, and so on and so forth. Meaning those cells are more estrogen-sensitive.

Now, the estrogen-dominant young woman will be the woman that, when she hits her [inaudible 00:56:38], the parts of her body that are estrogen-sensitive respond to the estrogens, and the higher estrogens, much more so than her colleagues. So, she's going to be the more curvaceous young woman. She's going to be the young woman that she can go to the gym, she can be healthy in her weight, she can be strong, but she's not going to get that striated muscle, that cut, that six-pack as easily as her andro-dominant colleague.

Dave: Okay. And it's probably not a healthy look for anyone, looking like a hunted animal, probably... It looks pretty good, but in terms of longevity, that might not be a really good strategy.

Mansoor: Indeed.

Dave: But in terms of being a fitness competitor, yeah, do it! But do it for a week. Don't try to do it all the time.

Mansoor: Brilliant.

Dave: Okay? And now, how is an estrogen-dominant woman going to face perimenopause or menopause?

Mansoor: Okay, so, key factors here are two things; estro-dominance should not be confused with estro-toxicity.

Dave: Okay.

Mansoor: In other words, a woman can be skewed to estro-dominance but then, when her body does see the estrogens, she's perfectly healthy in the way she metabolizes those estrogens, IE that her body's metabolizing the estrogens preferentially down the two-hydroxy pathway, her methylation is healthy because that's how we get rid of these estrogen intermediates, through methylation. Her detox panel is healthy, IE her detox...

So, you can have a young woman who's estro-dominant and perfectly out of the woods of any estrogen concern; you can have a young woman who's andro-dominant but the little estrogen she produces will tend to go down the naughty four-hydroxy toxic pathway... By the way, those are the young women that suffer the most when they go on the pill. You see, those andro-dominant but estro-toxic young women are the women that, outside of the pill, they innately don't produce as much estrogen, so that estro-toxicity is being camouflaged... They go on the pill, they uncover their latent estro-toxicity physiology, and all hell breaks loose, just FYI.

So, coming back to the estro-dominant young woman going into menopause, we must then ask the question: what is her estro-toxicity potential? And why is this so important, Dave?

When does the preponderance at a societal, population basis, when is the preponderance of breast cancer kick in? Perimenopausal, menopausal. Why? Ladies out there, this is so critically important, you've heard it from Dave in the past, let me re-emphasize this: during your menstrual years, your estrogens are being metabolized in the liver. In other words, that process where you break down your estrogens, you may or may not be making naughty intermediates... That's happening in your liver, and your liver is designed to handle this degree of toxicity, to a degree.

When you hit perimenopause, your estrogen metabolism begins to take place in your adipose and fatty tissues including your breasts. So now, if you happen to be that estro-toxic female, and you did not know this, these are the women, Dave... and by the way, when is the body producing these estrogen metabolites that we're talking about? All women, but when is it happen? About five days prior to their cycle.

So, when you're that young women, five days prior to your cycle, you start to get that extra nipple sensitivity, breast tenderness; this is a sign that your body is starting to break down estrogens in the breast cells, and you are bio-accumulating more of the inflammatory estrogen metabolites. So, these are the things we want to watch out for at the border of menstruating and menopause.

Dave: And do you tell women who do the panel with you what to take to avoid those things?

Mansoor: Indeed. I mean, you know, it's a guidance.

Dave: Of course.

Mansoor: And again, working with their clinician, but absolutely, that's the point of it, yes.

Dave: So, there's supplements and/or pharmaceuticals that you take to blunt those effects, because now we understand how your body genetically handles estrogen, so when this spike happens, you still have your normal cycling, but you don't have the pain and the annoyance.

Mansoor: Indeed.

Dave: Sounds kind of liberating.

Mansoor: And you mentioned earlier... It is! It is.

Dave: I mean, obviously, I haven't ever had that, menstruated, I'm a guy, but every guy who's lived with a woman knows that there are times when it can be just really a huge, painful, irritating, frustrating thing for the woman and for all of the people around them sometimes.

Mansoor: And Dave, on that point really quickly, let's just consider this: the estrogen metabolites, these twos and fours, hydroxy estrogens, they are what we call [inaudible 01:01:26]. It's a type of molecule in the body called a [inaudible 01:01:28]. What's the other group of [inaudible 01:01:30] in the body? Neurochemicals.

So, it is unsurprising that the individuality with which a young woman metabolizes her estrogens into two-hydroxy versus four-hydroxy, four-hydroxy being more inflammatory; those molecules remarkably mimic and look like the neurochemicals that impact mood. So, it's not surprising that we can start then begin predicting and helping young women understand why are there mood changes through their cycle, particularly in those days winding up to their flow, winding up to their menstruation.

It's remarkable, Dave, what you can start individually recognizing and treating when you understand intelligently what's happening in the body.

Dave: This is mind-blowing stuff, and I was... I was pretty skeptical when I first got a DNA test from you at the DNA Company, but it was my friend Joe Polish said, "No, Dave, you should give this a try. I learned stuff I wouldn't possibly believe..."

Because I have a stack of DNA results that have never told me squat. So, when I got on the phone with you and you walked through... kind of like you just did for listeners, but you walked through my specific story, it completely blew me away. And I think the work you're doing here around women is one of the most important things you can do,

because understanding your own custom sex hormone perspective, and then what to do about it...

