#576 The 12 Mechanisms of Aging Decoded: Longevity and Anti-Aging Supplements Chris Mirabile

Dr. Wendy Myers
Hello, I'm Dr. Wendy Myers. Welcome to the Myers Detox Podcast. On this show, we talk about everything related to heavy metal and chemical detoxification, the health issues caused by toxins, bioenergetics, one of my passions, and anti-aging. Today, we're going to be talking to my guest, Chris Mirabile, and he's going to be talking about the 12 mechanisms of aging. He'll talk about mitochondrial dysfunction, cellular senescence, inflammation, telomere shortening, and many other topics. We'll talk about his supplement line and his company, Novos Labs, where he's developed supplements targeting all 12 mechanisms of aging. We'll talk about his top 10 longevity practices that you should be doing and the top longevity supplements as well.

We'll also talk about Chris' biological age test called Novos Age, which is done through epigenetic analysis and many other markers. We'll talk about the importance of quantifying aging, why you want to be testing your biological age on a regular basis because it provides the star metric to assess your overall health trends, and how every seven to eight years of your biological age reduction roughly as equates to 50 percent lower mortality risk, and also how this biological age testing allows individuals to measure the effectiveness of their longevity interventions and if what they're doing for their health is working for them.

Our guest today is Chris Mirabile. As a serial entrepreneur, a brain tumor survivor, and the youngest winner of NYU Stern's business plan competition, Chris is known for beating the odds. Chris has co-founded multiple lucrative startups, including a commercial real estate tech platform whose first clients possess more than half a trillion in USD assets. Chris's success hit early with Hotlist, a startup that acquired nearly a quarter billion people's social plans, which caught the interest of Google and Facebook. All the while, Chris has been pursuing a lifelong passion for health and wellness with an emphasis on avoiding disease, spurred by his encounter with a brain tumor. He's also interested in extending his lifespan and maximizing his performance and well-being. As a self-proclaimed citizen scientist, Chris dug into the scientific research on longevity and experimented with many supplements, diet, exercise, and lifestyle hacks to find the secret to living a long, healthy life.

After more than a decade, Chris founded Novos, which is the first nutraceutical company that targets the 12 biological causes of aging to increase longevity. Novos includes a scientific advisory board of six of the world's top biologists and geneticists who study aging from Harvard, MIT, the Salk Institute, and more. With Novos, Chris created much more than a supplement company. He built a first-of-its-kind consumer biotech platform that leverages the latest science to help people take control of their health spans and lifespans called novoslabs.com. You can also check out Chris in the Longevity Hackers documentary on Apple TV and Amazon Prime. Chris, thank you so much for joining the show.

Chris Mirabile
Thank you for having me.

Dr. Wendy Myers
Why don't you tell us a little bit about yourself, your company and how you managed to achieve a biological age that's 13.6 years younger than your chronological age?

Chris Mirabile
There's a lot there. So, about myself, I grew up in New York. When I was a teenager, I was very interested in health, nutrition, and fitness. It came as that much more of a

surprise to me when I was suddenly diagnosed with a brain tumor after having a seizure. I was on a school trip in New York City, and THE next thing I knew, I woke up on the floor. I had blood all over my shirt because I had severed my tongue. They gave me a CT scan and found a brain tumor that completely changed my perspective on health and life. Prior to that, I looked at health on a more superficial basis or just wanting to be in good shape and play sports well. I think that's how most young people think about health, but I had a very quick crash course in what health ultimately is, which is the optimization of our biology such that everything functions well and we avoid disease and chronic illness.

After having that experience, I never wanted to go through something like that ever again. My interest shifted from reading Men's Health magazine to actually doing research. I found myself on PubMed, having many different questions and then just looking for studies that could help me to comprehend different aspects of my health. About a decade ago, I came across a scientific paper called The Hallmarks of Aging published in the journal cell. This paper was like an epiphany for me. This paper, first of all, broke down the mechanisms of aging and the actual fundamental root causes of aging, which I never even thought you could do for aging.

I think most of us just think of aging as this process that just happens as time elapses and as we get older. Scientists have actually broken that down to understand on a biological level, microscopically, molecularly, what is actually happening to cause us to get diseases and our bodies to break down and become more chaotic, if you will, and eventually for us to pass away. Understanding that there are these component pieces was empowering to consider the possibility of being able to interfere with their degradation and potentially slow down that aging process. It also was really empowering to realize that aging is a process that is malleable. You can speed it up and you can slow it down, and we know this is factually true.

We can do it in animal experiments, but we also know in humans, if you take someone, you take a pair of twins and one of them is a chronic smoker, drinking a lot and laying on the couch, and the other one's living a healthy fit lifestyle and you fast forward to when they're 60, first of all, who do you think is going to look younger,

much less actually be younger in the sense of their biology, their abilities, their memory, their physical capacities, and their risk of disease? So, we know it's possible.

This information then, along with the fact that the number one risk factor for the disease is aging, and that includes cancer, but also heart disease, Alzheimer's and diabetes, and so on. All of this together made me realize that the number one thing I should be focusing on for my health, both in the short term and feeling the best that I can, but most importantly for the long term and avoiding disease and premature death, was a focus on longevity and that's when I launched into getting deeper into the science, networking with the top scientists in the field, going to biotech events and so on, and eventually launching my business.

Dr. Wendy Myers
Okay, fantastic. Yeah. You have a fantastic product line of anti-aging supplements and you have tests as well, correct?

