GGT and Ferritin Levels as an Indicator for Good Health:

A Special Interview With Gerry Koenig

By Dr. Joseph Mercola

JM: Dr. Joseph Mercola
GK: Gerry Koenig

JM: Vitamin D: One of the most important tests you can have to make sure that you're going to be healthy. But what are two others that are nearly as important that everyone needs to get if they're interested in avoiding chronic disease? Hi, this is Dr. Mercola, helping you take control of your health. Today we are joined by Gerry Koenig, who is going to enlighten us about what these two other tests are and how they are so beneficial to your health. Welcome and thank you for joining us today.

GK: Hi, Dr. Mercola. Good to be here.

JM: I guess we should probably start with a short summary. I'll kind of lead that off, and then you can follow up and add to that. But one of the most common nutritional supplements that are used is iron. It's in most multivitamins. Many people use it because they think they're going to get energy. Iron, of course, does serve that role.

It is essential to the core of hemoglobin and helps bind oxygen and deliver it to the tissues. But that's when you have enough, and there are certainly people in our population who don't have enough. That would typically be menstruating women, especially if they have heavy periods, and children. This population may need iron supplementation. There's no question.

But the vast majority of us – I would guess probably over 75 percent of the people watching this, that would include all adult men and post-menopausal women – just likely don't need it. In fact, they should be on an aggressive program to lower their iron. We're going to talk about that. Because if you don't, iron will catalyze a reaction within the inner mitochondrial membrane, which reacts with hydrogen peroxide. It forms hydroxyl free radicals, which really decimate mitochondrial DNA, protein and cell membranes, which causes mitochondrial dysfunction and leads to the core of almost all chronic degenerative disease.

This is a very serious issue. Fortunately, it's something that could be relatively easily addressed. That's what we're going to discuss further. Perhaps you could elaborate on my opening comments.

GK: That's true, Dr. Mercola. I've been involved with this for about 15 years now. The last 10 has been a learning experience. Very recently though, we've been able to track another element, gamma-glutamyltransferase, GGT, as being very interactive with iron. When serum ferritin, which is a measure of stored iron, is high and GGT is high, it's like a double punch. Because then you have a combination of free iron, highly toxic, and high iron storage to keep that toxicity rolling. Epidemiologically, people who have a combination of high stored iron –

JM: Let's hold on for a moment. Because GGT, when I was first practicing, was an enzyme that was typically done in an automated chemistry profile. Now, it's not. For some reason, they took it out of the panel. I don't know why. They did that maybe 10 or 20 years ago, so you have to order it special. But it's a liver enzyme. Perhaps you can enlighten us as to how this specific liver enzyme is correlated with iron toxicity?

GK: Well, take a look at when they changed the definition of this enzyme. Now, they define it other than what it really works as. Recently, it was proved by the life insurance industry as the single measure that's most predictive of early mortality. Pretty much, it was everything. In the review that I put together with Stephanie Seneff, we highlight the interaction with the biggest life insurance tester in the country. It was the subsidiary of a large blood testing company. They regularly were testing GGT as an indication of potential heavy drinking.

JM: That's a really strong marker for alcoholics. No question.

GK: Yes.

JM: In my residency, I worked in an inner-city hospital. I did my training there. There was a large population of chronic alcohol users. That was the routine test that would monitor that, along with prothrombin time (PT) to check their liver function.

GK: That's a good thing. In 2011, I pointed that out. I was looking to do a joint venture with a particular blood testing lab. Their chief medical doctor (MD) went to their numbers. Looking back at their numbers, they figured that although they took it for alcoholism, that it was, standalone, the single measurement that predicted early mortality, against all other measures. In other epidemiological studies, it's linked to pretty much every cause of death, because it provides those free radicals and hydroxyl radicals.

JM: Let's start there. It's still confusing to me and I don't understand why there's such a strong correlation, as opposed to some of the other liver enzymes. But is this correlation also noted as one tends to age? The older you get, obviously, the higher your risk for most or all chronic degenerative diseases. That's just the nature of being alive. Will this tend to increase as you get older?

GK: Well, it is doing that now. But when it was recently studied for mortality, the risks relatively were greatest – in an illustrated study – in people under 30. Now, not too many people die of natural causes under 30, but it happened to be that way. People over 70 were at less risk relatively. That's all changed. I believe that mostly people born after World War 2 now are all at risk because of the environmental toxicants we face, basically using upour body's ability to detox naturally. Basically, reduction in glutathione levels, the body's most important antioxidant, is indicated by an increase in gamma-glutamyltransferase, GGT. It's almost a see-saw.

