THE MODEL HEALTH SHOW

EPISODE 922

The Root Cause of Parkinson's Disease & How To Prevent It

With Guest Dr. Ray Dorsey

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SHAWN STEVENSON: The number of people with Parkinson's disease more than doubled from 1990 to 2015, and according to a study published in The Lancet, the numbers could double again by 2040. The onset of Parkinson's disease can have devastating consequences for individuals and for families. And today I'm so grateful to have the world's leading expert in Parkinson's, both to share why these skyrocketing rates are taking place, and also to talk about. The science backed solutions. As things are going right now, it's going to be rare to find someone who is not connected to someone who's experiencing the ramifications of Parkinson's disease or experiencing it themselves. We've got to turn this ship around, and I'm so grateful to share this episode with you today.

One of the things that you're going to discover and what's affirmed in the vast majority of data is that prevention, an ounce of prevention is worth a pound of cure. Doing our best to prevent the onset of these conditions is a far better strategy, and there are a few things, very practical, common things, smart things that we can do to reduce our risk of developing Parkinson's as well as Alzheimer's, which has skyrocketed in recent decades as well. Most people have no idea that regularly drinking coffee has been shown to prevent cognitive decline and reduce the risk of developing Alzheimer's and Parkinson's disease. And these attributes are referenced in the top tier peer-reviewed journal, practical neurology.

As for benefiting overall cognitive health, a study published in the journal, Psycho-Pharmacology. Uncovered that drinking one large coffee a day around 200 milligrams of caffeine, or four smaller cups of coffee in a day, which was around 65 milligrams of caffeine each, had some remarkable benefits on mental performance. The researchers found that both methods of coffee intake led to equal improvements in alertness and improved reaction time, as well as enhanced performance on cognitive vigilance tasks, activities including multitasking and task, including deep concentration. Now you take the benefits of a high quality organic coffee that avoids the pesticides and herbicides and rodenticides that are commonly found in conventional coffee which are very, very bad for your brain.

As you're going to discover today, you take a high quality coffee and you combine that with science-backed medicinal mushrooms like lion's mane, which scientists at the University of Malaya discovered that compounds and lion's mane are able to significantly improve activity of nerve growth factor in our brain. Nerve growth factor is essential in the regulation of growth, maintenance, proliferation, and survival of our brain cells, and this unique combination of organic lines, mane and organic coffee. As well as organic chaga medicinal mushroom is found in the original mushroom coffee from four Sigmatic. Go to foursigmatic.com/model and get your hands on their amazing think blend that has all these amazing properties and ingredients.

Foursigmatic.com/model. That's F-O-U-R-S-I-G-M-A-T-I-C.com/model. And guess what else? You're gonna get hooked up with special discounts with their amazing subscriptions, 10, 15% off or more, plus some extra little bonuses that you're gonna find there as well. Again, that's foursigmatic.com/model. And without further ado, let's get to our special guest and topic of the day. Dr. Ray Dorsey is a professor of neurology at the University of Rochester and the director of the Center for Brain and Environment at Atria Health and Research Institute. For the past decade, he has pioneered technology to care for individuals with Parkinson's disease.

His research has been published in the leading neurology, medical and economic journals. He's been featured all over major media from the Wall Street Journal to NPR, to the New York Times. And he's here today to share the critical and shocking truth about what's causing higher rates of Parkinson's disease. Let's dive in this conversation with the amazing Dr. Ray Dorsey.

Dr. Ray Dorsey.

DR. RAY DORSEY: Thank you very much, Sean, for having me. I'm excited to be here. Thanks for all the work you're doing, improving the sleep, the nutrition, the health of thousands, if not millions of people. It's a huge difference for a lot of people. Thank you.

SHAWN STEVENSON: Thank you. I received that and it compliments your work, so well. Of course, we're gonna dive into so many different topics today, but I wanna start off by talking about first and foremost. What Parkinson's disease actually is? Can you share that for us?

DR. RAY DORSEY: Yeah. So Parkinson's disease classically is a brain disease that causes at least two of the falling four symptoms. One is a tremor. That's probably what most people know, usually in the hands, usually asymmetric. Second is lowness of movement. Third is stiffness or rigidity. And fourth is difficulties with walking and balance, and unlike other neurological diseases like seizures and strokes and migraines, which have been described for centuries, if not millennia.

The first major description of Parkinson's disease did not happen until 1817 when a 61-year-old British surgeon named Dr. James Parkinson, saw something new on the streets of London, and what he saw was new wasn't tremor, which has been described for many years. Shakespeare even talks about it. But he saw people with a slow and shuffling gait, astute posture, and this propensity to walk faster and faster. He called it the Shaking Palsy. He also said, this has not been classified in the medical literature before, and he described six people, at least five of whom were men, all older with the disease. Fast forward two centuries later in 2017, the Global Burn of Disease estimates that 6 million people worldwide have the disease.

So you go for something that's rare, that's not classifying the medical literature, that catches the eyes of a 61-year-old surgeon in London to 6 million in the span of just two centuries. And so why is that? And so I've been thinking about that and there are a couple possible explanations, one genes, but genes don't change or genes don't change that much in 200 years. Second one, which a lot of people talk about is aging. And indeed people are living longer now than they did 200 years ago. But if you look at the growth adjusted for age is still one of the world's fastest growing brain diseases. And then I think it leads you to the conclusion that it's our environment. That chemicals in our food, water, and air are fueling the rise of one of the world's fastest growing brain diseases.

SHAWN STEVENSON: Yeah. You actually shared, and it just really stood out to me in the book, which is, the book is Remarkable. The Parkinson's plan is the new book. Everybody needs to pick up a copy like yesterday. And you said that Parkinson's you believe is a manmade disease.

DR. RAY DORSEY: Yeah.

SHAWN STEVENSON: Talk about that.

DR. RAY DORSEY: So, in 1971, a really smart epidemiologist, Abdu Omran from Egypt, was interested in what drives population growth and for most of human history or homo sapiens been around for about two or 300,000 years. We've been relatively few, and for most of human history, he said population growth was limited by food when a hundred gatherers were limited in growth because there just wasn't enough food. And then we had 10,000 years ago, the agrarian revolution, which led to huge excess agriculture production, the ability to store food, the formation of cities, and huge population growth. But it also led to infectious pandemics, bubonic, plague, smallpox, and the like. So that was what was limiting human growth.