Chris Mirabile
Yes. We also offer biological age tests that look at the epigenome. So, this is, which genes are turned on or off? And then there are patterns that emerge and scientists at, for example, Duke and Columbia University, we licensed one of their algorithms where we're able to tell you the rate at which you're aging by looking at that epigenome. The good thing is that about anywhere between 70 to 90 percent, depending on which study you look at, it's been found that your aging is based on your lifestyle and environment as opposed to your genetics. So, in other words, whatever your rate of aging is or your biological age is, as long as you're making the right choices with your lifestyle and environment, you can actually slow down that aging rate and reduce your biological age.

Ads 00:08:26
For anyone listening who really wants to detox their body, go to heavymetalsquiz.com. I created a quiz for you. It only takes a couple of seconds and it’s based on some lifestyle questions. You can get your toxicity score and get a free video series that answers all of your frequently asked questions about how to detox your body. Check it out at heavymetalsquiz.com.

Dr. Wendy Myers
I'm really big on that. I've always been into health and wanting to look and feel as young as possible for as long as possible, and so detoxing definitely plays a big role in that because toxins definitely age you. They start accelerating that aging process, but let's talk about some of the 12 biological causes that you found that promote aging and help us understand exactly how they slow down the aging process.

Chris Mirabile
Sure. So, in the scientific paper I mentioned that was published just over a decade ago they identified nine mechanisms of aging, but those same authors republished that on the 10-year anniversary last year, and they added three more mechanisms to that list. The original nine, we can start with mitochondrial dysfunction. Most of your listeners have probably at least heard of the idea of mitochondria, right? The power plants of our cells convert the fats and the carbs that we consume into the energy for our cells to perform their functions. And as we age, we have fewer of those mitochondria and the ones that we do have are less efficient and effective at producing the energy that our cells need, and as you know, if something doesn't get the proper energy, it's not going to perform the way it should. And that's not just energy the way we think of it as waking up after a good night of rest and feeling energized. I mean, literally, the ability for our immune system to function properly or neurons to fire properly or heart cells or skin cells. All of these cells need energy to perform properly, and that's not as effective as we get older.

The second is cellular senescence. This one is becoming more popular. You hear people on social media talking about this concept of zombie cells. Senescent cells perform a function. So, we don't fully understand senescent cells. It's a newer area of research, but one instance in which we have senescent cells is we might have a cancerous cell and the body normally tries to remove it. The immune system will identify the cancer and remove it. But there are instances where the body can't remove it and it turns that cell senescent, which is better than it being cancerous, obviously. The senescent cell causes a problem in and of itself, because it secretes an inflammatory molecule known as a SASP, senescent associated secretory phenotype is what SASP stands for. It's letting out these molecules that cause

inflammation to nearby cells, and then those inflamed cells can also then turn senescent as well. As we get older, the number of senescent cells go up exponentially. It's one of the reasons why our skin wrinkles or our arteries harden. So, we want to try to remove those senescent cells, or at least reduce the rate at which our cells are turning senescent.

Next is loss of proteostasis. Proteostasis is this idea of our proteins need to fold in a certain way. When you think of proteins, most people don't know this but proteins are like the messenger molecules within our bodies. They're sending signals to our cells to perform in different ways. So, whether it be a peptide, which is just a short chain of amino acids or protein, which is essentially just a very long peptide, it's a longer set of amino acids, these molecules are going to signal to ourselves to behave in different ways. In fact, most prescription drugs in one way or another are impacting protein receptors on ourselves. As we age, the proteins are not folding properly, and if it doesn't fold properly, it doesn't take on the right shape. That shape is critical for it to bind with a protein receptor and to trigger that specific process on a cell. So, if it's not able to trigger then the cell's not going to behave the way that it's supposed to. These proteins then start to accumulate inside and outside of the cell and can cause a mess around the cells because they're not being used properly.

Dr. Wendy Myers
Those are prions also, correct?

Chris Mirabile
I believe so, yes.

Dr. Wendy Myers
Yeah, because I know, I think a lot of people have issues with prions that can promote dementia and poor brain functioning, et cetera. I personally use a Rife device to kill prions and misfolded proteins in my body. One way that you can address those is with Rife technology.

Chris Mirabile

Interesting. I'm not aware of that technology, but I'll look into it. So, just to that point, if the proteins are not being folded properly and able to communicate well, the next mechanism of aging is altered intracellular communication. Our cells are a vast network. We have essentially this quantum level network. Our bodies are these vast information networks. Everything is communicating with one another. When the proteins are not folding properly and not functioning properly, and for other reasons as well, our cells are not able to communicate with each other as well, and they need to be able to communicate with each other. For example, if one is inflamed and it needs to be repaired, let's say it needs to be able to send out an inflammatory molecule to signal this so the body can come and help to repair it but if it's not communicating well, then that cell might not end up getting repaired when it should be.

Next is genomic instability. This is a very popular one. If you have ever heard of the free radical theory of aging, this is what was very popular in the 80s and 90s. It was the idea that we age because of oxidative stress. Oxidative stress causes DNA damage. The theory was that we get older because over time there's more and more damage to our DNA. Eventually the information network within our DNA is damaged. Therefore, our bodies aren't able to function as well. But what we found is that genomic instability is actually just a small piece of the picture. It's a significant one, but it's nonetheless a small piece. We've got 11 other mechanisms, probably more that will be discovered in the future. So, genomic instability is this idea that our DNA gets damaged and the genes don't express themselves properly and obviously if you have a lot of DNA damage, you have a higher chance of cancer forming from these gene mutations.

