Telomere Biology and it's application to Environmental Toxins and Chronic Inflammatory Disorders

Dr. Joseph M. Raffaele, M.D.
Gordon Crozier, DO

Dr. Joseph M. Raffaele, M.D.
Hello, this is Dr. Joseph Raffaele. I'm the host of the Telomere Summit, and I'm happy to have on the show today for this episode Dr. Gordon Crozier. Welcome to the show, Dr. Crozier.

Gordon Crozier, DO
Thank you very much. It's great to be here!

Dr. Joseph M. Raffaele, M.D.
I'm just gonna tell you a little bit about Dr. Crozier. He's quite an accomplished physician. He is an in-demand speaker and lecturer and best-selling author. He's recognized as a leader in both the research and application of integrative medicine, and a pioneer in the field of genetics-based medicine. After graduating from Des Moines University and College of Osteopathic Medicine and Surgery in 1994, with a degree, with a Doctor of Osteopathy, he completed his internship and residency in Obstetrics and Gynecology at the Michigan State University Garden City Hospital campus. Dr. Crozier went on from there to practice in the areas of hormone replacement and women's health. A board certified physician in the state of Florida, Dr. Crozier is the medical director of Crozier Clinic in Orlando, where he is also a practicing physician. Dr. Crozier founded Crozier Clinic in 2014, and the business quickly became one of the fastest of its kind in the U.S. Dr. Crozier combines his life experience with his formal education to help patients from around the world. In addition to his private practice in Orlando, Florida, he accepts patients remotely and travels around the world giving lectures on the power of natural treatments and genetic-based medicine and integrative medicine. He's appeared and been featured on multiple national television and radio programs, and Dr. Crozier holds fellowships in anti-aging regenerative medicine and stem cell therapies. He's also

embarked upon a PhD in Toxicology and has submitted his thesis. So he's been a very busy man, and I'm looking forward very much to picking your brain about some of these areas.

Gordon Crozier, DO
Well, thank you. Yeah, it's great. It's awesome to be here.

Dr. Joseph M. Raffaele, M.D.
So, I know that we have certain areas of overlap in our practice, but there's quite a few that I don't have much knowledge about, so I'm really looking forward to hearing about some of that. But, to start, why don't we talk a little bit about how you got introduced to telomere biology, and how you utilize it in optimizing telomere length in your practice.

Gordon Crozier, DO
Well, I originally got into telomere medicine through my anti-aging portion of my practice, because I had to take some of the pressure off from all the chronically ill people that I see all the time, because it has a lot of stress, and it really does a lot to the individual physician. So, what happened was I got into the anti-aging aspects, and I kind of began to realize about telomeres and the aging process. After that, I realized, no! Everybody needs this! Because, it's so multi-faceted in the things that it controls. And, you know, people are always trying to optimize their human microbiome. Well, you know what? It comes about that actually, telomeres actually play a role in your human microbiome process. So, actually, what comes first? Do you need the proper human microbiome? Or do you need the telomeres? Well, it comes about that actually, telomeres actually help control the human microbiome by eliminating the bad, the SIBO, the small intestinal bacterial overgrowth, the bad bacteria that are overgrowing, and it allows the good bacteria to continue to grow. So, you know, what it does, and I've been involved with genes for a long time, and genetic expression, and people don't understand that genetic expression. But, the telomeres, because of where they are, the end caps of those chromosomes, that actually is going to have a large effect on your expression for your genes. And so, because of those multi-faceted things, I began to realize, it's for everyone. For everyone. So, that's why I really got so much into it, and began to study more, and began to give more applications, and I began to see changes in the patient population, and how well they actually did with this product.

Dr. Joseph M. Raffaele, M.D.
That's really interesting. I see that in my practice as well. Do you have any specific instances where you've seen changes when someone's...? What do you use to get started on optimizing telomeres? And do you do telomere length measurements in your practice?

Gordon Crozier, DO
Yes, yes, we do. We do telomere length analysis, but I also look very... because I have a lot of people with immune problems and immune deficiency, so I always look at their T cells. I look at their CD4 CD8 cells. I look at that aspect to see really kind of how they're responding to their supplementation in lengthening their telomeres. Because I begin to see that they're, even just their plain white blood cell, most of my people have below the normal range, even the normal range what we consider, not just below five, because below five, there's lots of studies say that there's probably incidents of toxins affecting your white blood cells pushing it down. Well, when you begin to give things that are gonna optimize your telomeres, you begin to see the white blood cell come out to a normal range. Then you look at your CD4 CD8, those different cells, and you begin to see that the T cells are optimized to be able to have a good immune system. When they begin to have that, you begin to see, and the other thing I do test is a lot of toxins, a lot of toxicology, and so I begin to see that as they are optimized, their environmental toxins, that toxicology report becomes more normalized.