And then in this third generation, he said, we live in the era of degenerative and manmade diseases. So he said in 1971 that we live in an era of degenerative and manmade diseases. And so what? What's a manmade disease? So the poster child for man-made disease is lung cancer. So if you look at lung cancer deaths in the United States in 1900, it's almost non-existent. There's almost no lung cancer. Indeed, it was so rare that medical students and doctors would gather around thinking that they would never see another case. They called it a once in a lifetime oddity. Unfortunately, they were wrong because 25 years after cigarettes were introduced into the United States, you saw a corresponding rise in lung cancer death.

Smoking in the United States, California, you know, peaked in the 1970s. And as soon as we stopped smoking 25 years after we stopped smoking, we see a corresponding decrease. Still today, over 80% of lung cancer is due to smoking. Lung cancer is the leading cause of cancer death in the United States and leading cause of cancer death in the world. And the vast majority of it's manmade, it could just live in a world where lung cancer is extraordinarily rare.

So what are other ones? I'll give you another one. Acne. So, three quarters of American teenagers have acne. And I asked one of my good friends, Dr. Mary Gail Rio in Rochester, Hey Mary Gail, what's up with acne?

What? What's the point of three quarters of teenagers getting the skin condition? She said it could be a disease of Western civilization. And so she pointed me to this paper, I think in the archives of dermatology. And they, uh, said, is acne a disease of Western civilization? And so they looked at hunter gatherer populations in Papua New Guinea, and Paraguay looked at 101 cohort and over a thousand in another cohort, including teenagers. You know how many cases of acne they found?

SHAWN STEVENSON: Please tell me. None?

DR. RAY DORSEY: No acne.

SHAWN STEVENSON: Huh?

DR. RAY DORSEY: So I'm not a dermatologist, and the authors weren't sure, but they said, you know, high levels of insulin, Western, highly processed diet, high levels of insulin leading to cellular proliferation, leading to acne. Again, I'm not an acne expert, but here it is a disease that just didn't exist in the past and still doesn't exist in certain populations in the world. And so, you know, type two diabetes, we go down, down the line. And then so, we argue in our first book that Parkinson's disease, based on the research of my colleague, Dr. Caroline Tanner at University of California of San Francisco is due to environmental causes, certain pesticides, dry cleaning chemicals, if you can believe it, and air pollution.

And these three major groups of environmental toxin are likely fueling the rise of Parkinson's. We get rid of these toxicants, we get rid of Parkinson's disease. We make it rare like it was for the net for 99% of human history. Parkinson's disease was extraordinarily rare if non-existent. We could do the same thing again.

SHAWN STEVENSON: Yeah. Oh, I had no idea we're gonna talk about some of these oth other subjects. I just want to pivot back to the acne thing really quickly because, you know, if you

think about this, our skin is also a major endpoint for detoxification as well. So even beyond the diet, just the things that we're exposed to, the things that we're putting in and on our bodies, and having this root to try to get out of our system.

I remember when I was a kid, but it was just so normalized, right? And so my mom would call them sex bumps. Right. Which sounds kind of weird now looking back on it, but like it's just what teenagers go through as their hormones are changing. Right. But we have cultures that this isn't a thing.

DR. RAY DORSEY: Doesn't exist.

SHAWN STEVENSON: Oh my goodness gracious. And so specifically looking at Parkinson's, why is Parkinson's, what, what are the, what are the things that you've identified in your research that are contributing specifically to this condition?

DR. RAY DORSEY: So, and your brain is 2% of your body mass, 20% of your energy consumption, and most of that energy consumption is from nerve cells, neurons. So your brain's a gas guzzling thing. It's hyperactive even when we're sleeping. It's active and consuming lots of amounts of glucose. So nerve cells are, many of 'em are chockfull of energy producing parts of nerve cells are called mitochondria. And some of our nerve cells are really long. You know, I'm a tall guy, so I have a nerve cell that goes from my spinal cord all the way down to my toe.

And that's, you know, a meter in length, three feet in length. And you have another one that goes from your brain all the way down to your spinal cord. So you have these nerve cells that are really long and have huge energy consumptions. You can imagine, you know, to maintain a three foot long nerve cell, you gotta have a lot of energy production. And it turns out that all these chemicals that are linked to Parkinson's, all damage the energy producing parts of cells. So there was a common mechanism. There are different chemicals, but they all share this common feature that they all target the energy producing parts of nerve cells or of cells in general.

Turns out there are some rare genetic forms of Parkinson's. About 12% of people in the United States have a genetic cause or genetic risk factor of the disease. Those genetic causes also damage the energy producing parts of cells. Indeed, one of the most common genetic cause of Parkinson's disease is called a mutation in a gene called LARC two. It produces the dry cleaning chemical trichlorethylene. MIMICS produces the same biological effect as the genetic cause. They both increase the activity of a protein, it's called LAR two. And so the genetic cause increases the activity of this protein, and this chemical increases the activity of this protein.

Dr. Brianna de Marand and her colleagues at University of Alabama Birmingham have demonstrated this. So basically we have these environmental chemicals that are mimicking the, are also damaging the mitochondria, the energy producing parts of cells, just like the genetic causes do as well.

SHAWN STEVENSON: So you're saying that dry cleaning chemicals, certain dry cleaning chemicals are implicated in higher incidents of Parkinson's?

DR. RAY DORSEY: Yeah. You want me to show the chemical? So you, you, you, you got your bachelor's in science so you know, a little chemistry. And so your listeners know water is made of three atoms, H2O, two hydrogens in one oxygen. So this is one of the dry cleaning chemicals. It's trichloroethylene, it's made up of a whopping six atoms, right? Two carbons in black. One hydrogen in white and three corn atoms in blue. Hence its name trichlorethylene. It's got a cousin that's commonly used in dry clean today. It's called perchloroethylene. It's got one additional chlorine atom instead of hydrogen atom. And these chemicals in a small twin study were associated with a 500% increased risk of Parkinson's.

SHAWN STEVENSON: Oh my.

DR. RAY DORSEY: 500% increased risk of Parkinson's disease. One small study in Denmark looked at the rates of. Uh, Parkinson's among female dry cleaning workers. They looked at different workers who trying to figure out which occupations are linked to Parkinson's disease. The occupation at the highest risk of Parkinson's was female dry cleaning workers, 15

times increased risk of developing partner. 15 times, not 15%, 1500%, 1400% increased risk of it. Now it's a small study, you know, really small. If you expose laboratory animals to this, it damages the energy producing parts of nerve cells and it damages the dopamine producing nerve cells that are lost in Parkinson's disease.