Next is epigenetic alterations. I mentioned very briefly before the idea of an epigenetic clock, but you can think of your genome as like piano, the piano keys, and then your epigenome is like the music that's being played on that piano. If you imagine, you know, Vivaldi, the Four Seasons being played when you're very young, it sounds like this beautiful song. But then as you age, a key might be missed or the wrong key is played or it's pressed too hard or too soft. This is the idea that as we age, specific genes turn on and off when they shouldn't, or are over expressed or under expressed. The result is that, for example, maybe a skin cell starts to behave

like a different body part cell when it shouldn't, or a gene meant to reduce inflammation is not turned on as loud of a volume as it should be, and therefore inflammation starts to spread and increase. So, we can actually look at the epigenome and these patterns, as I mentioned before, and be able to approximate how old someone is on a biological level, which equates to approximately their risk of morbidity and mortality based on these patterns in their epigenome.

After that is telomere shortening. This is also a relatively popular one. A lot of people, when I ask if they know what the causes of aging are, they'll either say, the DNA damage, or they'll oftentimes say telomere shortening, because this was very popular over the past, say, 15 years or so. These are the end caps of our chromosomes and our chromosomes are what contain our DNA. As we age, these telomeres, which are like end caps of your shoelaces, they get shorter and shorter and eventually you get to the point where they're so short they reach what's known as the telomeric brink. Imagine your shoelaces that the end caps getting so short to the point that now the threads from the shoelace start to come out and imagine that's like your DNA. Your DNA is not protected as much and it starts to get exposed. When you reach this telomeric brink, that's when the risk of disease goes up quite significantly.

This is one of those metrics where it's not necessarily about having the longest telomeres because there's no difference between being on, say, the 60th percentile and the 99th percentile for your length, at least as far as research has found, but being at the 5th percentile is actually going to be associated with negative health outcomes. So you just don't want them to be too short. Next is deregulated nutrient sensing. So, as we age, our cells are less tuned to nutrient signals. These are things like, MTOR and AMP kinase. These are terms that a lot of people in the longevity community are familiar with. For example, MTOR is a growth pathway. It's when we eat carbs and proteins, especially mTOR is upregulated.

Our body is in growth mode and more cells are proliferating, but that's also associated, believe it or not, with shorter lifespans. That's why things like fasting, which reduce your mTOR levels, are associated with longer lifespans largely because processes like autophagy kick off. So, rather than creating more and more cells, the

body says, oh no, we don't have food. We don't have this growth signal turned on. We need to recycle the cells that we do have. These older cells that aren't performing their function as well, the body scavenges them and we'll recycle those parts and use some calories from it and so on for the body to be able to survive. And that's actually a good thing, right? These signals of mTOR, AMP kinase, IGF and so on are deregulated and they're not processed. Our cells are not processing them properly as we get older. That's a negative.

Number nine is stem cell exhaustion. A lot of people are familiar with stem cells, at least all of the injections, and that's kind of becoming a trendy area for rejuvenation. Stem cells are cells that essentially make copies of ourselves. So as a cell dies off, the stem cell is what's able to then create a replica of it. As we age, some of these stem cells reach what's known as the Hayflick limit. This is the number of divisions that the stem cell can complete before it gets to the point where it can no longer divide anymore. It's almost like making a photocopy of a photocopy of a photocopy. Eventually the quality declines and the cells are not coming out perfectly. So, these stem cells get exhausted or they die off. We have fewer and fewer stem cells as we age so we can't replace ourselves as readily as when we're young.

Those are the original nine and then the three that were added one is inflammaging. That's a play on words. It's inflammation plus aging and it's because inflammation is distinct from say an acute inflammation, which is a good form of inflammation. Maybe you scrape your knee and you're back to normal. The body needs inflammation there to quickly repair it, and then you go back to normal. Or chronic inflammation, which can come from toxins like you mentioned before, but it could come from eating a very unhealthy diet or laying out in the sun every day and getting sunburn from UV rays. This chronic inflammation can occur from lifestyle practices. Inflammaging is different from both of them because it's something that is mediated by the aging process in and of itself. When we're young, there's really no inflammation. As we get older, it's like a whisper and then it becomes like this quiet voice and then it eventually becomes louder and louder until it's like a really deafening sound.

Maybe when you're hitting your 80s or 90s, hopefully you're living that long, but that's when inflammation is really becoming significant and it's systemic. It's across the body that you're inflamed. Number 11 is disabled autophagy. I mentioned before the idea of autophagy is recycling these cells. As we get older, our bodies cells are largely based on our immune systems and less capable of running that process of executing autophagy. Finally, number 12 is dysbiosis. This is our microbiome, largely based on our small intestine but actually we have microbiomes on our skin and our mouth. It is in multiple different places. And so, it's all of that and the diversity of the bacterial species declines as we get older. And the forms of bacteria that we have, we tend to have less healthy bacteria as we age and more of the unhealthy bacteria starts to propagate.

Ads 00:22:39

This episode is brought to you by Chef's Foundry. They've got a fantastic line of cookware called P600. It's totally non-toxic. I think people don't realize that when they're cooking, most people's cookware is adding toxins to their healthy food. People spend so much money on healthy organic food and then cook it in toxic cookware. That includes cast iron, which I do not recommend. It adds way too much iron in a form that we can't absorb. People use aluminum cookware, which is very inexpensive and it's used at most restaurants, giving us tons of aluminum. People are also using ceramic cookware, which can leach toxins into your food, not to mention the nonstick cookware just has so many PFAS or P F A S that is so toxic. That's one of the forever chemicals. So, you really have to pay attention to what you're cooking in. That's why I recommend the P600 line by Chef's Foundry, so that you can have peace of mind when you're cooking and you're not getting any nasty chemicals like lead or cadmium or nickel or PFAS in your healthy food. You can get a special discount for my listeners by going to bit.ly/myersdetox. So that's B I T dot L Y forward slash Myers detox, to get an exclusive discount just for my listeners. I want you to be thankful while thinking about what you're cooking your food in and I highly recommend the P600 line by Chef's Foundry.