So, it's multi-faceted. You know, everything kind of works together in our human body, and you have to really optimize in multiple ways our human bodies to begin to control different things. So, we know that your telomeres really affect your genetics. So, you know, back in 1999, the first article said telomere length had nothing to do with optimizing your genetic expression. Well then, in 2014, came out with an article that stated differently. 2016, another article. Recently, well, not real recently, but 2018, they came out with another article, and that article actually really said, and I can quote it right here. It says, "We recently described a phenomenon where genes are regulated by the telomere length. They are dependent on telomere loop dependence." So, we know that the length of the telomeres are actually controlling our genes. So, genes, mostly are in a turned off state.

We don't want them to be turned on because you can turn on genes associated with diabetes, genes associated with chronic illnesses, autoimmune diseases, and I have a lot of those in my practice. But also, genes affecting your inflammatory response. So, telomere length actually helps control your inflammatory response to things, and that's what I see a lot in my practice, because I see people with really high CRPs, people with high homocysteines, people with high TGF beta-1's, MMP9's, all these high inflammatory markers in their body. And you can actually see that the interleukin aspects become more controlled so that the pro-inflammatory markers come down and they have a better stasis, and a better homeostasis, so that they can actually become better people. I'm not saying that we can cure anybody, but they can live a better life, even with their autoimmune disease when they're optimized correctly.

Dr. Joseph M. Raffaele, M.D.
Yeah, I mean, that is something that has been well-described. I think a lot of people, and I myself, when I first got introduced, or reintroduced, I guess, to telomere biology in the early 2000's. You know, we learned about it in medical school, but then we didn't really think much about it, because there was no way to measure it, and there were no therapies for it. And then, of course, there was this explosion of information and publications about it. But, people think that telomeres are only important to the extent that they're a molecular clock for telling how many times a cell can divide before it becomes senescent. But there is that whole phenomenon that was, as you said, more recently described, called telomere position effect, where the degree to which it loops back onto the sub-telomeric region can control genes up to, you know, 10 mega base pairs away... ...from the end of the chromosome.

Gordon Crozier, DO
Yeah.

Dr. Joseph M. Raffaele, M.D.
So, if you just get a slight shortening, that's gonna change gene expression. It doesn't have to be down to the critically low level, and I think other people like Michael Fossel, who has written a lot about telomere biology, has talked about the fact that you want to maintain optimal telomere length for you, which is sort of what you were when you were 25 or something like that, for your gene expression to stay the same. So, you brought up the CD4-CD8 ratio. Do you see that it's inverted or less than 1 in your patients that come in? And, do you see it shifting back into the more youthful or healthy range after therapy?

Gordon Crozier, DO
Yes, I do. And it's amazing because a lot of my patients... If you look at a CIRS patient, chronic inflammatory response syndrome, people that are sick with mold illness or sick with Lyme, or whatever, you look at those factors, and you notice that they are critical. And, as you begin to lengthen their telomeres, you can see that reversed to a youthful age, and suddenly, they're not getting sick all the time. Suddenly, they're better, they're well. And, I don't know, but I'm kind of starting to look into more of a psychological influence of telomeres as well, because they become more alert, they feel well, they have a better outlook on life. And, I know a lot of it's because your immune system does drive a lot of these things. So, when your immune system is suppressed, you're sick all the time. You don't feel well. But, when they begin to feel well, they have a better outlook on life, and that has some psychological influence, because we're one entire person. Our psychological influences affects our health, and our health affects our psychological influences. So, that's what some of my papers recently have been on, on how they're inter-related, and how they work together. But, I'm kind of interested in the aspects of

psychological diseases and the telomeres. So, that's another aspect that I'm kind of moving into, and researching more, and I think that we need to have more research science in that basis as well, because I really believe it's an important aspect.

Dr. Joseph M. Raffaele, M.D.
Yeah, I agree with that. There is a growing body of evidence. Elissa Eppel, who has worked with Elizabeth Blackburn, has published a series of studies showing that there is faster attrition of telomeres with chronic stress. I'm not sure that I'm aware that they've published anything looking at what happens when you have stress reduction. But, one would think that potentially you could get at least a slowing of the attrition, if not some potentially, some lengthening. Cortisol, which is sort of the stress hormone. Chronic elevations of it is a known telomerase inhibitor, and telomerase is of course the enzyme that makes telomeres longer, that's suppressed at birth. In your work, have you seen, in some of the papers that you've been working on, seen changes directly? Are you directly measuring toxins and T cells, or as I mentioned earlier, any telomere length measurements?