JM: Really. As your glutathione levels improve, your GGT levels will decrease.

GK: Decrease. Yes.

JM: Now, this is a test – I just want to dive deeper into this because it's such an important component. You've got a lot of other studies that you published that go into some other details, especially in Africa. What is the optimum and what is the average now to be ideally healthy? If you could pinpoint. Because like most numbers or lab tests, there's an optimum range. You don't want to be too high. You don't want to be too low. What do you think the optimum is?

GK: We haven't seen trouble. But theoretically, it could if you can't produce or synthesize gamma-glutamyltransferase, you have a problem. We know that through lab rats and so forth.

JM: Sure.

GK: But low levels don't seem to be a problem. Anything under 10 for a female seems to be fine. We don't see measurements any longer under 10 for men. Typically, low would be under 20. But the midpoint for most men in the U.S. is now about 25. Anything above that typically portends some kind of a chronic disease. Anything can happen.

Part of it is depending on body weight. Strangely enough, the most recent indications are that people who are too thin, whatever their level of GGT is, it could be harmful to them if it's relatively high. For instance, a thin man or woman with a GGT, and the woman's case is of a premenopausal woman, anything in the range of the second quartile, which is going to be generally 14 to 18 today, can be dangerous if she's expecting to have children and has a very low BMI.

JM: It seems that we're missing one level of precision here, because the ranges are really single digits between optimum and pathologic, which is totally different than almost any of the other lab tests we use, like blood glucose, serum ferritin or cholesterol. Usually you're looking at 20, 30 or 50 ranges between healthy and diseased. But here, we're looking at as little as single digits.

GK: For chronic disease, yes.

JM: Yeah. Is there any effort to get another level of precision? Like we get a 14.3, which would essentially give us three levels of precision, or is the lab assay not doing that?

GK: No. It's hard to find labs to do it. It comes as a special order test in most labs, although it's a very inexpensive test as a single order. It's one of the least expensive tests there is.

JM: Yeah. I actually had my test done after our last conversation. It was 17. That's in the healthy range. It's surprising because I also have struggled most of my life with high iron levels as a result of having thalassemia, which essentially presents a hemochromatosis-like condition, because I recycle my blood cells so frequently. By paying attention to that, you can abort some of these sort of genetic predispositions towards harm and damage if you understand it.

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I would recommend to even everyone now to just go and get your blood level tested for GGT. You're going to be even more motivated to do this as we continue this conversation. Put that on

your to-do list. It's an inexpensive test. You do need a doctor's order for it. Actually, there are some companies that, I think, offer that without. But it's under 50 dollars.

GK: Yeah. On our site, it's 28 or 29.

JM: You have it on your site for 28 dollars. This is not a pitch to get lots of people to go to your site.

GK: No. They can get their doctor to order it for them. That's the best thing.

JM: Yeah. The intention here is to motivate and catalyze action so that you can understand what your number is so that you can understand that you're at risk for chronic disease if it's elevated. You're going to have to use the normals we're talking about or the optimum levels, not the ones that are going to come back from the lab, because they're using outdated ranges. Let's talk about those ranges now that they would get back if they got a lab from Quest Labs, if their doctor ordered it from them. It's covered by their insurance.

GK: I'd like to look at the midpoints, because there's nothing below zero, certainly. You can get very high values after they're skewed to the right. Medians are a good point. If you're below the median, you're relatively safe.

The male medians in the U.S. today are 25 – they're higher for African Americans, quite a bit higher in some cases. Twenty-five for men when they were 16 30 years ago, 1980, or was that 35 years ago? But they've roughly doubled almost since that time.

Females have doubled. Females have gone from a median of 9 in 1980, in a median age of 40-year-old females, up to 18 fairly recently. That range for premenopausal women is a little high. There are more cases, for instance, of gestational diabetes if they're childbearing and problems – we believe – including autism beyond pregnancy.

JM: Let's stop there. There are a number of reasons why this could occur, but something has caused this. It doesn't appear to be as dramatic, but it is indeed a dramatic increase that is strongly suggestive of a radically increased risk of dying prematurely.

GK: Yes.