The what-to-do-about-it part can oftentimes be a shot in the dark. In the conversation we had earlier about birth control pills, and what it does to that depending on your system, is also critically important. And so far in the show, Dr. Julian Brighton's been on a couple times, and Dr. Sarah Hill was just on talking specifically about birth control pills, and TS Wiley was on, as well.

And the bottom line is, I would love for that to just work, and also, there are people that were saying, "Oh, there's birth control pills for guys that they're experimenting with." Look, I'm not hacking my hormones to that level; I'm happy to hack my hormones. I take testosterone, and it's improved my life dramatically. But I tuned it with a doctor, and I don't take crazy levels, and I do it in a way that is supportive and increases my health instead of taking it away.

Mansoor: Indeed.

Dave: And so, I would encourage people to check out the test. You're at TheDNACompany.com, and as I mentioned before, guys, I am an advisor, I'm an investor, I'm helping to bring this message to the world. So, when I care a lot about something, I either start a company that does it, I invent it, or I support people who are doing something really different and interesting.

So, I would say, Mansoor, you've definitely done... you have an amazing body of work in your career, but this new stuff is really important.

Mansoor: This is my legacy, Dave. You know, of all of the things I've done, actually if someone asked me, "Mansoor, what is the legacy? What do you want to leave behind?" And I did a lot of work in oncology and childhood development, but it is this. The real ability to access the operating manual of the human being and do something with it, Dave, and that's what I want to be my legacy.

Dave: Well, it's a good legacy that you're leaving, and it's... hard to explain. I think the closest thing is Neo from the Matrix. There's this scene where he finally realized it, and he's looking around and he's looking in a hallway, and everything is just zeroes and ones falling; I know functional movement people who can do that. You walk in the room and they're like, "Oh, so, what's wrong with your left ankle? Got a little pain in your right knee..."

And like, what? How did you know that? I'm just a guy walking in the door. And you're the same way, but you're looking at someone's genes.

Mansoor: Well, you know, it's just of funny. My younger son introduced me to a young woman that he's interested in, and the first thing I looked and I said, "Oh, boy. This young woman has PCOS." I obviously didn't ask her, but all of the physiologic signs are there, and I knew right off the bat, this is a young woman that is...

Dave: You must be the worst father ever, because you're like, "I'm so sorry, son, but her phenotype is not compatible with yours. You need to find another girlfriend." I mean, have you ever said that?

Mansoor: It has come pretty darn close to that [crosstalk 01:05:41].

Dave: That's such a... oh, my God.

Mansoor: Because, of course, I know my children's genotype, and I know what's going to happen when there's certain combinations for their children, and so on and so forth. Absolutely.

Dave: You are an expert in that. And this isn't something that I planned to chat with you about, but in fact... I'm going to have you back on the show. When you come back on the show, I want to talk about designer babies, and choosing the proper mate, and some things like that. Because there's a whole episode about guys' hormones and about cardiovascular risk factors in men versus women, and genetics, and you are top of the game for those things. So, it's part of my, "I'm not going to die from the four killers," from Superhuman, I am taking your advice in my own practice.

And that said, though, I want to talk about that... "Okay, how conscious do we need to be about choosing a mate?" And so, there's some interesting technology coming that way that I have a feeling you're going to know about.

Mansoor: Let's just say, some of our largest intended investors wanted to use this technology for dating apps, and I...

Dave: You know, I can't wait to talk about that. To be perfectly honest, if I was dating, earlier in life, and you could say, "You know what? I'm going to present you with a list of people who would be emotionally compatible with you," because you [inaudible 01:07:03], "And genetically compatible with you," I'm pretty sure they're going to smell better and look hotter to me, because that's how biology works.

And I'm going to smell better and look hotter to them, so it's just going to be a better date. Right? And if it turns out to be more than a date, and it's a lifelong relationship, having genetic compatibility so you're less likely to have kids with all of the genetic defects that happen somewhat randomly now, that seems like it's good. So, wow. I'm excited about that.

Mansoor: You know, I must admit that I now embrace the knowledge much, much more than I did. Obviously, the ethics of it, the responsibilities of it, and we'll get to that when we come back on the show. But knowledge is empowering to the degree that you know intelligently what to do about it, and I think we're getting to that point, Dave, where with the right team, with the right insights, we can do some amazing things with what we have.

Dave: We can, and we can enhance freedom, too. So, then if you're with someone, you say, "Hey, we're in love, we like this, and we know we're genetically... we got some issues," they're probably hackable in the coming years.

Mansoor: That's the point, actually, right there. It's not the negativity of it, it's the positive that we're looking at.

Dave: Well, you're doing some of the most cutting-edge, useful genetic research out there, and I am super happy I'm a part of The DNA Company and that I get access to you and your knowledge and your team. And I'm happy that Lana does, as well, as well as my kids. So, we will have you back on the show in very short order. In the meantime, people can go to TheDNACompany.com, and I don't think we set up any sort of Bulletproof Radio thing there, so just go to TheDNACompany.com, check it out. It'll be worth your time.

Mansoor: Honor and a pleasure.

Dave: Mansoor, thank you.

Mansoor: It's a pleasure, sir.