Dr. Wendy Myers

Yeah, so that's great. That's such a very clear picture of why we're aging and detoxification plays a huge role in what you mentioned with the free radicals and

damaging our DNA because that's exactly what heavy metals and chemicals are doing. That's why my personal belief is that when you're removing toxins from your body whether it's through sweating in saunas or foot baths or taking certain supplements, you're dramatically reducing the rate at which you're aging in doing so. You mentioned that you're aging at a rate 31 percent slower than normal based on the testing that you've done. So, what kind of specific habits and things have contributed to that?

Chris Mirabile

First let me clarify what I mean by making such an extreme statement in saying that I'm aging 31 percent slower. So, this is based on a number of different types of assessments. There's no one single perfect way to measure this. Although we offer the biological age test at Novos, and this is probably the most accurate and precise way to measure the rate of biological aging, it's not the only way to, and so I've run a whole series of biological age tests looking at my epigenome. There are many different algorithms. I've also looked at my metabolome, which is basically hundreds of different molecules that are in my blood, many of which your people are familiar with from standard blood panels, many of which are actually these, almost seemingly random molecules, but that are correlated with aging and even like physiological markers like my VO2 max and my visceral fat and my maximum heart rate and my resting heart rate, even something known as face age, which we offer for free on our website where you can take a selfie and that selfie is powered by AI and millions of pictures have trained this AI. We can tell you how young or old you look, and then skin health markers and facial health markers, and then we give you guidance for how to improve all of that. All of this combined is essentially how I arrive at this slower aging figure.

In terms of what do I do to arrive at that? Well, some of it is not necessarily perfectly known, right because like self-experiments, it's not like a scientific study with hundreds of people and we're changing one single variable at a time. It's got confounders is I guess what I mean to say. But the things that scientific research supports and I also have integrated into my life, those are the things that I'll focus on. When it comes to diet, for example, I practice more or less a Mediterranean style diet. It's actually slightly tweaked. We have something called the Novo's longevity diet on

our website, which is 90 percent Mediterranean, but then some changes based on the latest research to make it that much more powerful. I basically follow the Novo's longevity diet. In terms of how many calories I consume, I'm typically either eucaloric, meaning I'm eating as many calories as I'm burning, or slightly hypocaloric, so I'm eating less than I would say the average American is eating. I'm eating a little bit less.

Caloric restriction is actually found to be the best method for slowing down aging and extending health span and lifespan. Of all things ever studied, caloric restriction is number one. Now it's really hard to do significant caloric restriction like 15 or 20 percent restriction. I wouldn't recommend that to people because of quality of life that declines as a result. But being in a little bit of a deficit most days of the week and then on the weekends, I might be a little bit hypercaloric and have a little bit more than I'm burning, which balances out to me being probably 5 percent below what I would normally be burning.

Dr. Wendy Myers
Where does fasting play a role in your health habits?

Chris Mirabile
I do time restricted feeding, which a lot of people call intermittent fasting, but technically it's different. Intermittent fasting would require that you're eating fewer calories while restricting the hours that you're eating. But if every single day you're doing the same time period that you're eating, eventually you're not restricting calories anymore. You're just eating the same types of food every day. It's technically not an intermittent fast at that point. I do time restricted feeding. Typically, 16-8. So, I'm not eating for 16 hours and I'm eating for eight of them. It typically works out to like 11 am I'll have my first caloric source and then 7 pm I'll finish my dinner, and then I do 24-hour up to 72-hour fast occasionally, but not that often. I used to do it more often, but a little bit less because I was finding I was losing some muscle mass from doing 72-hour fasts. It's not necessarily the best thing for me to do, particularly because I am very physically active and a lot of the benefits that I would get from fasting, I'm actually getting from that exercise. I don't necessarily want to counteract it with the fasting, but something like a 24-hour fast is actually surprisingly easy to do once you've done it a couple of times.

The first time might be really tough. You might get hungry if you haven't had these periods where you just go extended periods without food, but once you get used to it, it's actually surprisingly easy. And so a 72 hour fast, I might now do like once every six months, whereas I used to do it like once a quarter. So once every six to 12 months, I'll do that now.

Exercise is a big one. I weightlift three to four days per week. I used to do it more often, but now I'm balancing it with some more cardio. I'll do weightlifting for four days and then I'll walk every single day. I'll also either run or bicycle throughout the day. Sorry, I'll run three days and then I'll bicycle once. So, I'm getting four days of cardio in there. I'm typically pushing myself. I know a lot of people are advocates for like zone two cardio training, and it might be particularly good if you have a race goal and you're doing a marathon or whatnot, but I've actually been pushing myself to maximize my VO to max, which is the maximum amount of oxygen that my body is able to utilize at any given point in time for my cardiovascular output.

As part of that, I've been doing a lot of mile runs as fast as I can. My goal at 40 years old now is to outperform my 20-year-old self and my 20-year-old. So, I ran my first fastest mile. I'm now down to I believe the best I've done is five minutes and 32 seconds. I'm within just two seconds of having my best time of my whole life at 40 years old. That's something that I'm doing now, but for your listeners who are not as athletically inclined, it's not that important to push yourself as hard as I am. In fact, there's an argument to be made that I might be pushing myself a little bit too hard when it comes to longevity, because studies have found that if you're pushing yourself too hard, it can actually increase your biological age, not to the degree that it's worse than being sedentary. It's actually still in the top percentiles, but there is a happy medium where you get the best benefit, maybe doing 80%, not going to 95 percent like I am.