This chemical, some people heard about the marine base Camp Lejeune in North Carolina. Maybe if you see these commercials. So it turned out that the marine base at Camp Lejeune was contaminated with this chemical from a dry cleaner on the base called ABC, dry cleaners. You can't make this stuff up. A B, C dry cleaners. Inappropriately disposal of a trichlorethylene. It gets into the water supply at the marine base in North Carolina. So I think Marines are usually trained at either Camp Lejeune in North Carolina or Camp Pendleton in California. And from 1953 to 1987, the Marines were drinking water that was contaminated with this chemical.

And for the latter years, the Marines knew about it. And this chemical is known to cause cancer. That's the opinion of the World Health Organization, the Environmental Protection Agency, the Department of Health and Human Services, and it increases the risk of Parkinson's disease. They looked at the rates of Parkinson's among Marines who served at Camp Lejeune versus Marines who served at Camp Pendleton. So the Marines, by and large, are healthy. They're young on average ages 20, and they're out of marine base only for 25 months on average. Yet, 35 years later, the Marines at Camp Le June had a 70% increased risk in developing Parkinson's disease.

SHAWN STEVENSON: Oh my gosh, man. Oh, that's, this is heartbreaking. And first of all, you're a man after my own heart pulling out a molecule model right out of his pocket. That was awesome. And just to really give this some substance, because when I think about, you know, dry cleaning, like this is just such a normal part of our everyday lives. And it doesn't appear to be anything nefarious about, it's just a service that's available, but it's invisible. It's one of those things that we don't really think about. What are they using to clean the clothes? Like what is a part of this whole process? And you're kind of exposing this and sharing, like, we need, we need to do something different because this is harming our health.

DR. RAY DORSEY: Yeah. And so how does Parkinson's becomes the world's fastest growing brain disease? Well, you get chemicals like this that are everywhere. In 1970, 500 million pounds, two pounds per American were produced of this. You would find this in typewriter correction fluid. It was used to decaffeinate coffee. So if you drink decaffeinated coffee in the 1970s, you may have been drinking this. This was used as an anesthetic agent for pregnant women to relieve pain. There's actually one study, so people ask me, well, what about the pregnant women? There's actually one study that suggested anesthesiologists have a higher risk of a Parkinson's disease. And then it, then it's inappropriately disposed up, so it gets into the groundwater. Up to 30% of groundwater in the United States is contaminated with this chemical.

It's contaminated groundwater, at least I think, on five different continents. And then like radon. I dunno if, you know, radon evaporates from the soil and enters your home and can cause lung cancer, it turns out trichlorethylene is very volatile. It rarely evaporates. Hence its use in dry cleaning and it can evaporate from underlying groundwater and soil and enter people's homes, workplaces and schools completely undetected. There, can I tell you a story in, so this. Things everywhere. It's in Southern California. Can I read you a little bit?

SHAWN STEVENSON: Please do. Please do.

DR. RAY DORSEY: So this vapor intrusion is invisible as you were pointing out, and it's everywhere. And so I'm gonna read you a story from our book. The chapter is called An Invisible Cause, inside our Homes, this section is at the corner of health and happiness. After several years of investigating trichlorethylene, abbreviated TCEs role in Parkinson's, Ray began thinking that the chemical might be everywhere. He thought of the least of the least likely place to be contaminated. Newport Beach, California.

So Ray, who went to high school in the beautiful coastal town, googled Trichlorethylene plus Newport Beach. What he found shocked him. Not only was there a contaminated site in the wealthy city, but was just a quarter mile away from his Alma Matter. With its year-round, sunny Skies, strong universities and entrepreneurial spirit, Southern California has long been a major hub of the aerospace industry. During World War ii, the region employed 2 million

aerospace workers and produced 300,000 airplanes in the 1980s. One third of the nation's aerospace engineers were located in the region. In 1957, a large aerospace unit opened in Newport Beach to conduct quote, research, engineering and manufacture missile guidance components, rocket Motors computer hide hardware.

Not surprisingly, the work generated a lot of grease. Which was easily and conveniently cleaned with chemicals like TCE and PCE. So in addition to dry cleaning, these chemicals are widely used to degrease metal. Following the end of the Cold War in the early 1990s, the aerospace industry shrank and the plant located three miles from the Pacific Ocean closed its doors. When the facility was demolished, TCE and PCE were found in the soil and groundwater and cleanup efforts began until 1996. This land was subsequently rezoned from industrial to residential use. However, the remediation was not complete and the pollution did not just disappear. In the early 2000, TCE and PCE were still found in the soil vapor and shallow groundwater. This did not raise health concerns, at least at this time, perhaps because the water was not being used for drinking.

By 2017, the Santa Ana Water Board, however, had become concerned that TCE and PC Vapor could migrate and enter the homes of churches and other buildings in the area. Scores of monitoring wells replaced throughout the region. So these are monitoring wells that you can find on the ground if you're looking, and this is one right? My high school, Corona Mar High School is just there in the background, beyond this monitoring well.

SHAWN STEVENSON: Unbelievable.

DR. RAY DORSEY: And multiple wells, the soil gas levels were elevated in some cases, 100 times above screening levels. Among the locations near the wells were homes close to the corner of "La Salud", Spanish for health and "La felicidad", Spanish for happiness. Beginning in 2018, the indoor air of homes in Newport Beach was tested and TCE and PCE were found above screening levels for about a third of the approximately 390 homes sampled. So over a hundred homes in Newport Beach, California with unsafe levels of TC and PC. Elevated con concentrations were found in bedrooms, living rooms, and in kids' playrooms.

In 29 of these homes, vapor intrusion was thought to occur based on property specific evaluations. The remedy offered to remove these cancer causing chemicals in the indoor air people's homes as included both air purifiers, remediation systems. Despite the extensive contamination, many in the community remain unaware of the risk. Katherine Culligan, a lifelong resident of Newport Beach, learned of the pollution by listening to a podcast featuring Ray as a guest. When her hometown was mentioned, her ears perked up while she never lived in the area that was formally occupied by the aerospace company, her friends did. She spent many afternoons and nights there.