Gordon Crozier, DO
Yeah, so... I probably have quite a few patients now that I've actually been comparing their toxicology report, their environmental toxins, along with their T cell functioning, and comparing it against their telomere length. So, it's kind of something... You know what, I like science to back up what I'm doing, because if somebody's gonna come at me, I can actually prove the science there. So, I like science to back me up on what's happening. And, what I'm seeing is that as their T cell functioning becomes correct, actually their environmental toxins come down. And, I think part of that is as your immune system functions normally, and as your T cells come up, we know that the T cells are gonna expect, you know, affect the inflammatory genetics of our body. So, then you begin to...the inflammation comes down, and your genetic expression for detox pathways begin to correct themselves, and that all becomes corrected. It's not an overnight process, I have to say.

And, it usually is taking three months, depending on where they're at, and how much environmental toxins they actually have in their body. People with four or five environmental toxins don't have that much, and it can reverse very quickly. But, people with high amounts of environmental toxins, say they have 15 different environmental toxins, they take a longer time, but it can be reversed. And I've actually had my first one now that was actually... because I've only tested one person that has been negative for glyphosates, and out of all the thousands of people I've tested, I've only had one. And, that person actually had a telomere length of a 16-year-old. So, I was like, "Oh my goodness! Here you are, almost 40, and you have a telomere

length of like you're 16, and you're the only one I've tested that doesn't have glyphosates in their body." And we're actually...it's quite interesting. So, I think looking at that is important.

Dr. Joseph M. Raffaele, M.D.
Which telomere length measurement company did you use for that?

Gordon Crozier, DO
I used one out of Spain, but I've used several of them.

Dr. Joseph M. Raffaele, M.D.
Yeah, so you mentioned CIRS, and just for our listeners and for me, since I'm not that versed in it, can you just tell us a little bit basically about what CIRS is, and how you approach it?

Gordon Crozier, DO
Yeah, so CIRS is chronic inflammatory response syndrome. So, that response syndrome affects every single cell in the body, it affects the mitochondria. And these people have no energy, usually, when they come in. They have mental fog. They have all types of chronic diseases, probably a plethora of them. And they've already been diagnosed with multiple ones from other physicians. And they've gone everywhere. So, chronic inflammatory response syndrome can be caused by environmental toxins. So, usually, it's by mycotoxins, the gasses put off by molds. But, it can be by parasites, by spirochetes such as Lyme. And there's over 30 species of Lyme, so it doesn't necessarily have to just be Borrelia burgdorferi, but it can be one of the other ones. And, so all those things affect inflammatory markers. Those inflammatory markers actually will be elevated, such as C3A, C4A, TGF-beta. I look at all those numbers. When those numbers become normalized, the people gradually get well. But, what I've found is that actually introducing optimization of telomeres... So, if you give a product to optimize their telomeres, they actually, these numbers, these inflammatory markers, come down much quicker than they do in the regular patient, compared to somebody that's just doing traditional things: a lot of antioxidants and other things to try to get them better. That works partly, and it's great, but it doesn't work in total. So that's why I've introduced a lot of TA65 for these people. Most of them only tolerate a small amount to begin with, so I have to give them smaller amounts to begin with, and then gradually, as they get used to it, build them up on the amount of TA65 that they can tolerate. They're hypersensitive to everything with chronical inflammatory response syndrome.

Dr. Joseph M. Raffaele, M.D.
So, when you say they're not as tolerant, what kind of symptoms do they have when they start taking it that makes you have to use a lower dose?

Gordon Crozier, DO
Well, they'll have increased aches and pains. Some of them will have nausea. Some of them have diarrhea, some of them they have headaches. Some will have increasing mental fog, decreasing clarity. So, they can have a lot of those different things. So, what's interesting, as they begin to tolerate it, I'll tell them, "Listen, you know. These come in these caps. So, take the 100 and get a veggie cap, and take half of it."

Dr. Joseph M. Raffaele, M.D.
They're really only 50 milligrams. Wow, that's interesting.

Gordon Crozier, DO
A lot of them can only start at 50. So, they can start at that. But then you have to slowly increase them. So, I just slowly increase them up to what they can tolerate. I think 250 units is the optimal. Myself, I take 500, but...

Dr. Joseph M. Raffaele, M.D.
You don't have CIRS, so... You know, in my practice, I deal with a largely, relatively well population just trying to slow down their aging process, and it's fascinating to me, because I don't typically see that kind of sensitivity to it. I start patients on 250, and some of them feel a little bit more energy, or they feel maybe a little activated at times, in terms of just, might keep them awake at night. But, nothing like the gastrointestinal or the aches or anything like that. So, what do you think is happening? Do you think that you're having... We've shown that TA65 does reduce senescent T cell burden, that's causing them to go into apoptosis. Maybe there's some cytokines being released. I mean, I'm just curious about... You said it takes about three months to see that first effect of TA65, a little bit longer probably for telomere length to be actually lengthened.