For most people, it really comes down to only having to do about 21 to 25 minutes a day of cardio and that cardio can really just be like brisk walking, for example, get into heart rate zone to get your heart rate, depending on your age and your fitness level, that might be around like 100, 110 beats per minute. So, you're feeling a little bit

of a gasp of air if you're trying to talk to someone, but you can still talk to them. Do that for 20 to 25 minutes a day, and you're probably going to get 60, 70 percent of the benefits at that point.

Dr. Wendy Myers
I agree. And then people need to do weight bearing exercise too, correct?

Chris Mirabile
Yes. I'm weightlifting four days a week. I do it the more traditional way, like back and biceps one day, chest and triceps, legs and lower back with deadlifts and then shoulders. But yes, definitely weight bearing exercise, especially for the legs. The whole body is important, sure, but legs particularly, because a lot of people will pass away when they're older from falling and not necessarily the fall itself, but the consequences of that fall. You fall and you might sprain your ankle or break your leg or fall on your hip and then you're in a wheelchair. In that period that you're sedentary in the wheelchair, then leads to the rapid decline and the aging process can accelerate dramatically at that point. So, it's not the fall itself where they crack their head. That's less likely. It's actually all the consequences that follow from that fall.

Dr. Wendy Myers
Yeah, and then people just don't recover. They don't get out of the chair, out of the recliner. I watched that happen to many family members, but especially after they break a bone from osteoporosis. Let's talk about the concept of the longevity hexagon. You said you have six components of that. Can you expand on that?

Chris Mirabile
Sure. Two we've already spoken about. One of them is a diet and that includes the timing of those meals and the calories in those meals and the meal components as well. Second is activity. That's the exercise. Along with that exercise, it's actually not overdoing it, not pushing yourself too hard. That's why I don't, for example, do an ironman a triathlon or a marathon because that can cause excess inflammation. I balance that with adequate rest. Next is sleep and making sure that you are recovering properly. A lot of people, myself included when I was in my teens and

twenties, I didn't respect sleep that much. I looked at it as well, I'll sleep when I'm dead type of mentality and I'm going to push myself hard. I'm going to work hard, play hard, that type of lifestyle. It's not well advised. It's not smart. We're realizing from scientific studies that it can increase the risk of all different diseases, including Alzheimer's and cardiovascular disease.

When we sleep well, we all know we wake up and we feel like a new person. We feel great. We're excited about life. We're more positive, optimistic, and our work, we perform better. We treat our loved ones better. And when we don't sleep well, all of that starts to slip. Life is just better. This is one of those things where both quality of life and quantity of life are both positively impacted by focusing on sleep.

Ads 00:35:46

This episode is brought to you today by Purity Woods Skin Care. If you care about your health and longevity, which let's face it, if you are listening to this show right now you probably do, then I assume you know to watch what you eat, get plenty of exercise and prioritize your sleep. But where I noticed many of my health-conscious peers can drop the ball so to speak is when it comes to their personal care products. Truly folks, we all need to be reading the ingredients list on any product that we are putting on our skin and absorbs directly into our bloodstream. But, how often do you buy skin care products because they're labelled as clean or organic or they have organic in the name of the product or they say paraben-free only to find out that there's a ton of toxic ingredients in them that are damaging to your skin, body, and hormones? Why is it so hard to find skin care products that are truly 100% USDA organic certified? That's why I use and recommend Purity Woods Skin Care.

Purity Woods' mission is to provide people with the cleanest and most effective healthy aging and longevity products available. All of their products are USDA-certified organic, non-GMO, free of anything artificial, free of toxic preservatives and additives like pesticides, chemical fertilizers, dyes, parabens, and of course, it's cruelty-free and never tested on animals. Purity Woods' best-selling products the age-defying Dream Cream has been flying off the shelves for a reason. This formulation includes red maple leaf extracts along with collagen-boosting ingredients like organic mango seed butter, organic gooseberry, which if you don't

know is the most antioxidant-rich food on earth. As you know, I am a big research geek and in recent years, there has been some generally fascinating science coming out of the University of Rhode Island about red maple leaf extract for the skin. So, this little-known skin care ingredient has been shown to block the breakdown of elastin, the key protein in your skin that allows it to stretch and remain firm. Some researchers are even calling this ingredient a potential plant-based Botox, so to speak.

So, if you are ready to detox your skin routine of all those hormone-disrupting synthetic chemicals that plague 99% of the skin care industry but you don't want to compromise on the results, I highly recommend that you try out Purity Woods age-defying Dream Cream. If you do not agree that it is the best skin care you've ever used, your purchase if protected by their really generous 60-day happiness guarantee. But honestly, I've never seen a skin care product of this quality at this reasonable price point. Thankfully, the good people at Purity Woods have a special discount code specifically for my listeners. You can try it yourself for 27% off today. Just go to puritywoods.com/wendy or enter Wendy at check out

Dr. Wendy Myers
Yeah. I see you're wearing an aura ring there, correct?

Chris Mirabile
Yes.

Dr. Wendy Myers
Yeah. I have mine too. I'm trying to win the sleep Olympics and I got my aura ring just to accomplish that goal. But yeah, the sleep is the foundation of everything.

Chris Mirabile
Definitely. Some quick hacks that I use. I'm actually traveling right now. I'm in Miami for an event I'll be speaking at, but everywhere I go, I bring my earplugs, which most people don't actually insert properly. Watch a YouTube video to understand how to put in your ear properly, because if you do it right, it'll block out 90 percent of the sound, and then a sleep mask. And then as long as the temperature is good in the

bed and the pillow's comfortable, that's all I need, and that gets me 90 percent of the way there. There are other more advanced things people can do and they tend to cost a lot of money, but to get to the 90 percent point, that's all it takes for me.