JM: What has caused this increase in the last generation or two? What's your belief on what's contributed to this?

GK: Yeah. On the research, it's pretty interesting. The reason I did was for my own health. I had a low ferritin a year ago and I tested with a high GGT. I've been doing research on –

JM: How low was your ferritin?

GK: Thirty-nine.

JM: That's about what mine is. Thirty-seven.

GK: Yeah. But my GGT was up over 60. Now, I was just studying fatty acids.

JM: Sixty? Wow. That is really dangerous.

GK: Yeah. Very high. I had a bad case of gout with that low ferritin, which was unusual to me. I didn't think that would happen. I spent a year taking good quality krill oil. That drove that measurement of GGT down. It drove my triglycerides down. And also, something that most people don't know about – I really didn't – is lactate dehydrogenase (LDH), which is a marker.

JM: LDH.

GK: Yeah. LDH.

JM: Yes.

GK: As I studied this, it became the most commonly used test to determine if you have cancer or how long you're likely to live if you have terminal cancer. There are over 2,500 abstracts now and papers in PubMed using that measure as an indication of survival for terminal cancer patients. It's not a happy test to have high.

JM: No. I'm glad you're able to reduce it with krill. Krill, I believe, is the best form of docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) omega-3 supplementation. Animal-based, I think, is not the ideal. The ideal is clean seafood, which is my source. I typically have sardines or clean shrimp on a regular basis. You can use an omega-3 index to confirm that your omega-3 and omega-6 ratio is fine. Do you believe that omega-3 deficiency is a big factor or are there other variables? Like excess iron, glyphosate or electromagnetic field (EMF) exposure?

GK: Well, glyphosate, excess iron, all of the substances in the environment, whether you take it in as food or it's in the air, that utilize your body's toxic waste disposal system in some way or another, reduce your antioxidants, whether it's vitamin D, cholesterol, vitamin E, vitamin A. A reduction of those makes you more vulnerable to disease, particularly chronic disease, autoimmune diseases across the board. Our main factor – gout remission.

We have a paper that we just submitted now on gout. It's actually been approved. It'll be in press pretty shortly. I've studied this about a year and a half ago. That's what got me to figure out right away when I got the high GGT level.

Rheumatoid arthritis and all of the rheumatoid diseases pretty much are all related to relatively high ferritin than high GGT. Now, having only high [levels] in one of those two is not so bad, but you don't want to have high [levels] in either one. I thought I was safe with a low of 39 in serum ferritin. Generally, they correlate. I was really surprised that my cellular health was obviously poor. I fixed that up a bit and still working on it.

JM: Now, one of the things you may want to look at, especially if you believe there's an autoimmune component, would be looking at plant lectins. I've interviewed Dr. Steven Gundry recently. He wrote the book *The Plant Paradox: The Hidden Dangers in "Healthy" Foods That Case Disease and Weight Gain* and discusses how these lectins, which are proteins that the plant produces to protect themselves against predators when we consume them, tend to stimulate these autoimmune reactions.

From my perspective, a lectin removal diet, which is pretty easy to implement – basically removing legumes and seeds for the most part and optimizing your vitamin D levels – are two profoundly simple and radically effective measures to abort or reverse most autoimmune diseases.

GK: Where I've learned more recently on that is a book by Susan Allport.

JM: I have not heard of her.

GK: Yeah. *The Queen of Fats: Why Omega-3s Were Removed from the Western Diet and What We Can Do to Replace Them* is the book. It's several years old, but she connected with an investigator, an MD scientist by the name of Ralph Homan, I think. In going through his older literature, I mean, she learned a lot from him.

In my case, I've done the same with a scientist of ours, Eugene Weinberg, who had done all of the science on iron metabolism. These papers are still cited in today's world very frequently. But this particular investigator, Ralph Homan, he shows at that time elevated serum ferritin and elevated GGT as common factors in almost all autoimmune diseases. I've since alsoshown that it is. It's a sleeper. They're not elevated through the roof, but they're elevated.

JM: Yeah. I'm suspicious that the less-than-optimal vitamin D levels and the ingestion of plant lectins might actually contribute to those. Those would be markers of exposure to those risk factors. I think they may be really useful strategies. Interesting.

I want to talk a little bit about ferritin now too. Because my ferritin was running about 150 maybe two years ago, until I started implementing some self-phlebotomy, where I would take out anywhere from 2 to 6 ounces of blood every few weeks. I was able to get it down below 100 pretty easily.