Gordon Crozier, DO
Right.

Dr. Joseph M. Raffaele, M.D.
You're seeing this kind of, almost a Herxheimer reaction, which it sounds like you're talking about, from just TA65!

Gordon Crozier, DO
Yes! And, I do think that has a lot to do with cytokine release, and I do think it has a lot to do with decreasing the senescent cells. Because those senescent cells, it's so critical to get rid of

those senescent cells in our chronically ill patients. The senescent cells are what is keeping them ill, and it affects all the cells around them. We know that. We already know all the studies on that. So, decreasing that senescent cell load in those chronically ill people has to be done kind of on a gradual basis. And, we even notice that even with doing IB protocols. You know, we had to kind of decrease the things that were killing off the senescent cells. Like, if you use FOXO4 or NAD, you know, whatever it is, you have to be very careful on killing off those senescent cells. So, that's been kind of my theory, in how and why that's been going on. But it's my theory, but we know that that does; the apoptosis associated with TA65 does exist.

Dr. Joseph M. Raffaele, M.D.
Very interesting. So, what are some of the other... I mean, CIRS seems to have somewhat of an overlap with something like chronic fatigue syndrome. Are there specific criteria in terms of clinical symptoms or laboratory tests such as c-reactive protein that would give somebody the diagnosis of CIRS versus chronic fatigue syndrome?

Gordon Crozier, DO
Yeah, actually it's an ICD-10. To actually really have a true ICD-10 of CIRS, you have to have at least three markers. I prefer five markers that are abnormal, such as your C3A, C4A, TGF-beta, your MMP9... CRP, homocysteine, ACTH, MSH... So I look at all those markers, and if they have three to five of those markers, then I qualify them as CIRS patients. So, some of my fibromyalgia patients and my chronic fatigue patients, not all of them, but some of them, will be actually positive in CIRS, and they will have other biotoxins that we can find that are actually, probably, part of the lead cause for them to have what they have. And then you just began to help them in those realms. But, TA65 happens to be one of the major things that I think that everybody needs. I'm trying to get more and more of my patient population on it. I can't force my patients to do anything. But, you know, if they will take it, and if they will do it, we are seeing results.

And, some of them might not feel good for a couple of weeks, but, you know, that changes, and they begin to feel better, they begin to have more energy as they go along with it. So, as you get them up to a full dose, that 250, they begin to feel better, they actually, sleeping is improved with it, eventually. I know that sleeping can be an issue at first, and I see that all the time, where they say, "Oh, I can't sleep with this. I don't wanna do it." And I said, "Give it time." So, you have to talk them through it. You actually have to...dealing with all the chronically ill, you really have to be proactive in talking with them and communicating, and keeping communications open. So, I probably get 50 emails a day from patients, just with questions on what's going on with them. You know, and you have to talk them off the cliff, and talk them back into reality and what's gonna help them get better, and how they can see an end that is improved in the end.

Dr. Joseph M. Raffaele, M.D.
Yeah, the wonders of email, which can be great and efficient, but also a difficult thing to keep up with, and a little bit of stress. But, there's a few papers by Sahin and Depinho looking at the effect of telomere length on mitochondrial function through the master regulators PCG1F and beta, and I think that in chronic fatigue, and perhaps in your CIRS patients, another way in which it's benefiting them is through lengthening telomeres, so that then they are allowed to have improved mitochondrial biogenesis and mitochondrial function, which, you know, of course, is what gives us all energy and allows our cells to function. I wonder if you see... Do you see any other types of patients sort of, the well-aging that are athletes that see any benefit from that?

Gordon Crozier, DO
Yeah, so because I got involved with power lifting myself, so I started power lifting, and I got kind of involved with the whole athletic community. So, those people really do notice a bigger difference. They have improved energy function. I have, one of my patients, he's a heart transplant. He's very young, but he's the strongest heart transplant patient in history. He can bench close to 600. You know, he's a powerhouse. But, he's really noticed a big difference with TA65 and his energy. Also his recovery, so, after he works out, his recovery time is improved taking TA65. And I love that for him because every day matters for him. He feels like he's living on borrowed time, and he's such an asset to the community, and to the other athletes in our area, because he works at our local gym here, and he's an inspiration for anybody. Anybody with chronic disease. You know, I just tell them, "Listen, this guy came back. You know, he's a heart transplant, and he works out, and he does well, and we all can do that." You know, I think that as we work out more, we actually improve our health as well. So, I think it's multi-faceted.