After sleep, there's also psychology and relationships. These are components that are associated with longer lifespans and better health spans. You need to be able to try to minimize the stress in your life. And then if you have stress, learn how to cope with that stress properly. There are different methods, whether that be meditation or prayer or journaling, whatever works for you, just make sure that you're able to cope with that stress because it’s critical. You can take two different people and put them in the same exact scenario, and one person gets all riled up and super stressed out, and the other person just gets through the experience like nothing happened, and guess who's actually healthier at the end of that experience? So, sometimes you can't control the stressors in your life, but you can at least control how you react to those stressors, and that's very important.

And then relationships. Science shows that having three strong, positive, healthy relationships in your life with people that you feel like you can talk to them about anything that's happening in your life, that you can count on them, that they'll be there for you. They're not toxic relationships. That's the magic number for people to have to maximize their health spend and lifespan. It's not about having five or seven or ten of these friends. It's about having the three really solid close friends. That can be a family member as well. It could be your sibling, it could be your mother or father, but just make sure it's someone that you feel like you can talk to them about anything that's on your mind. That goes back to the stress. It will help you to cope with stress when you feel like you have someone who you can turn to. That's very important.

Next is supplementation. Supplements, there's a wide range of supplements out there and it depends on what category we're talking about, but you can start with, for example, general health supplements. These are essentially the nutrients that the government has set a minimum daily allowance for. These are the essential vitamins and minerals, everything from vitamin A, vitamin the family of B vitamins, C, D, E, K, and then throw choline into the mix as well, the forgotten B vitamin, as they call it,

and then minerals such as potassium and sodium and chloride and magnesium, zinc, copper, and so on. We need to reach a certain daily level of these, and when you eat a very healthy diet, the chances are that you're still going to have an inadequacy in at least one, most likely multiple of these vitamins or supplements or minerals, because it's nearly impossible today to eat a perfect diet. That's going to get you everything you need. Take for example, vitamin D, it's really hard to get adequate vitamin D from your diet alone, and unless you're living like at a near the equator and you have our light skins and you're outdoors in the sun every day and getting it through the natural vitamin D production from the UV rays, which can also then accelerate skin aging.

There are two sides to that point. You probably need vitamin D, you probably need some vitamin K supplementally, probably need magnesium. More than 60 percent of people are deficient in magnesium. That's the essentials and for baseline foundational health, making sure that, for example, your body can detox well and getting adequate selenium to help with that process. But then, you can go into different categories of specialty. There are obviously athletic sport nutrition supplements. Maybe it's beta alanine and arginine and creatine for weightlifting and physical performance. Then there are libido supplements and there are new nootropics for cognition and so on.

The area that I specialize in and my company Novo specializes in is in the longevity category of supplements. Now, a lot of companies out there are claiming to be longevity supplements when they're not actually longevity supplements. The way to define a longevity supplement is that it is shown in scientific research in ideally multiple animal species that it is extending lifespan by a statistically significant degree, and it's also by extension, ideally increasing health span along with that process and very few nutrients or supplements actually fit that criterion of being something that is extending health span and lifespan. Just because something feels good today or is optimizing performance today, take for example, growth hormone. If someone in their 60s starts taking growth hormone, they're going to feel young again. But that's quite different from actually extending health span and lifespan. There are arguments to be made that growth hormone might even kill you, reduce lifespan and increase the risk of cancer. So, that's something that people oftentimes

confuse is the feeling of being younger compared to actually extending lifespan and longevity is about extending health span and lifespan.

Dr. Wendy Myers
Talk about some of the supplements that your company has and the benefits of them.

Chris Mirabile
The single product that we are most proud of is called Novos Core. This is the first product in the world to ever address all 12 of the mechanisms of aging simultaneously. I brought on top scientists in the world to collaborate, and they're on our scientific advisory board. People like Dr. George Church, the geneticist from Harvard and MIT who invented genetic sequencing in 1984. Dr. Matt Kaeberlein, who's very famous for his work as a gerontologist and his work with rapamycin and the dog aging project to extend dog lifespan and so on. He was in Time magazine for that work.

We've got more than a dozen of these scientists and medical doctors who study aging. Together we worked on this formulation. And not only did we get together, we based this on more than 400 scientific studies for the inclusion of the 12 ingredients in this formula, but we went on to do a number of scientific studies to validate the combination of these ingredients, because believe it or not, when you are adding two healthy ingredients together, it doesn't necessarily lead to a healthier outcome. In fact, science has shown that oftentimes when you add two healthy ingredients together, they can counteract each other, and in some cases, even have a negative outcome.

We wanted to make sure that our hypothesis for including all of these ingredients together was actually leading to better health outcomes. So, we did a number of in vitro studies where we looked at DNA damage, for example. We were able to show that we significantly reduce DNA damage by as much as 77 percent from irradiation. Think of UV rays. We did another in vitro study where we looked at human skin cells and we administered really harsh chemotherapeutics to those cells because that's a potent toxin and we wanted to see if our supplement was able to protect these cells

from a really potent threat and we were able to it. That's a peer reviewed study that was published in the journal nutrients in August of this year and you can find that on our website, but we prevented single and double strand DNA breaks.

We've done another study where we looked at cellular senescence, which I mentioned before, the zombie cells, and we compared ourselves to the prescription drug rapamycin, and that's the gold standard for longevity drugs, and we were able to reduce the size of senescent cells by approximately the same order of magnitude as rapamycin.

We did another study at the Salk Institute, a very prestigious lab in California, and we looked at this process known as oxytocin spherocytosis, which can lead to Alzheimer's and certain forms of cancer, and we were able to reduce that process again in an in vitro study by more than 50 percent compared to a lab study of prescription R and D drug that's in the pipeline right now for approval specifically for those diseases. That's a lot of in vitro studies.