But then, I actually stopped doing self-phlebotomy. I started a detoxification strategy involving near and far infrared sauna and a whole variety of other supplements to facilitate detoxification. My ferritin continued to drop over the next nine months. Now, it's down to 37, I think. I just had it tested like a week ago, which was really surprising to me. I wasn't aware that a detoxification program could actually lower iron.

GK: Oh sure. Yeah. As a matter of fact, there was a professor, or a doctor, rather, FS Facchini. You might remember that name. He did his last paper before he was, I think, retired by the pharmaceutical industry. He was an endocrinologist. He was basically telling the whole story about iron and the benefits of iron reduction. His last published paper was a gout paper in 2003.

He bled or phlebotomized his patients down to what he called near-iron deficiency, which would be the level that you're talking about. I was at 39.

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Getting the iron out of the extracellular iron that's floating around wherever it is – It's not in your serum. Reducing that to a non-toxic level requires bringing it down to near-iron deficiency, because I think that's the last iron out of your body to formulate new red blood cells. Until that's gone, you have the risk of injured tissues through free radicals. I think that paper is freely available. It's probably on my website, I know.

JM: He documented the detoxifying?

GK: Yes he did. He documented the episodes. These were people with frequent gout episodes. They dropped precipitously in terms of numbers per annum, where people who were getting sick seven or eight [times] went down to perhaps one or two pretty rapidly. But they had to get down to low ferritin, which would be typically 25 to 50.

JM: Yeah. If you go below 20, then I believe there's some risk, at least in most of the conventional literature, that you're going to be having problems with iron deficiency. We certainly don't want that, because you do need iron. You need it to generate energy in your mitochondria. But the problem is that almost everyone watching this has too much. It actually gets counterproductive. Excess iron will actually lower your ability to produce energy.

GK: And it's no longer a standard test since 1997. For whatever reason, they figured that we don't need to test it.

JM: Was that the GGT or the ferritin?

GK: It's both actually, the ferritin. GGT, you can get your doctor typically to order that for you, but there are stringent reimbursement rules. Some won't do it because they've been rejected in the past, particularly an iron panel. If you go in and ask your doctor for an iron panel, he's got to put down why you have it. Suspicion of iron deficiency is fine if you're a woman, but you're not going to get that diagnosis from the doctor to get you reimbursed for an iron panel.

JM: Unless you had a bleeding ulcer, colon cancer or you have some form of blood loss.

GK: Right. Yeah.

JM: Right. Now, you were very excited about this GGT test for other reasons too, because you've uncovered some research in Africa.

GK: Yes. Just yesterday, I may have sent you –

JM: Yeah. You sent me a few studies on that. I wanted you to go into that a little deeper to expand on your excitement about these findings.

GK: The excitement actually went back before then. Because back in the ‘90s, when GGT was tested broadly in the U.S. in the National Health and Nutrition Examination Survey III (NHANES III), 1988 to 1994, the measurements of African Americans were quite a bit higher than white Americans and Hispanic Americans, in terms of both serum ferritin and GGT.

Back then, those measurements were compared to measurements in Zimbabwe. In people who were not exposed to spraying for mosquitoes, the African Blacks, they were roughly half. They had obviously been on a native diet. Their measurements in gamma-glutamyltransferase and serum ferritin, even if they had a virus like a hepatitis B or C, were half what the American Blacks were, which indicated that they were not getting the chronic diseases yet.

But I found that, through several papers that were recently submitted in South Africa, that those measurements now are very high. They’re catching up and probably surpassing the American Blacks’ measurements and they’re suffering the chronic diseases. The stiffening of the arteries reported – I can provide you with the links to those abstracts. I can’t send the full papers. I can send them to you, but they’re under – The abstracts would be available. The new ones from China will be available.

The Chinese have not been helpful. They supply a lot of extra iron with their foods. In various areas of China, their ferritins are typically up around 300 among the men. The women are overloaded as well. Most recently, they’ve been testing GGT there.

A study just recently published in Western China, they proved that the addition of serum ferritin to GGT – GGT indicated a higher risk among the midpoint of GGT for chronic kidney disease.