Dr. Joseph M. Raffaele, M.D.
Yeah, I see that in my practice. You know, you always want randomized control trial data, but some of these Masters Athletes have so much data on their times, their training regiments. And then, you know, for them to see an uptick in recovery or an improvement. You know, a 60-year-old marathon runner, or a 10K runner, seeing improvements at that age, they're real. They know they're actually seeing them, because they've been tracking it for years.

Gordon Crozier, DO
Right.

Dr. Joseph M. Raffaele, M.D.
That is fascinating to see.

Gordon Crozier, DO
Yeah.

Dr. Joseph M. Raffaele, M.D.
In your practice, in my practice, for sure. You do a fair amount of genetic testing as well. Can you tell me a little bit about what genes you look at, and how you integrate them into your practice, and if there's any relation to telomere biology?

Gordon Crozier, DO
I used to look at a plethora of genes. I used to do a lot. You know, I used to use this, it was by Rutgers University, it was a gene that actually, you could develop into a pyramid thing. So, it looked at all your genes for detox pathways, your genes controlling your MTHFR, your FUT2's, your...all of those. So, I kind of cut it back, and I don't really look at as many. But, I also was looking at APOE's, you know, if you're an APOE 3 4, you're at bigger risk for cardiac disease and cognitive decline. And so, I looked at a lot of those different genetic aspects. But, I began to realize that, you know, what half of those genes we don't even know if they're working correctly or incorrectly. There's some that you perhaps can, because you can measure different amino acids, or you can measure different...your Vitamin B levels. Some of those that you can actually measure, you can look at liver enzymes to see if specific genes are working correctly or incorrectly. So, I began to see some of that correlation, but then, I began to realize, you don't really know if genes are acting correctly or incorrectly; you don't know if they're turned on or off. So, most genes are supposed to be in a turned off state; they kind of react to an insult or a situation and they get turned on.

So, some of those genes, you can actually notice that gene expressions through chronic diseases or different things like Crohn's, other things like that, that they become turned off as the inflammatory and inflammation come down, because there's several things that really affect gene expression. One is telomere length and telomere cycle. So, inflammation, peptides, and that human microbiome. So, balancing all those things correctly, I think actually helps you to cause genes to express correctly. It's not gonna change genes, but it's gonna cause them to express in a correct function. So, you know, epigenetics is a big thing. A lot of people are doing it, and everybody keeps yelling out, "MTHFR! MTHFR! MTHFR!" Well, you can give all the methylated B's you want, and they can perhaps over methylate, possibly. But you don't know. But, what you can do is help with the telomere length, and then you can see a change in how people are absorbing their B vitamins, and if things are working correctly. So, it's not just giving the correct supplements. It's actually going a little bit deeper, which a lot of doctors are not doing anymore, and I don't understand why we don't dig deeper. I'm always about the next thing. Let's dig deeper! What does this mean? Is there a deeper aspect that we're missing? So,

you know, like what genes are affecting... We were talking about the mitochondria. What genes are actually affecting that mitochondria, and is our telomere length gonna affect that gene expression in the mitochondria so that we can actually help to have better mitochondrial functioning, so we can have energy and, you know, that mitochondria does help to interpret your DNA. So, we want proper interpretation as well. So, all of that matters to me. So, I wanna find the deeper length. I don't wanna just push a bunch of supplements at somebody, and say, "Here it is!" But, we have to think about what we're doing with each supplement.

Dr. Joseph M. Raffaele, M.D.
Sure. I mean, I think the promise of the whole genome sequencing and looking at all sorts of different genotypes, and of course APOE4 is an exception, because it's very well characterized, and we know what's going on with that.

Gordon Crozier, DO
Yeah.

Dr. Joseph M. Raffaele, M.D.
But, you know, people looking to see what polymorphisms they might have, ultimately what we're learning now is that that is important, but really, what's most important is the epigenetics. What gets turned on, what gets turned off?

Gordon Crozier, DO
Right.

Dr. Joseph M. Raffaele, M.D.
You know the whole Russian genes load the gun, lifestyle pulls the trigger. Well, I would say, lifestyle plus other therapies, peptides, exercise, diet, various things... Because what really matters is how genes are expressed, which sort of brings me to a question. Do you do any work with DNA methylation testing, and have you seen any effect of that on those measures in some of your patients?

Gordon Crozier, DO
So, yeah, we do some DNA methylation testing. I've done some. Not all of my patients wanna do that, because they, number one, the expense, and two, they feel like they've already gone through a lot of testing. So, some of them won't do it. But, when they do do it, you can see a change and a difference when they're optimized. And, you can tell the difference with that DNA methylation process.