She also recalled the whispers of cancer in the community that affected numerous parents of her classmates. It would, "it was known that people in that neighborhood got cancer." Everyone thought it was due to a landfill. But the new nearest one Ray could locate with miles away. Today she sees solutions such as testing, remediation, as accessible. She says that most residents can readily afford $1,000 or $2,000 to remediate their homes, but no one is telling them about breast cancer or Parkinson's. Her fiance, Harrison Aviso echoes Catherine's impressions. He recently asked a friend who grew up in the affected LA neighborhood where there he had heard about the contamination.

He said, oh, yeah. Tons of people talked about it and the soil was tested super often. There are higher levels of chemicals in certain areas, and there were tons of cancer cases in the neighborhood. Harrison says, if this is happening in one of the most beautiful affluent areas, was it mean for other areas?

SHAWN STEVENSON: Yeah. Whew. I just need to take a second. Got a quick break coming up. We'll be right back.

What are the most important nutrients for a healthy brain in great cognitive function? Well, many people are aware that our brains are mostly made of water, but the dry weight of the human brain is mostly made of fats. Now the question is, what kind of fats do our brains really need to make a notable difference? While research published in the American Journal of Clinical Nutrition discovered that increasing dietary levels of Omega-3 DHA, that's do casa

hexa noic acid, DHA, was able to improve both memory and reaction time in healthy test subjects.

Now, just to be clear, if you want a great memory, we have to have DHA. Now what happens when we don't get enough DHA in our diets? Well, another study that was published in the journal, neurology used MRIs and analyzed the brains of study participants. The scientists found that people who ate less than four grams of DHA per day showed the highest rate of a brain shrinkage. While those who were eating at least six grams a day had the healthiest shrink proof brains. Now if you want to keep your brain thick and healthy, you wanna make sure again that you're getting in plenty of DHA. And according to NYU neuroscientist Dr. Lisa Mosconi, the best natural food source of DHA is going to be found in fish row AKA fish.

Eggs have upwards of three times more DHA per gram than the best fish sources. Fish sources are notably high in DHA, but fish eggs or fish row is actually quite higher now. This is one of the big reasons why things like caviar are so expensive and also considered a delicacy, considered to be very valuable. But with the price point and also the quality and the freshness, keeping all of those factors in mind to make sure that we're taking advantage of these benefits that can be found in Fish row.

I recommend the Fish Row from Paleo Valley. It's made from 100% wild caught fish from fish runs in pristine waters, sourced from sustainable minded fishermen, committed to preserving fish runs for future generations. Their wild caught fish row is gently freeze dried to keep the full range of nutrients and omegas intact and undamaged. It also, in addition to the DHA content, it's high in choline, selenium, vitamin E, C, and D, and valuable phospholipids for your brain. It's 100% pure with no binders or fillers, and the coolest part is that you're going to get. 15% off exclusively at Paleovalley.com/model. Go to P-A-L-E-O-V-A-L-L-E y.com/model and get 15% off their incredible wild caught fish row you. You're gonna get 15% off, automatically applied at checkout. So head over there, check them out. Get your DHA needs met at Paleo valley.com/model. Now back to the show.

SHAWN STEVENSON: So number one, this is Insidious.

DR. RAY DORSEY: Yes.

SHAWN STEVENSON: It's not just something that's associated with, I think it's more of a concentrated exposure if we're talking about the dry cleaning industry, but it's been integrated into so many things that have become just a normal part of our lives. And also am I hearing like it its ability to be broken down is very difficult. Would this be in this category of PFAS chemicals by chance?

DR. RAY DORSEY: So it's not like a forever chemical, but it slowly breaks down. It can hang out for years. So this aerospace industry shut down in the eight 1980s or 1990s, and yet in 2018, they're finding unsafe levels 30, 40 years in people's homes. It begs the question, what's been going on for the decades before that, when the concentrations were even higher. And again, it's known to cause cancer. So you know, we know cancer rates in the United States are going for people under 50. It's going up. Diseases have reasons. They don't just happen. They have reasons and the reasons that why people are getting cancer, I think is trichlorethylene. I think one of the reasons that Parkinson's is one of the world's fastest growing brain diseases is trichlorethylene and Perchloroethylene.

SHAWN STEVENSON: Yeah. We're unknowingly stacking conditions against ourselves.

DR. RAY DORSEY: Yes.

SHAWN STEVENSON: And so like as you mentioned, you know, just seeing so many of these newly invented chemical complexes being vehemently stamped as carcinogenic to humans, there's so many of them and they're in so many different things, is very difficult to escape them. And so this work in putting together the Parkinson's plan you are addressing. The biggest culprits. And also, number one, your work is about prevention. Prevention is the most powerful player in this, but also what can we do to slow the progression? And we've got so many signs back, things that you talk about in the book. The Parkinson's 25.

DR. RAY DORSEY: Yes.

SHAWN STEVENSON: For instance. Can you talk a little bit about that? What, what is the Parkinson's 25?

DR. RAY DORSEY: Yeah. So, if chemicals are causing these diseases, then these diseases must be preventable. And so if they're preventable, what can I, as an individual, what can I do to take action to reduce my risk of ever getting Parkinson's disease? And if I already have Parkinson's, if I'm one of the 1.2 million Americans with Parkinson's, what are the things that I can do to possibly slow the rate of Parkinson's? So I always got asked this question, and so my colleague, Dr. Michael Oak and I came up with a Parkinson's 25. 25 actions people can take in their everyday lives to reduce their risk of Parkinson's. And if you already have the disease, possibly slow the progression. And so number one is to wash your produce, even your organic ones.

So it turns out there are, in some cases unsafe residues of pesticides on people's fruit and vegetables and even organic ones can have. Not only can they have residues of pesticides, which begs the question, how are they getting pesticides on them, but can have unsafe levels of them. So I wash all my fruits and vegetables like apples, for example, and water. It turns out the US Department of Agriculture, when they measure the residues of pesticides, do so after holding it underwater for 15 to 20 seconds. So that's what the safety test is. After 15 to 20 seconds, I don't know if anyone's ever held their apple under the faucet for 15 to 20 seconds. I add a little bit of soap because some pesticides are fat soluble and some of these pesticides can get in fat and your brain's covered in fat.

So I get really most concerned about the pesticides that are fat soluble and what role that they're playing. So I wash it with basically soap and water. You can get a vegetable wash. I get it for like $4 at the grocery store. It lasts me six months. Or other people, studies have suggested that vinegar and salt can do it. So I have a big glass bowl. I put my apples that I buy organic where possible, and I put all my produce in a big bowl. I give 'em a bath and I put 'em, you know, out in the bowl to be eaten at a later time. And so that, that's, you know, one easy thing. We had an air purifier here earlier. So many of these chemicals are inhaled.