Then we did an in vivo study with mice and we found that we were able to extend the mouse lifespan by more than any supplement ever studied. This is an aged mice that just came out. The study is a pre-print right now, but that just came out about a month and a half ago. We published that on our website as well. And then we did a case study with people and almost three quarters of the participants, after taking Novos Core and Novos Boost, a second product of ours, for six months, were found to have a reduced biological rate of aging by the equivalent of more than one month per year. The one quarter that did not improve also did not get worse.

So, we're hopeful that we're actually protecting those people because you would expect some people in the studies should have sped up their aging, and the fact that nobody did, indicates that we're likely protecting them. Now we have a clinical trial underway to study the benefits further. That's all of the science behind it. But in terms of like the practical real-world benefits, people report improvements in their skin health within four to eight weeks, improvements in mood, sleep, energy, and cognition. It's a daily drink mix. It's in a sachet. It would otherwise require more than 15 pills, but you tear it open. There's an orange flavor, Sweden with stevia, so there's no

sugar. We also have an unflavored version. If people don't want the stevia, they can have unflavored and that tastes good mixed in anything flavored like a juice, a smoothie, a protein shake, or a yogurt.

Dr. Wendy Myers
Okay, fantastic. And then you said you had the Boost product as well. What is that?

Chris Mirabile
Yes, so we have two products actually. Novus Boost is a simple product. It's these tiny pills you take two a day and it's NMN. NMN became very popular after Dr. David Sinclair at Harvard talked about it. It's a precursor for NAD and NAD is essential for cellular energy production as well as DNA repair processes that are fueled by these molecules known as sirtuins. That's NMN. That's our entry level product. It's the least expensive. We call it Boost because it's a great booster to Novos Core. Core is the core foundational supplement in our lineup. If you get one single thing, I would suggest it be Core. But if you can afford to stack that with Boost, we would suggest that.

And then finally, we have Novos Vital. These are daily chews. You take four of them a day. I personally take two of them with lunch, two with dinner. They focus on organs that decline with age, specifically the brain, eyes, heart, liver, kidneys, muscle, and gut. Most supplements will focus on one single organ. We're all about making this as simple as possible for people and an enjoyable experience. That's why we make a tasty drink. We make these sweet chews that taste great. It's an enjoyable experience where you're getting seven supplements targeting seven organs all at once. It includes apple cider vinegar in it, a full hefty dose of it so you can have it with your meal. It will help with digestion and metabolism. But then we've got other really potent ingredients in there for all of those other organs.

Dr. Wendy Myers
Yeah, fantastic. What are the ingredients in the first product you talked about?

Chris Mirabile

Novos Core contains calcium alpha ketoglutarate, glycine, which is an amino acid, glucosamine sulfate, pterostilbene, which is found in blueberries, Fisetin, which is found in strawberries, but the dosage level for both of these is orders of magnitude beyond what people consume on a daily basis of these foods, ginger extract, malate and in the form of a magnesium malate. Malate has longevity benefits. This is what makes apples a little bit tart. And then magnesium, we mentioned before, most people are deficient hyaluronic acid. The oral form has a number of benefits, both for longevity, surprisingly, but also for skin health and hydration and joint lubrication, L-theanine from green tea, which is great for focus, but it's also been found in longevity studies to extend lifespan. Rhodiola rosea, which is an adaptogen, vitamin C, which is really intended to improve the benefits of the alpha ketoglutarate, the first ingredient I mentioned.

Finally, the most controversial ingredient, but a really powerful healthy ingredient is micro-dosed lithium. It's actually technically by scientific definition, a trace dose of lithium, but it's only one milligram. This is hundreds of times lower than most prescription doses of lithium. We evolve with lithium in our water supply and in our food. With municipal water now we filter everything and we get rid of all of the natural minerals in them. But if you had, for example, San Pellegrino brands bottled water that has high levels of lithium in it and if you're eating fresh salmon, for example, you're going to have lithium in it because lithium leaches through the rocks into the fresh water that we consumed throughout evolution. Lithium has been found to be correlated in multiple studies with, for example, lower rates of Alzheimer's and Parkinson's lower rates of depression, a bipolar disorder of suicide. To be clear, for FDA reasons, I'm not saying that lithium is going to prevent these things directly, but it's correlated with these, and there's a lot of science behind potential health benefits from lithium.

Ads 00:54:16

I want to introduce you to one of my favorite podcasts. It's from Dr. Jockers and he hosts the Dr. Jockers Functional Nutrition Podcast. Dr Jockers is such a wealth of knowledge, and I just love how thorough he is with every podcast and blog post that he produces. His Instagram has amazing infographics that make learning about

health so clear and easy. I just love his content, and I know that you are going to also. He's got over 400 podcast episodes where he shares practical tips around topics like fasting, disease prevention, brain health, and so much more. He's so thorough. Dr. Jockers has hundreds of five-star reviews for his podcast. So, if you're looking to continue to grow on your health journey, just search for Dr. Jockers on whatever podcast platform you're listening to. You won't regret it. I highly recommend his show.

Dr. Wendy Myers
Yeah, and everyone's deficient in lithium. We do hair mineral analysis, every single person does not have lithium, and we need it. It helps to detox aluminum as well, which I think helps with some of the brain benefits. We also need lithium to make GABA and help to relax us. So it's a really important and critical mineral that everybody's missing for the most part.

Chris Mirabile
Definitely. I didn't know that about aluminum, but when I've been tested for aluminum, I have extremely low levels. So it's probably, partly at least from the lithium.