Dr. Joseph M. Raffaele, M.D.
Yeah, I'm just starting to measure it more regularly in my practice, and I'm curious to see whether or not telomere lengthening therapies such as TA65 or whatever you're trying to do in terms of lifestyle and optimization of slowing down telomere attrition, whether that correlates with change in epigenetic age. We haven't seen that yet, but I don't think we have enough data quite yet. One would think that it would, and my patients come in, they're all about data. I have a lot of bio hackers that come in, and we have a software system that helps them track all their data, but they wanna know, am I a year older? A year younger? Because I call myself a longevity physician, so I should be able to tell them what's happening with that, and that's another tool in our toolbox.

Gordon Crozier, DO
Right, right.

Dr. Joseph M. Raffaele, M.D.
Speaking of tools in the toolbox, I saw in your bio that you also do some work with peptides. Any favorite ones, and any stories about effects on patients?

Gordon Crozier, DO
Well, you know, for a while, I used Epitalon, I just felt like Epitalon didn't help with the lengthening as much as doing TA65, and it's just one less injection a person has to do, too. So, and Epitalon if you've ever injected it, it has a little bit of a burn to it. So, I kind of went away from Epitalon and went back to TA65 for that. But, I also, I love Ta1. So, Thymosin alpha-1, which we don't know, it's probably gonna be on the chopping block from the FDA, we don't know. We're just waiting for the FDA to make their final word on that. I won't be able to use it any more then.

Dr. Joseph M. Raffaele, M.D.
It works pretty well. It's hard to take it away.

Gordon Crozier, DO
Yeah.

Dr. Joseph M. Raffaele, M.D.
The cysteine, that's ridiculous, the thing about taking that away. It was a supplement as well. But, what experience have you had with Thymosin alpha-1?

Gordon Crozier, DO
It's really helped in a lot of my autoimmune patients, because it's really helped them in balancing their TA1, TA2's. It helps to balance...I mean TH1, TH2. So that the inflammatory pathways, I really think it balanced quite well with Ta-1, and I've also noticed that their immune systems seem to be functioning much better. So, I've seen that there's been improvement in their white blood cell counts, and more normalization. Even the differential counts become more normalized with that, so people with high inflammatory monocytes, they become more balanced when they're on Ta-1. So, the monocytes, you know, you might have a monocyte percentage of 10, which is too much, which can... There's articles that tell us about high monocytes and bowel inflammation, of which I've seen in my Crohn's patients, and I kind of have some Crohn's patients, probably because of my own history with Crohn's. But, it shows that they come down, and they can actually be more normalized. So, that's why I like it for my autoimmune patients, but I use it in a lot of patients with inflammatory issues, because I really think it helps balance that.

Dr. Joseph M. Raffaele, M.D.
Yeah, and I think, the thing that I find interesting about telomeres and telomere biology is that it's an integrator of all the slings and arrows that get thrown at your body. Viral insults, parasites, toxins, chronic psychological stress, and so that's sort of the most upstream thing, is sort of your ability to have the reserves to fight off these things. You know, you see, I guess a fairly, well, it sounds like, mostly a relatively... not sick, but chronically ill with things, a population, rather than a healthier population. Have you seen that, in general, their telomere lengths are shorter than average?

Gordon Crozier, DO
Yes. Yeah, so they have very short, even for some of the young, sick ones. But, it's kind of amazing how they kind of revert back to more of a normal stage. Even my young high school students, some of them, their age is much older than what they are when you look at them. But, they do revert back. And, I'm so excited for some of my young people, because I actually have three that are now in residencies because I treated them. They weren't able to even attend medical school, but they were able to get through medical school. And, hopefully, those will be physicians that kind of go into more of an integrative medicine line, doing all forms of medicine and encompassing all things, not just traditional Western medicine route. So, that's what I like about being able to treat some of these chronically ill people, because some of them go back to their normal life. I had a woman who, she had to hire a housekeeper, she had to hire a nanny, she had to hire a chef, a cook, to cook for them. She could no longer do any of those things. And, actually, we optimized her. She went back, she was from Washington, D.C. area. She actually fired all of those, and she says, "I can do this all on my own!" And, so she began to really

be integral in her three children's lives again, went back to horseback riding, and really is enjoying life. And I think that's probably a key part of why we do what we do. We want people to be well and enjoy life, and really have a hope and a future for their life. And that's why I like doing this, because you can see that 90 percent of the people really do get to a better part in life, and they can really perform better, and be better people, and, you know, contribute to society.