When they added top quartile range of serum ferritin, that increased the risk of chronic kidney disease by a factor of four to five, above the midlevel of gamma-glutamyltransferase alone in that population. Risk for chronic kidney disease increased by 20 to 30 percent. But if you added serum ferritin, you happen to be in the top quartileserum ferritin that went up to another five-fold in risk to roughly 2 to 1, 2.5 to 1 of coming down with chronic kidney disease.

JM: Yes. But I would think that an increased body level or load of iron would also increase your risk of cancer and heart disease.

GK: Definitely. Yeah.

JM: And diabetes.

GK: Diabetes is probably the main or almost the easy one, if you want to put it that way. The population of diabetics in the world today, particularly in these countries that don’t achieve getting fat. Now, you don’t want to think that getting fat is a positive thing, but it’s protective, although you have a lot of risk factors than just that happening. If you have the biochemical risk, like as it exists in Southern Africa. where people aren’t just getting fat with these biochemical measures as they are in the West, that’s actually proved to be a very significant risk factor – staying too thin.

JM: You know, what's interesting, one of the other guests I've interviewed – I'm not recalling specifically who it is this time – but he let me know – I didn't know this prior – that man is the only primate that has the ability to store body fat, which gave us a relatively novel competitive advantage to exist in culture. The chimps and gorillas, they have like 2, 3 or 4 percent body fat. That's it. You will not see a fat monkey. They cannot store fat. It's metabolic flexibility to store fat and burn it when you need it, and then burn carbohydrates. You need to do both.

Some people think that doing ketosis all the time is healthy. It's not. But you need to be able to burn ketones, to create them and burn them as fuel. Most people can't because they're taking too many carbohydrates and they're not fasting or going for periods of time without food. To top that off, they're being exposed to these high levels of iron, supplemental iron, and they're not removing it through optimal detox, as opposed to these other toxins.

It sounds like it's a combination of things. We eat too much meat, for the most part, which is a pretty large source of iron. We have supplements. Food is supplemented with iron. We're being exposed to toxins that we're not detoxing properly. Would you say it's fair to say that this is the primary reason? Or are there other contributing factors that you'd like to add?

GK: We have iron in our bodies already. Most of the iron is in the red blood cells. We have 2 or 3 grams in our red blood cells, in our myoglobin, in the muscles. If we don't have good lipid linings, good fat linings in our cells and our sub-cells, the opportunity for that iron to come out one way or the other because of poor lipids, that's where most of the toxic iron comes from. It doesn't take a lot. It's not that you eat too much iron one day and you get sick. That's not the case. It's normally that the cells fail and the iron comes from both the red blood cells –

JM: So you can die acutely from it. There are a number of children who take iron supplements, chewables particularly, and go to the emergency room. It's a common cause. But most of them are saved because they can essentially detox.

GK: Now, they have them in the plastic packages they can't get. They used to be able to pour them out of the bottle, but that's no longer the case.

JM: Yeah. A lot of kids used to die from acute iron poisoning.

GK: Yeah.

JM: But that's not the typical process for a chronic issue. It's toxic at relatively low amounts.

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GK: Most people don't know either. I mean the important thing to note is to be certain of the pain medication, particularly if given in its hard-to-dose-like liquid pain medication – Tylenol in a bottle. If you have a screaming kid at 3 o'clock in the morning, how do you tell the right dose? If you want to make him quiet, you can overdose him. That very quickly depletes antioxidants. It's just a natural function of that particular drug or other pain drugs.

JM: Yeah. For Tylenol or acetaminophen, specifically it decreases glutathione. One of the remedies for acetaminophen overdose, or suicide with acetaminophen, is to actually give them an intravenous N-acetylcysteine, which is a rapid precursor for glutathione, which reverses the toxicity pretty rapidly.

GK: That's the standard cure or reversing that condition. Recently, I've been in touch with the World Mercury Project. They were in a bit of a quandary because they were being told by the Centers for Disease Control and Prevention (CDC) and others, with respect to autism, autism rates increased in the 1990s in California and in Denmark, even though thimerosal, the mercury additive to vaccines, was stopped in those two locations.

But there's an answer for that involving iron and GGT in the U.S. Between 1980 and 1990, GGT doubled for young women. That increased the exposure, particularly in California. In Denmark, it was a very similar thing. Basically in the western world, GGT doubled in that roughly 10-year period. The oxidants and the stress levels doubled. That just made it very difficult to maintain health.