Trichlorethylene is inhaled, so air purifiers can reduce exposure to particulate matter, can reduce exposure to volatile organic chemicals like trichlorethylene. So that can be done. A water filter on your water, you know, on your faucet at home can reduce exposure to pesticides or other chemicals in your water. And we can talk about golf and exposure to pesticides. I mean, there are scores of things that we can do to decrease our risk of getting exposed to these chemicals in our everyday life and we put them together in the Parkinson's 25. We have a, it's almost like a tearaway thing in the back of book that gives each one of these to be done.

Of course, there's only so much we can do as individuals. We can do other things in our community and if we can get rid of, why are we spraying pesticides on kids' schools and playgrounds ounce, right? I mean, you talked about, you know, why are we putting soda in kids' schools? Why are we spray nerve toxins on playgrounds in schools? You know, there are tons and tons of things that we can do in our community to do this. And then fundamentally, we can ban some of the most toxic chemicals. You know, we got rid of lead and paint and lead and gasoline today. Lead levels in kids. Our kids 95% lower than when we were.

Our kids are smarter today because we got rid of lead and paint and lead and gasoline. We should use some of that intelligence to identify other ways to improve our environment. Improve our health so we never have to get these diseases. I mean, who wants to be a patient, right? Who wants to go to the doctor's office? You know, doctors are nice people, but you know, people have better things to do. Who wants to get health insurance bills? You know, who wants, why are we spending $50 billion a year on caring for people with Parkinson's disease and we spend less than $50 million? There are homes in Los Angeles and in Miami, Florida that are sold for more money than we as a society invest in trying to prevent Parkinson's disease.

SHAWN STEVENSON: My goodness. You know, part of any movement has examples, you know, like things that really stand out to people because so often, like suffering is a solo act. Like you don't usually see what's going on behind closed doors. And so my initial exposure to knowing what Parkinson's was, was, you know, early on, and it was Muhammad Ali. It was Michael J. Fox. And I'm curious because, you know, we attribute certain, you know, this

condition to certain things just unconsciously, you know, and I think in particular with Muhammad Ali, you know, and being a boxer and the head trauma and all these different things. So does that play any part? Can trauma, you know, insults to the brain contribute to this condition as well?

DR. RAY DORSEY: So Dr. Michael Oaken with permission of the, his family was one of the physicians who helped care for Muhammad Ali, and he wrote a paper in which he said that head trauma may have been contributing to it. I also wonder about, you know, he grew up in Louisville, Kentucky, and I in, in agriculture area, my understanding, and so I worry, you know, was he exposed to pesticides, inhaling pesticides? And it turns out that a head trauma increases your risk of Parkinson's. Not surprisingly, certain pesticides increase your risk of Parkinson's. And the interaction amplifies the risk. Right? So you've talked a lot, you've talked about this about the impact of mixtures and of chemicals coming together.

And so you're not just exposed to one chemical or one toxin. You're often exposed to many, whether it's air pollution, whether that's cigarettes smoke, whether that's pesticides, if you're a farmer. And it's likely that sometimes the interaction among these environmental factors could be amplifying the risk and explain why some people exposed to these chemicals developed disease and why some people expose these chemicals don't.

SHAWN STEVENSON: Yeah, and his daughter, Layla Ali is really good friend. She's been on the show a couple of times, but really, really good friend. And just seeing this progression of her father or regression with this disease over time is heartbreaking. And that's another thing that you mentioned. Nobody wants to deal with a disease, but specifically we don't wanna suffer. And this is one of those things that we are suffering needlessly. It's a manmade condition, and there are things that we can do to help defend our bodies against this. And we need to do this stuff right now. And so I want to ask you about some more of these in the Parkinson's 25 if we can. Is that okay?

DR. RAY DORSEY: Yeah. Yeah. Absolutely.

SHAWN STEVENSON: All right. One of, one of the other ones, well, since we already mentioned dry cleaning, one of them is dry clean cautiously. What do you mean by that?

DR. RAY DORSEY: Yeah. Do you know why we dry clean clothes?

SHAWN STEVENSON: Please tell me.

DR. RAY DORSEY: So we dry clean clothes so they don't shrink.

SHAWN STEVENSON: Of course. Yeah.

DR. RAY DORSEY: So the price of dry cleaning should not be Parkinson's disease.

SHAWN STEVENSON: Mm. Right.

DR. RAY DORSEY: It shouldn't be cancer. So there are green dry cleaners and California has banned perchloroethylene. The trichlorethylene with the one additional chlorine atom. I think they're facing it out or it's already been eliminated. But other places and the, in 2024, the United States government banned perchloroethylene with a phase out over 10 years, hopefully that ban is gonna be put into place, but still, 60% I think of dry cleaners in the United States still use perchloroethylene. And so, I find a green dry cleaner. So when I dry clean clothes, fortunately for men, most shorts are la they're washed in water. But so if you, if you're gonna dry, clean, use a green dry cleaner and you can find green dry cleaners. And if you can't get a green dry cleaner, take your clothes and air 'em out before you bring 'em into the home.

So it turns out when you take the dry cleaning from the store into your car, on your way home, you're breathing in the chemical. When you put it into your closet at home, it's now inside your home and you're breathing it in your home. So take off the bag, air it out before you bring it into the home so that when it's, it does its offgassing before it enters your.

SHAWN STEVENSON: How about before you get into the car?

DR. RAY DORSEY: Yeah, you can do it to the car too.

SHAWN STEVENSON: Or if you can again look for green, dry cleaner.

DR. RAY DORSEY: Green cleaner. And that's why I just recently moved to New York City and I spent a couple days finding a green day.

SHAWN STEVENSON: Yeah, I did the same here. So the, the dry cleaning that I have done, you know, is a green dry cleaner. And again, it's becoming more prevalent because of this information and people like yourself and, and especially you really leading the charge on this mess.

DR. RAY DORSEY: So the, you know, I say I'm sometimes the PR agent for Dr. Caroline Tanner. So Caroline Tanner is a Parkinson's disease expert who got a PhD in epidemiology from Berkeley 'cause she was a Parkinson's specialist. And she was concerned about these environmental causes and she wanted to go at 'em rigorously. So after doing all her neurology training, after being a neurologist, she went back to get a PhD. I mean, who does that? And so she has quietly, politely, she's this, you know, in my mind she's like five foot eight. She's a giant. But when you meet her, she's like five feet tall. And you know, this most unassuming person has quietly told us for 40 years what the environmental causes of Parkinson's disease are. If we paid attention to her work. We could live in a world where Parkinson's is increasingly rare.