Dr. Joseph M. Raffaele, M.D.
Yeah, that is very, very gratifying. In my practice, since most of the people aren't that ill, what I like to see is, I have a lot of creative people, or business people that are giving to the communities in their seventies and eighties, and they're continuing to do it at sort of the level of a 60-year-old. And so I feel like that's one of the most gratifying things you do, is sort of give back by helping these people continue to do what they do. And you're bringing people back from illness. You see a fair amount of sick people, but is there... since I'm not familiar with this area of medicine. Is there a top five or ten toxins that you test for, that people may not know they have, even if they're not particularly ill, but it may be keeping them from being optimal? What do you look at, and how do you test that?

Gordon Crozier, DO
So, I use a test by... and the reason I use this one is because it gives you a ton of environmental toxins. I mean, a lot of environmental toxins. So, I use this one by Vibrant. But there's other ones out there; I'm not saying that's the only one. But, I look for glyphosates, phthalates, plasticizers, so things that are in plastics. You know, and it gives you the list of all of them, and it kind of gives you an idea. You know, people don't realize they're still cooking on non-stick pans, and some of those non-stick pans are putting a lot of toxins into our bodies. People don't realize that they're drinking out of plastic bottles all the time, even though they say BPA free, they're still getting toxins from those plastic bottles a lot of times. So, trying to drink out of glass as much as possible, for my patients. And I see that those things can inhibit them. Glyphosates also, I see in a lot of people. If it's moderate levels, I don't see it causing too much of an issue. When it becomes what we call in the red zone, or the high risk zone, then I see issues. But, there's, you know, I look at all those toxin loads. And the reason I do that one is because, you know, I can't remember the price of it right now, but for whatever amount of dollars, you get three pages of different environmental toxins that could be affecting you. So, that's the one I use, just because it's easy for me to use.

Dr. Joseph M. Raffaele, M.D.
Vibrant Labs?

Gordon Crozier, DO
Yeah, yeah.

Dr. Joseph M. Raffaele, M.D.
Yeah, so, speaking of glyphosates, do you feel like it's in more different regions, where, do you think urban livers or dwellers are at risk for that less than people in suburbia or rural areas?

Gordon Crozier, DO
I wish that was so. But, actually, some of the people that live right here in Orlando, I'm seeing really high, high levels of it. Now, I've seen my highest levels in people that live in and around farm lands. So, some of my people from, you know Kansas and Nebraska and Iowa, I've seen some of the highest in them. But I still can see in some of my people that even live in cities, that they still have kind of a pretty high level. But, some of the glyphosates are actually put into the seeds of products now. So, you know, those people I'll kind of encourage them, if they have a really high level, if it's low, moderate, I'll tell them don't worry about it. But, if it's really high, I kind of get to the point where I say, "You know what? We probably need to try to do things to get rid of this. And then, we probably need to look at where you're getting this or how you're getting it, and change what you're doing." So, perhaps, you maybe need to get more holistic in your eating approach, more organic vegetables, because I find that some of them are... And some people don't even wash their stuff when they get it. Those people, I'll see pesticides and herbicides and all kinds of things in them. They don't wash any of their vegetables; they just buy them at the grocery store and cut them up and use them. And, I'm like, "Whoa!"

Dr. Joseph M. Raffaele, M.D.
What about the ones that are in the bags, is that a problem? The ones that are already pre-washed in a bag?

Gordon Crozier, DO
Those are probably better. I think those are better. But personally, I still wash them.

Dr. Joseph M. Raffaele, M.D.
Okay. And you also talk about mold...a specific... I had a patient who I've been treating for a long time, but who was complaining of some post-nasal stuff and some other symptoms, went to see a mold specialist, and got diagnosed with a mycotoxin. Tell me a little bit about your experience with that, and what tests should be used. I mean, I think these are all important, because again, it's another stress, it's putting stress on your body, and that means your immune system has to respond to it.

Gordon Crozier, DO
Right.

Dr. Joseph M. Raffaele, M.D.
So, I'm always looking for things to fix that keep from stressing our biological 401k, which is what I call our telomeres, telomere length.

Gordon Crozier, DO
Yeah, right. So, mycotoxins actually, you know, can affect a lot of different things, and they are associated with 94 plus diseases. You begin to realize how widespread mycotoxins are, and what they can do. So, some of them are gonna be through foods. So, you can get some of these mycotoxins through foods. Make sure that you're washing things, that you're not eating things that are high mold. For me, I had to stop eating cashews. Cashews were an issue for me. But, not for everybody. I'm not saying that's for everybody. But, a lot of people, you know, the first sick building syndrome, we call it sick building syndrome, the first one was actually in Connecticut. I actually had some patients from that building that have been sick ever since then, and that was way back in the 1970s. And, they've been sick for a very long time from that mold exposure, and really never able to get well.