During the 1980s, many people got fat in the U.S. That was probably the fattest decade. We had diabetes increase, but it wasn't due to the fat. It was due to the toxicants. Most of that increased serum ferritin and increased GGT, which doubled in that decade.

A similar thing happened in Denmark. They had been pointing to the increase for autism after 1990 when thimerosal was stopped in Denmark. But the factors were in place during the 1980s in Denmark when they stopped supplementing iron. But yet, those people who were non-blood donors had a significant increase in serum ferritin in that decade, which was strange. However, the people who were blood-donors had a decrease in serum ferritin, which one would expect with the stoppage of iron supplementation.

We gave that information to Robert F. Kennedy, Jr.'s group. We'll follow-up with them if they need more. But the articles will show that.

JM: Why don't you review some of these published epidemiological studies documenting the pretty radical reduction in chronic diseases for those who are regularly donating their blood two or three times a year?

GK: Yes.

JM: I thought it was like reductions of up to 50 percent of heart disease and cancer?

GK: Yeah. Definitely. That's the case. Now, remember it was the reduction of sudden death, heart disease, stroke, etc. over the last 30 or 40 years.

In my opinion – this is just an opinion I've got looking at the literature over the last 10 or 15 years – there's probably more to weight gain and the distribution of the toxicants out to the fat cells. One of the reasons that it's difficult to get the doctors to order GGT tests is they're discouraged because they know some of the prescription drugs themselves increase that level.

Although the overall effect may be protective, it's not a happy situation to see a measure of disease increase just by taking a drug. There's resistance in that area of getting tested. But it's a pretty simple test. It would be recommended. But blood donation basically keeps one healthy.

JM: Yes. Well, I would have agreed with that wholeheartedly in our last interview, and I still think it's a useful strategy, but now, I've become anecdotally and empirically convinced of the power of effective detoxification to optimize levels, actually lower than I was ever able to do with therapeutic phlebotomies.

I think it's a combination that you need, obviously, paying attention to the ingestion of iron. I don't think it's wise to eat a lot of meat. I personally only eat maybe 2 to 4 ounces of meat a week. I think [if you eat] much more than that, you're just asking for trouble because you don't need a lot of protein. There's a lot of ways that you can get adequate protein. Most of us overeat it. That's for sure.

GK: Yeah. One of the things that Stephanie Seneff and I are taking a look at – I've been studying the malnutrition for several years now, mainly kwashiorkor, which is a typical malnutrition disease, along with marasmus in developing countries. There you have a situation where the individual children, particularly in kwashiorkor, cannot synthesize the important proteins necessary.

JM: Kwashiorkor is protein-calorie malnutrition. I'm not sure –

GK: That's the name they applied to it some 50 years ago.

JM: Right.

GK: It's important to keep the distinction, which the health workers haven't done. It sometimes leads to improper treatment – giving iron too early in a recovering child with kwashiorkor, or an adult for that matter.

The measure that skyrockets early on in that particular case happens to be GGT. High amounts of free iron, only because they don't have the proteins to safely containthat iron withineither transferrin, which is the protein in the bloodstream that protects the body from the iron in the bloodstream, orceruloplasmin, which is necessary for copper transport. But basically, to get iron safely into the brain, it needs to be complexed with ceruloplasmin. Those can't be synthesized in a malnourished person. Iron to a malnourished person is highly toxic.

JM: You mentioned transferrin.

GK: Yeah.

JM: I'm wondering if you would agree or think it's even necessary to include that in the screening and to do a percent transferrin saturation level along with a ferritin to get a better idea. If so, should the number be under 25 percent?

GK: Well, 25 to 35 is normally considered good. Overall, epidemiologically, it's come down. In 1980, based on NHANES I, which was done in the early part of the 1970s in the U.S, that was one of the high markers of early death. Having a transferrin saturation percentage of over 55 indicated a probability of a 60 percent premature death.

That has been wiped out. Because right now, in the U.S., there used to be – At that stage in the 1970s, there were 2.6 percent of the population that had transferrin saturation percentages that high. Now, it's down to half of that. That's only down because of the relative increase in obesity and more places to hide the iron and tuck it away.

JM: You don't think it's that grade-A test to run or a marker for toxicity secondary to iron?

GK: I would if you'd happened to be thin. If you have a body mass index (BMI) under 22 or 23, I would get that test. It's a pretty standard panel. If you get an iron panel –

JM: Yeah. It'll be there.