SHAWN STEVENSON: That's so powerful, so powerful. Another one is don't poison yourself. It sounds pretty obvious, but again, I don't think we really think about this. And you talk about various insecticides, pesticides, flee collars, ant sprays and all this stuff in particular.

DR. RAY DORSEY: Sure. So number 11 is don't poison yourself. Sometimes the remedy is worse than the disease. Insects including fleas, ants, and moss can be unwanted guests. Unfortunately, some common pesticides can increase the risk of Parkinson's. For example, the pesticide permethrin found in flea collars, ant sprays, moth balls, and outdoor apparel can reduce dopamine producing nerve cells and laboratory animals consider safer alternatives,

and if necessary, minimize exposure by wearing a mask, increasing ventilation, and avoid spraying near children.

So, I, when I, wrote our first book ending Parkinson's Disease, I didn't know about these causes of Parkinson's disease. I had heard vaguely about pesticides, but that was about it. So the more research that I did, the more I thought about it. And so I went into our garage when we used to live in Rochester, New York, and I found pesticides linked to Parkinson's disease in my garage. Yeah, and so here I'm a Parkinson's specialist trying to get people to prevent Parkinson's disease. Yet I've been an unknowing consumer of chemicals that are linked to the disease.

SHAWN STEVENSON: Yeah, when I was reading, that was the first time I ever associated a flea collar with these chemicals. Like I just thought it was magic. You know, when I was a kid, put the little flea collar on Smokey and you know, it's just, it is what it is. I didn't think about the chemical complex and the off-gassing of that particular device to be able to do what it says it's supposed to do.

DR. RAY DORSEY: Yeah. And you know, people are spraying in their lawns, they're spraying it on golf courses, they're spraying it everywhere.

SHAWN STEVENSON: You mentioned golf courses. So let's talk about, this is another one, mind your greens. So I was like, oh, is he about to talk about spinach? But you were talking about the golf course.

DR. RAY DORSEY: So, my colleague, Dr. Brittany Kowski, who's a geographer, so she maps things, and her colleagues came out with a study last two weeks. Showing that people who live near a golf course within a mile of a golf course in Rochester, Minnesota have 124% increased risk of developing Parkinson's. Living with when one mile of a golf course in Rochester, Minnesota is associated with 124% increased risk of Parkinson's disease. And why is that? And so it's likely, certain pesticides because pesticides are sprayed on golf courses. I think one study suggested that pesticides per acre are sprayed with 80 times as much pesticides as agricultural areas are. And some of these pesticides, including a pesticide called

chlorpyrifos, which used to be found on over half of apple's in the United States. So if you've had an apple in the United States, you've likely eaten this pesticide, which damages dopamine producing nerve cells.

And it's been associated with Parkinson's and studies widely used on golf courses. So I think people who are living near golf courses, the reasons that they might be at higher risk is they're getting exposed to. These chemicals, it's almost like secondhand smoke. You know, they're not smoking, they're not applying the pesticides, they're just innocent bystanders. And you know what led to us banning cigarettes, you know, in restaurants and in airplanes and including here, beginning in California, was people said, if people wanna smoke, that's their business. But you know, I don't want to be at the bar or in the airplane breathing the toxic chemicals. That are from somebody else, and so I think this is a great example.

There's one study done by Dr. Beit and Kimberly Paul here in Los Angeles that showed people who simply live near where a certain weed killer called Paraquat is sprayed, have a doubling of their risk of Parkinson's disease. Simply living near where a weed killer is sprayed, doubles your risk of a Parkinson's disease. And so I think we can, there are organic golf courses, so why can't we create more organic golf courses? Why can't we ask golf courses to reduce their pesticide use by 50%? Why can't we ask them to use safer alternatives? Some of these pesticides that are being used are from the 1950s and 1960s. You drive in a car and you fly in an airplane. You don't drive in a car from the 1950s or when step in an airplane from the 1960s. If engineers can come up with safer modes of transportation, chemists can certainly come up with safer pesticides.

SHAWN STEVENSON: Yeah. Yeah. We just don't think about it. We see those beautiful greens out there. We don't think about all the careful manicuring and all the stuff that's used from the weed killers to the insecticides and you know, all this stuff. It comes at a cost, you know? So just being mindful of that.

DR. RAY DORSEY: And that's what Rachel Carson wrote about in Silent Spring in 1962. Pesticides like DDT played a role in preventing people from getting malaria. But she was saying warning about the indiscriminate use of pesticides. Think about pesticides on school

playgrounds. Really? To what end? And so she was worried about the effect on the environment and on birds. So you that your spring, instead of hearing birds chirp, you would have a silent spring.

She told us in 1962, she warned us that new diseases would appear in farming communities that would puzzle the doctors in the cities. She was even predicting like diseases like Parkinson's would become increasingly common. We listened to Rachel Carson in 1962. We could prevent lots of people from getting intellectual dis disabilities from getting ALS, from getting Parkinson's disease, from getting cancer.

SHAWN STEVENSON: This is cracking the door open a little bit on the monetization of diseases because information's been out there for quite some time.

DR. RAY DORSEY: Yeah. Yeah, I think you get to some uncomfortable conclusions. You know. I've been trained at, you know, reasonably good in institutions. I'm a reasonably bright guy. How come I didn't know about this for the vast majority of my academic career? How come I, I wasn't taught, and I think in one of the problems in American medicine, listen, it does fantastic things, but we go from disease to treatment. Disease to treatment. You know, someone's depressed antidepressants, someone's anxious, anti-anxiety medications, someone Parkinson's, treat 'em with medications to treat it.

But we need to ask why. So if you go from disease to y disease to, cause you can one identify the underly underlying cause. Once you identify the underlying cause, it's a lot easier to figure out what the appropriate treatment is for it. You can figure out how to slow the progression and then most powerfully you can prevent the disease. So instead of going from, you know, type two diabetes to a medication, why don't we say what's causing the type two diabetes address that like, you know, you've written about and talked about with hundreds of guests on your show. And I think if you find out what the underlying cause of these neurological conditions, why are brain diseases the leading source of disability in the world, more than heart disease, more than cancer, more than infectious diseases?