But, you have to understand that part of that is because of genetic expression. So, do they have the inability to, or a decreased ability to be able to get rid of and detoxify their bodies from mold? If that's the cause, and that's their true problem, then as we increase their telomere length, that should be, in theory, should be corrected. But, we also have to be proactive at making sure that they're really getting rid of these toxins from their bodies so that they can live healthy, and live better, because mycotoxins actually... I've seen 90 percent of my fibromyalgia patients actually have mycotoxins. And, as we remove those mycotoxins, they actually get better, and they respond better. They respond better to telomere length. They respond better to all of those things. So, that is one of the key things I always look for in those patients, because I see it's very critical. You can look at, and there's lots of them out there... Vibrant has a test to test for mycotoxins, Real Time Labs, there's some other ones out there. Doctor's Data, I believe, has one.

Dr. Joseph M. Raffaele, M.D.
The tests, are they nasal swabs, or what are they?

Gordon Crozier, DO
Those are urine tests.

Dr. Joseph M. Raffaele, M.D.
Urine tests, okay.

Gordon Crozier, DO
Yeah. So, those are simple, because it's just a urine test, and you can just test the urine to see these mycotoxins in them. And, that's one way to test. But, I always do that in conjunction with my CIRS markers, you know, looking at all those inflammatory markers, and seeing what MSH, VIP, ADH, all those different things, because those are affected by mycotoxins. Mycotoxins affect and they like to affect the fatty layer of every cell. So, the bi-lipid layer around every cell in our body, those mycotoxins like to reside in there, and they like to hide in there, including the fats in our brain, including the bi-lipid layer in the mitochondria. That's where those mycotoxins like to be. That's why they affect everything and every part and every organ system.

Dr. Joseph M. Raffaele, M.D.
So, when you're doing these tests, you mentioned the blood test plus the urine test, is it a situation where you could potentially have mycotoxins in your urine, but you're not responding in an inflammatory way to it? Sort of like, if some people, a lot of people, I'm sure, have candida, but don't necessarily have candidiasis.

Gordon Crozier, DO
Right.

Dr. Joseph M. Raffaele, M.D.
So, it's a subset that respond with illness and inflammation?

Gordon Crozier, DO
Yeah, it's not everybody. And, that's why you have to be very wise with what you're doing. Just because somebody has mycotoxins in their urine, it could have been something that they ate yesterday, and that's just going to go out. So, we have to be smart in what we're doing and how we're doing things. Just because some people show certain things on their labs, doesn't mean that they actually have that. You have to be careful in what's going on with that, especially in the mycotoxin realm.

Dr. Joseph M. Raffaele, M.D.
Yeah. So, is there any other types of things you wanted to tell me about that you're doing in your practice? Or, tell our audience before we wrap up?

Gordon Crozier, DO
Well, that's...we hit a lot of what I do.

Dr. Joseph M. Raffaele, M.D.
That's true, we covered a lot.

Gordon Crozier, DO
So, and I still like to do... You know, I'm kind of getting more into the anti-aging realm, because I'm 64 now, so I have to cut back on some of these chronically ill people. So, I've been opening up more, doing more anti-aging things, and really opening up that realm. I love it, and I love to optimize people. I like people to be optimized in every way. I think hormones actually have to do a lot with what we're talking about today. We didn't talk about hormones, but hormone optimization is just part of that little factor of how people respond to nutrients and respond to their telomere lengths as well, so.

Dr. Joseph M. Raffaele, M.D.
Yeah, in fact, that's a big part of what I do in my practice as well. And that's very gratifying to help people get their hormones in an optimal place so that they can function better over time.

Gordon Crozier, DO
Right.

Dr. Joseph M. Raffaele, M.D.
You know, I practiced internal medicine for about five years and I know, treating ill people, it can be very stressful, and you've been doing it for a long time, so I understand the switchover. I love my practice, where I'm just helping people stay healthy longer. I do have some chronically ill patients, and they are great as well, but as Dr. Eppel's work shows, taking care of ill patients, whether you're the spouse or the parent or the doctor, can be quite stressful.

Gordon Crozier, DO
Yes.

Dr. Joseph M. Raffaele, M.D.
Well, it's been a pleasure talking to you and learning about an area that I don't know much about, and hearing your stories about telomere biology and how you're utilizing it in your practice. I wanna thank you very much for taking the time out to speak to us today.

Gordon Crozier, DO
Well, thank you! It was great being with you. You have a great day!

Dr. Joseph M. Raffaele, M.D.
You too! Take care.

Gordon Crozier, DO
Bye!