Dr. Wendy Myers
Yes. It's so important. Let's talk about the aging tests that you have. You said this is an epigenetic test.

Chris Mirabile
Yes. It's called Novos Age. There are three outputs from it, soon to be four. The first output is your pace of aging, and this is powered by an algorithm called Dunedin pace. This is arguably the most accurate and precise of all biological age clocks out there is created by researchers at Columbia and Duke universities. They used a longitudinal data set from a cohort called the Dunedin cohort in New Zealand. These people were followed from five years old to, I believe they're around 50 years old now. More than 30 different biomarkers were taken from these people, including white matter in their brains and all different blood tests and sit stand tests and grip strength and different assessments of their lifestyles and so on. With all of this data, scientists were able to then run epigenetic tests and determine how fast or slow

somebody is aging based on their epigenome. This is something that you can speed up or slow down, as we mentioned before, based on lifestyle. That's the first test, and we emphasize that that should be the primary thing that consumers should look at when they purchase the test, more than any other output in the test.

The second is a biological age clock. This is just to scratch the itch of, well, if I'm 40 years old, chronologically, how old am I biologically? Everyone's curious. Now, that algorithm is in the process of being upgraded, and that's going to be out very soon. The algorithm is a brand-new algorithm out of Yale University, and it's significantly more accurate than the current one that we're using. Along with that algorithm, a new output is going to be organ ages. We'll be able to tell you the age of different organs, like your heart or your liver, your kidneys, your brain, and so on. And then finally, the final output is telomere length. We mentioned before your telomeres are the protective end caps of your chromosomes are one of the 12 mechanisms of aging. You want to make sure that they're not too short, you're not in the lower percentile. So we can tell you based on your chronological age, what percentile you are in for your telomere length.

Dr. Wendy Myers
I'd love to take that test. I forgot to ask you about that before you came on the show. I've done other biological age tests and I was five years younger than my biological age, which I was thrilled to hear about. It's doing a glycan test. Testing glycans, but yeah, it's just one parameter and like you mentioned, there are a lot of different ways to test your biological age.

Chris Mirabile
Right, and glycans might be more associated with like inflammation, and so it's one aspect of aging, but it's not as powerful as the epigenome because the epigenome is really reacting to everything in our lives, everything from the foods we eat and the inflammation in our bodies and even our psychology impacts our epigenome. Everything is impacting that epigenome, so it's more of a source of truth, whereas glycans are an aspect of aging. But if ultimately you get a score that's five years younger, or ideally, to play with, research has found that every seven to eight years, our risk of death doubles, which when you're young, it's a very low number. It's like

with, say, one in 100, 000. But when you're getting older, like when you reach centenarian status, a hundred years plus, your risk of death is approximately 50%. The point is that if you are reducing your biological age by say seven or eight years, that implies that you are probably at 50 percent of the risk of other people, your chronological age of passing away or getting a chronic illness. That's what the results imply.

Dr. Wendy Myers
I think it's such an important marker to test to see just one of the markers where you can see what you're doing is working or not. Certainly, it's great for biohackers that are looking to quantify what is it they're doing and if it's working.

Chris Mirabile
Definitely. I like to call it a North star metric. You've got like these blood labs that get really into the weeds and you specialize in that, and you can help people to comprehend that. But what if we just want to see like overall, how am I doing? How is my health? Am I above average? Am I below average? And are the changes that I'm making in my life actually moving the needle and bringing me to a healthier state? That's where these algorithms come in because you know, as a doctor, if you took a comprehensive blood panel, you can identify things that are in range and out of range. I don't think you would say that you could look at the whole thing holistically and say, like, comparing two people, let's just say both of them are in range on everything, looking at both of them and saying, okay, you are definitively healthier than this other person.

It's hard to actually synthesize all of that information into a conclusive statement about that person's state of health relative to other people. That's where biological age clock comes in. It's a simple metric where we can actually see if regardless of the directions that these different biomarkers are going, are you trending in the right direction or in the wrong direction? And then you can dig into specific issues like you do on individual biomarkers.

Dr. Wendy Myers
Why don't you tell us where we can get your supplements and do your test?

Chris Mirabile
The website is novoslabs.com, and you can find us on all of the social networks as Novos Labs. We also have a free mobile app on the website. You can find it. It is called Novos Life. It's Android and iOS. We're a public benefit corporation, so we produce as many free resources for people as possible. That app is one of them. Face Age, which I mentioned before, is another. And then we also have a blog called Novos Flow, which has tons of information written typically by PhDs or MDs on the subject matter. I'm personally on all of the social networks as SlowMyAge. I have a blog called Slow My Age. Also, a documentary is coming out, narrated by Edward Norton, and it's got people like Steve Aoki and Tony Hawk and Tony Robbins and Peter Diamandis and so on in it. I'll be in that film. It's about longevity. So, by the time people hear this is probably out already. And that's on Apple TV and on Amazon Prime.

Dr. Wendy Myers
What is the name of the documentary?

Chris Mirabile
Longevity hackers

Dr. Wendy Myers
Fantastic. Everybody, check that out. I found you because I was researching anti-aging supplements and just digging into that research. I found your website and was very impressed with your site and everything that you're doing, and I wanted to have you come on the show. So, thanks for coming on.

Chris Mirabile
Thanks for having me. It's great to be on. Nice to meet you.

Dr. Wendy Myers
Yes, and everyone, thanks so much for joining the Myers Detox Podcast. I'm Dr. Wendy Myers, and it's such a privilege to bring experts from around the world every week to help you connect the dots with your health. My only goal with this show is to help you

find those missing pieces of the puzzle, make some connections, and help you to upgrade your health. Thanks for tuning in every week, and I'll talk to you soon.

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