Why are diseases increasingly common? I think you find out that for many of them, they have their roots, not so much in our genes. The genetic contributions to Parkinsons are modest to genetic Contributions to a LS are modest. The even the genetic contributions to Alzheimer's disease is in the moderate range. Most of these diseases have their roots in our environment. If we clean up our environment, we make it so that people can live into their sixties, seventies, eighties, and nineties without giving Alzheimer's disease or Parkinson's. These diseases are not natural consequences of the agings. They're unnatural consequences of aging.

You know, none of our early presidents, Benjamin Franklin, George Washington, and John Adams, age 90, Thomas Jefferson at 83, did not have Alzheimer's disease, did not have. Parkinson's disease. You know, Dr. Parkinson in 1817 saying, this has not been classified in the medical literature, it's not been around, and that's just 200 years ago. If we clean up our food, water, and air, we create a world where these diseases are increasingly rare, and instead increasing common. We save people lots, society, lots of money, and we save lots of people suffering. A lot of suffering. That's been silent.

SHAWN STEVENSON: How dare you bring so much logic today. I mean, I mean, come on. You know, you mentioned Chlor, chlorpyrifos or Chlorpyrifos.

DR. RAY DORSEY: Chlorpyrifos, but you know.

SHAWN STEVENSON: Either way. Anyway. Tomato, tomato, but chlorpyrifos is one of those that's been caught up in red tape for years. Years, you know, and we've got. Multiple studies affirming birth defects, you know, in particular for workers who are exposed to it. We've got data on it being disruptive to microbial genes and not just our genes, but the genes of our microbes. And it's just kind of, you know, rampant use in particular with some commodity cash crops. Things like coffee, you know, you mentioned coffee earlier and being decaffeinated with another chemical. And then we got these chemicals using growth of it, and people are just drinking a piping hot cup of chemicals. And they're just trying to, you know, have some coffee and they don't, they're just not aware that this is happening.

DR. RAY DORSEY: Can I tell you a Chlorpyrifos story?

SHAWN STEVENSON: Go for it.

DR. RAY DORSEY: So, Chlorpyrifos was used to be used to kill insects, cockroaches in homes in New York City, and this great scientist, Dr. Virginia Row at Columbia University. She looked at women who were in those households and the outcomes of their children. So one, she found chlorpyrifos in the umbilical cord blood. Of the children and then she followed these children forward. And the higher the level of chlorpyrifos in the umbilical cord blood, the lower the IQ at three, five, and seven.

So we're wondering what's fueling the rise of in intellectual disabilities? What's fueling the rise of autism? Why do one in 36 children have autism today? I think there are chemicals in our food, water, and air that are fueling the rise of these diseases. You know, we're almost substituting the effects of lead. You know, we got the lead out and we got people's lead levels. 95% lower. What a great accomplishment. 95% lower if kids are smarter, and then we're exposing 'em to other nerve toxins in the form of pesticides. If we stop this, our kids are smarter. There's less autism, there's less intellectual disabilities. There's less expenditures, there's LT suffering. You know, suffering may be part of the human condition, but needless, preventable suffering should not be.

SHAWN STEVENSON: Yes, yes. Since I mentioned coffee, one of the Parkinson's 25 is to have a cup of caffeinated coffee. You specifically said caffeinated coffee. Talk about that one.

DR. RAY DORSEY: Yeah, so this is your, for your coffee drinkers. It turns out that caffeine may be protective of nerve cells. And that appears that it's the caffeine, not the coffee. So there have been studies that have associated caffeine consumption with a reduced risk of Parkinson's. So if you already drink your caffeinated coffee, this is a reason to continue. Now, caffeine has some other side effects. I'm a neurologist. It can cause headaches, it can cause anxiety. So if you're enjoying your cup of caffeinated coffee, you can continue to do so.

SHAWN STEVENSON: All right. Some people are like, yay. I knew it.

Another one of these that I wanted to ask you about was sleep well.

DR. RAY DORSEY: Well, you know far more about this than I do. Your book is outstanding on the topic. And as you point out, a University of Rochester, a neuroscientist, Megan Beauregard, has demonstrated that sleep is a key point in time when we flush out toxins through something called the glymphatic system. I was listening to some of your podcasts on the subject, last night. And so that, sleep, I think 10 times more active, as you pointed out at night than it is during the daytime. So sleep's a great time to clear out toxins. So if you're working or you're getting exposed to these toxins, it might even be more important. And you know, you, you know this topic far more than I do, but you know, eight to nine hours of sleep can do wonders for clearing out toxins from your brain.

SHAWN STEVENSON: I love it. I love it. And of course, there isn't any aspect of your health that isn't gonna be impacted by prioritizing good sleep. Yeah. But this is another reason, just another check mark for us to make this something that is important.

DR. RAY DORSEY: And it gives you an explanation for why. So I think, you know. Our grandparents and our grandmas, you know, you need to sleep. Well, they didn't know necessarily why, but now we have the mechanism by which their advice is proved to be true.

SHAWN STEVENSON: Yeah, so again, we think about all of these like active things that we need to do. But sometimes we need to be inactive. You know, to slow down, let the body do what it knows how to do, already get out of the way and it's sleep. That there's this powerful mechanism of detoxification that takes place and we are living in an increasingly toxic environment. And so it's like a superpower. It's our, it's our ability to jack into our own charging station and clear out a lot of this waste. Give our body the chance. Give it a fighting chance to do this work.

DR. RAY DORSEY: Exactly.

SHAWN STEVENSON: Another one of these was exercise and this one in particular, again, there's a lot of new information coming out on the importance of exercise. Humans have

been moving forever. We just kind of stopped. But why in particular, what's the connection with exercise and Parkinson's?

DR. RAY DORSEY: So in the 1890s, the when the top neurologists with Sir William Gowers, and he wrote the Bible of Neurology and he said, for people with Parkinson's disease, the treatment should be a life of quiet rest. He was wrong. So, one of the great advances this century is that the benefits of exercise for people with Parkinson's disease. So numerous studies have suggested that vigorous exercise, the Cleveland to like three and a half to four hours a week cannot only reduce your risk of ever getting the disease, but can be immensely beneficial.

Exercise for people with Parkinson's disease or just in general releases, growth factors in the brain, brain derived growth factors that protect the remaining nerve cells that might be damaged in Parkinson's disease. But this exercise thing is just unbelievable in terms of its benefits. There was a study last week in Newman Journal Medicine that looked at people with colon cancer. So they looked at people who had colon cancer, who had already had surgery. And already had chemotherapy. Their average age was 60. They randomized 'em to give an a, a educational brochure on the benefits of exercise or an exercise training program where they met once a week with a trainer for an exercise program for three years, and then followed 'em out for an average of eight years.