GK: It'll be there.

JM: Yeah. The ideal should be between 25 and 35?

GK: Yeah. I'd say 25 and 35. You get up at about 40 because it depends on the pH of your blood. Your transferrin could lose iron down to a saturation percentage of 31, if you have acidic blood. People generally don't know what their blood acid level is. Anything 25 to 35 is safe. If you're unusually thin though, I would get that test donebecause there you could have unsuspectingly high transferrin saturation, particularly if you're malnourished. Unfortunately, some people become – Anorexia nervosa has severe effects on the brain when you're that thin and your BMI is at 14 or 15.

JM: Or the standard American diet – pizza and ice cream.

GK: Yeah. What's wrong with that?

JM: Well, nothing if you really enjoy [eating] food. But if you have any concept of living a long and healthy life where you're free of disease, there's plenty wrong with it.

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GK: That's right.

JM: Any other comments you'd like to make or emphasize?

GK: No. We keep on working away. I'm older now. My own health gets meworried about a bit.

JM: But you know what? I want to add something to this. I think I may have emailed you earlier. I definitely emailed Dr. Seneff about this. But I want to put a bug in your ear, because I think it's one of the most powerful innovations that I've ever encountered with respect to

therapeutic supplementation. It's not really a supplement. It's a gas – molecular hydrogen, which is the most novel, selective antioxidant known to man with virtually no toxicity.

It's the smallest molecule in the universe. It permeates essentially every membrane in your body. It's a neutral. It's not an ion, so it's not impeded in its ability to transfer to all of these compartments. It will instantly neutralize the primary pathology from excess iron levels, which are hydroxyl free radicals. Molecular hydrogen combines with hydroxyl free radicals and forms this really pernicious deadly product called water.

GK: Yeah. Right.

JM: That's the problem.

GK: We could drown.

JM: Well, yeah. It's intercellular water, so I don't think it's going to be an issue. We're talking very small amounts, a few millimoles or stuff. It's usually taken as a tablet and pulsed in a cyclical fashion. But I am so excited about this approach. I think it's one of the most profoundly effective strategies to improve mitochondrial function to decrease toxicity in the Fenton reaction from excess iron, and to basically scavenge these unnecessary free radicals.

The problem with multi-antioxidants is, you know, there's this antioxidant theory of aging or the oxidative theory of aging, which has been pretty much dismissed now. Any serious scientist doesn't accept that, because you do need free radicals. We have to have a certain base level for them. They're important signaling molecules. If you indiscriminately suppress them with these broad spectrum shotgun antioxidants, you are going to mess with those baselines. But the studies done with molecular hydrogen doesn't impair baseline normal natural free radicals you need for biological signaling.

It's something you've got to look at. Because I think, especially for you because you're connected to that community, for the people who have high levels and they're not able to get it down through detox and therapeutic phlebotomy quick enough, they really need to be on molecular hydrogen. I think that could radically improve their health. I mean radically.

GK: Simple question. How do you get it?

JM: Usually it's tablets. We're probably going to be having some in the future, but there are a number of companies out there now that produce them. The technology is emerging.

The Japanese have been studying this for about three or four decades. They are the leaders in the world. Most of the published literature is from Japan. It's an artifact of the alkaline water systems. But alkaline water doesn't work for squat. The only reason why you get benefit from it is because it produces molecular hydrogen. But drinking it is not the best way. Drinking it all day long is not a great strategy. You really want to pulse in high doses to get the benefits, because it's also a hormetic.

You know what it does is that it's a really profound stimulant of the NRF2 pathways. What does NRF2 do when it's activated? It makes glutathione, superoxide dismutase and catalase – all the beneficial antioxidants that your body wants to fight this oxidative damage. But it makes it at levels that you need, not in excessive amounts that could cause problems.

GK: Well, the depletion of antioxidants is a serious problem.

JM: Yes. Absolutely. But to try to play god and think that you know better and take these antioxidants. Superficially, it appears healthy, but I think it's counterproductive in the vast majority of people who are doing it.

GK: Well, you know. The free radical theory of aging was proposed in 1954.

JM: Yeah. It was Denham Harman was it?

GK: Yeah. Harman. He was a gerontologist. He died about three or four years ago at age 98 himself.

JM: Pretty good.

GK: He was applauded by the pharmaceutical companies because they jumped right on that. They liked him.