They found that the risk of cancer recurrence among those in the intervention group was 27% lower. The risk of dying in eight years was 37% lower. The risk of death was 37% lower. If you treated 14 people with colon cancer with the exercise treatment, you prevented one death. The intervention group, they only exercise on average three hours extra per week, three hours of brisk walking, extra per week, and you reduce the risk of cancer recurrence, and they reduce the risk of death. If this is happening in 60 year olds with who already had colon cancer and have already had surgery, and have already had chemotherapy, what does it mean for Parkinson's disease? What does it mean for health in general? I just think that the evidence is increasingly clear. Dr. Peter Atia says that for neurodegenerative diseases, the first and most effective intervention is exercise full stop.

You know, the benefits are hard to be understated. And you said something also in one of your things about sunlight, and I tell my kids, and again, I'm not an expert in this, but I tell my kids three things. One, they should be outside. Two, they should be with their friends, they should be social. And three, they should be physically active. If you're outside, physically active and social, you guys have an enormous health benefits.

SHAWN STEVENSON: Yeah, I love that. And these are epigenetic influences. And now we, again, we're existing in this glorified snow globe that's just riddled with newly invented chemicals that are influencing our genes as well. We can proactively influence them in a, in a positive way.

DR. RAY DORSEY: Yes. And we can clear these chemicals up. We got rid of CFCs, we've gotten rid of lead, we've gotten rid of DDT. We've done this time and time again. We need to do the same thing. Our generation right now needs to do rise up, make their voices heard and say, we don't need pesticides on our kids' playgrounds. Thank you very much. We don't need pesticides on our kids' schools. We don't need it on our sports fields. We think golf courses can have 50% less pesticides. We can use safer alternatives instead of subsidizing crop production with pesticides. Why don't we subsidize? If we're gonna subsidize crops, why don't we subsidize crops without pesticide use? I mean, there are tons and tons of things that we can be doing. $15 billion a year of our taxpayer money is going to subsidize the production of crops using pesticides. Only 1% goes to subsidizing production of crops that are organic. Shouldn't it be the other way around if we're gonna subsidize anything?

SHAWN STEVENSON: Damn logic. So what can people expect when they pick up a copy of the Parkinson's plan?

DR. RAY DORSEY: We give you constructive solutions. So we paint out. The first half is painting out the problem. What are the chemicals in our food? First chapter one, water chapter two, indoor air chapter three, and outdoor air chapter four, that are fueling the rise of Parkinson's disease. And then we talk about how we need to learn why diseases start. So if we learn why diseases start, we can prevent them from happening and more effectively treat

them. We need to amplify the voices of those affected. The silence around the suffering needs to end.

We need to amplify the voices of Michael J. Fox. We need to amplify the voices of the Ali family. We need to amplify the voices of Davis Finney, of Brian Grant, and 1.2 million Americans with the disease, and we need to navigate the frontiers of new treatments. And in chapter 10, we give you a plan. We give you 20 steps that we as individuals in our communities and as societies can take to prevent and treat Parkinson's disease. And we have three goals. I'll give you an example. In 2013, AIDS came up with three goals to change the course of HIV. And those goals were 90, 90 and 90. They said that by 2020, 90% of HIV should be diagnosed. 95% of individuals who are diagnosed with HIV should be treated, and 90% of those who are treated should have the viral.

The virus levels suppress in their bloodstream. And that way you can prevent part, prevent. HIV. The incidence of HIV today is at its lowest level since 1990. You know, we're in Los Angeles. Magic Johnson, courageous man, shared his story with HIV. Everyone thought he was gonna die, but we changed the course of it. HIV is preventable with a condom 'cause we figured out what the cause of the disease is. So in our book we give you 0, 10, 100. We say that in 10 years, when we come back and speak in 2035, that a hundred percent of people with Parkinson's will be able to have access to the most effective medication levodopa, safe and expensive, highly effective.

If we can give 90% of people with HIV access to expensive, complex medications, why can't we give a hundred percent of people with Parkinson's access by 2035, we will increase research funding tenfold for Parkinson's, and we will in increase the proportion focus on preventing the disease, tenfold. Right now, out of every Parkinson's research dollar, only two pennies, 2 cents goes to preventing the disease. If we take that from two pennies to two dimes, we will change the course of this disease and finally, zero. By 2035, the rise of Parkinson's, the global increase in the incidence of Parkinson's will be 0%. That adjusted for age, we will flatten the rise of Parkinson's disease. So in 2036, we start talking about the fall of Parkinson's disease.

And I can't think of a greater gift that you know, you know, when you're focused on health, I'm focused on health. I'm passionate about Parkinson's disease. What a great gift of future generations in the world where Parkinson's is increasingly rare instead of increasingly common. Where that, you know, maybe when Dr. James Parkinson's discusses the thing in 2117 300 years later, that again, is a rare condition and it's only in the textbook. It's only classified in the medical literature and it's absent from the world.

SHAWN STEVENSON: This has been phenomenal. I'm so grateful for this conversation. What's the best place for people to pick up a copy?

DR. RAY DORSEY: So they can go, they can get on Amazon, they can get at their favorite books store, or you can just go to our website, pdplan.org. Michael and I are gonna devote the vast majority of our proceeds from selling this book to efforts to prevent and treat Parkinson's Disease.

SHAWN STEVENSON: Thank you for doing this work. Truly, it it, I mean, it's, it just helps me. I feel more at peace knowing that there are people like you who are focused on this specific topic and shining such a bright light and paving a way for a better future is just powerful. So I, I really do appreciate it.

DR. RAY DORSEY: Thank you very much for having me.

SHAWN STEVENSON: Amazing. The one and only Dr. Ray Dorsey. Thank you so much for sharing your time with me today. This is such an important conversation and one that we need to spread far and wide. We need to get this information out there, and truly it is of the utmost importance. As mentioned, when I started this episode, the number of people with Parkinson's disease more than doubled from 1990 to 2015 and could double again by 2040. We've got to break this cycle and education is a huge part of this. So please share this out far and wide. Share it on social media and tag Dr. Ray Dorsey as well, and share your voice. Share your heart, and of course you can send this directly. From the podcast app that you're listening on, but just engage, share this.

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