JM: Yeah. Well, it's been modified. Now, instead of the free radical theory of aging, it's the mitochondrial theory of aging.

GK: Yeah.

JM: Which really refines it quite a bit. It's the excessive free radicals that are problematic, not just free radicals, excessive free radicals.

I'm convinced that EMF exposure, which is my new passion to help people understand that, is another one. Actually, this is the same darn pathology. It produces, ultimately, by opening these voltage-gated calcium channels, allowing calcium to leak into the cells, combining or causing the release of nitric oxide, which then combines with superoxide to create peroxynitrite, creating hydroxyl free radicals – the same thing that causes damage in excess iron. The molecular hydrogen is a winner there too, although just like the iron exposure, you'd want to limit your iron and aggressively implement strategies to remove it.

Similarly with EMF, you just don't want to take hydrogen and say that's the end of the game. You'd want to limit your exposure to it, because it's a toxic poison that most of us have no understanding of the damage it's doing to us. Actually, I'm convinced now, after reviewing these studies, it's worse than ionizing radiation, unless you get massive doses that'll kill you in a few days, like you could with a nuclear fallout. But the typical X-rays that we're exposed to, I think EMF is far more dangerous.

GK: We're currently looking at hypervitaminosis A, vitamin A toxicity. I'm not sure of the mechanism behind this.

JM: Synthetic.

GK: Yeah. Only synthetic. You can't eat too many carrots. I don't think.

JM: Well, it's not vitamin A. It's beta-carotene. You can get vitamin A. Vitamin A is present in animal products, typically like butter. But all the plant sources are beta-carotene.

GK: But basically, there's a – I don't recall the number now. But it's the preformed vitamin A that can be toxic in certain amounts. High soda drinkers, whether it's high-fructose corn syrup or artificial flavoring in soda, can increase both GGT and serum. It's a risk factor. It's interesting. I won't go into the details, but 10 years ago, there were some interesting studies that reported on GGT. They said it's the soda companies that are doing it. Largely, they are right. Before my first transplant, I switched from alcohol to sweetened non-fat soda. That did a real job on me.

JM: We definitely don't want to do those.

GK: No.

JM: We've given our audience quite a few pearls that they can take home. Just to sort of summarize it, if you were interested in being healthy, staying healthy and preventing chronic disease, I would strongly, strongly encourage you to get a ferritin and a GGT level regularly, until you are able to implement lifestyle changes to get them in the optimum range. GGTP should be in the teens to even below 10, if you're a woman. For ferritin, I would say 40 to 60, but under 40 is fine, 20 to 40. I don't know. What's your best level for that?

GK: For a male, I'd say under 50. At Iron Disorders Institute, we say between 100 to even up to 150.

JM: I thought it would be a vitamin D level of 20.

GK: There are two champs. The lab levels now work upwards to 400. Some countries, unfortunately – we don't agree with this at all. Fortunately in the U.S., we have some flexibility, but some countries won't permit you to get a free iron reduction phlebotomy therapeutically if your ferritin is 500, 600 or 700. They'd want you to wait until you get to 1,000, if you're still alive.

JM: That's criminal. Ideally, below 50? What do you think the range is? Thirty to 50?

GK: I would say 30 to 60 probably.

JM: Okay. Thirty to 60.

GK: I wouldn't worry too much about it if you get the other test, if you get tested for the GGT --

JM: The GGT. Yeah.

GK: And your GGT is low, your ferritin can float up and you're going to be safe.

JM: Okay. Good.

GK: It's interactive.

JM: Yeah. Again, these are markers, folks, markers for iron toxicity. Even though it may not seem like it's a problem, it is. It's a major contributor to heart disease, cancer, diabetes and obesity. And it's so, so easy to turn around.

GK: Liver diseases, fatty liver.

JM: Fatty liver. Not the alcoholic kind.

GK: High triglycerides.

JM: You name it. It's a problem.

GK: Infections. All sorts of infections. You don't want to go to the hospital with high iron.

JM: Yeah.

GK: Because you might not come out.

JM: Yes, indeed. Alright. Actually, that is one of the complications or relative contraindications for taking vitamin C. If you take vitamin C with any food that contains iron, it will actually increase the absorption, which is not a good thing for most of us.

GK: No.

JM: Alright. Thank you for joining us. Hopefully this has been helpful for everyone.

GK: Thank you, Doctor.

[END]