Nutrition Power: Heal Your Biochemistry and Heal Your Brain: A Special Interview with Dr. William Walsh

By Dr. Joseph Mercola

JM: Dr. Joseph Mercola
WW: Dr. William Walsh

JM: Wouldn't it be nice to be able to target specific nutrients to improve your mental function? Hi, this is Dr. Mercola, helping you take control of your health. Today we are joined by a pioneer in this area – actually, not too far from where I was practicing medicine – Dr. William Walsh, who is the president of the non-profit Walsh Research Institute. I believe it's in Naperville. He has a Ph.D. in chemical engineering from Iowa State University. He really focuses on nutrient-based psychiatry and nutritional medicine.

He also is a fellow of the American College of Nutrition, as am I. We're both on that same professional organization. He's designed nutritional programs for Olympic athletes, NBA players and major league baseball players. He's done quite a bit. He's really a pioneer in this area and a well-respected researcher. Welcome and thank you for joining us.

WW: Thank you. [It's a] pleasure to be here.

JM: Are you in Naperville, Illinois?

WW: Yes. That's where we're based.

JM: Okay. I thought I didn't recall. Why don't you expand on the short bio I gave and mention anything you'd like to provide our viewers, with respect to what your training is and what you specialize in?

WW: I started off in **"**hard" science as an experimentalist, at first working in the nuclear field at places like Los Alamos, The Institute for Atomic Research, and the University of Michigan Research Institute. I wound up at Argonne National Laboratory in Illinois. While working as a scientist there, I started a volunteer project at the local prison, Stateville Penitentiary. I eventually got really interested on why people were violent. That's how I got started.

JM: What catalyzed that fascination with violent behavior?

WW: What really catalyzed it was when we started an ex-offender program and I got to meet several families that had produced a criminal. I found some wonderful families, caring and capable families, that had other children who turned out just fine, but one child who was a disaster from the age of one. I began to realize we didn't understand why people had bad behavior.

We then asked the question, "Could it be something related to their brain chemistry or their body chemistry?" Several Argonne co-workers knew I was going to the prison and asked "Can I come to?" After recruiting a couple world-class chemists, I started doing lab studies of their blood,

their urine and hair and found that they were very, very different from the rest of the population. That's how I got started studying body chemistry.

JM: Were these studies that you initially did, these lab studies, were they different than the conventional analysis that a typical family physician might do in their office?

WW: In the beginning, we studied nucleotides and other biochemicals that I thought might be abnormal. For many months the data was terrible. Everything changed one day when I met a lecturer at Argonne by the name of Dr. Carl Pfeiffer, whom you may be familiar with.

JM: Sure.

WW: I was able to spend an hour with him after his lecture. At the time, I didn't know he was one of the world's leading nutritional scientists. He told me that he thought our work was valuable. He urged me to continue and suggested that we study trace metals, because he said that when he was doing his work on schizophrenia, that was where he got his first really good data. I took his advice. We started studying trace metals, and sure enough, copper, zinc, manganese, and toxic metals were very different in criminals compared to the rest of the population.

JM: You mentioned Dr. Carl Pfeiffer, who was really another legend in this area, also in the Chicago area. Didn't you wind up developing a pretty strong collaboration with him in implementing your theories and strategies?

WW: Yes. Actually, he became very interested in our research. I would send him some of the data as time went on. Once he invited me to the international symposium that he held once in a year at Princeton. It was pretty daunting for me. The first morning speaker morning was Roger Williams, the great Roger Williams. The second speaker was Abram Hoffer. The third speaker was Carl Pfeiffer. I was the last speaker before lunch and I expected everybody would leave before my talk.

JM: That is actually the best spot on the speaking schedule, by the way. Before lunch.

WW: Really?

JM: Absolutely. No question. The worst one is like right after lunch.

WW: You're probably right. Everybody's drowsy. Anyway, he really loved the research. Of course he knew that he had inspired it. I had terrific data really by that time. We had found four different trace-metal patterns for violent people including a Type B group who were the sociopaths

Pfeiffer urged me to send some criminals to him so he could study them at his clinic, so I did. I had founded a public charity by that time. First I brought him five criminal sociopaths with the Type B trace-metal pattern who were fresh out of prison and he spent the entire day studying them. By late afternoon he was very excited because he found they each had the same odd combination of chemical imbalances. Pfeiffer believed this abnormal chemistry might be partly

responsible for the behavior of sociopaths (often referred to as psychopaths), including serial killers. They all had severe zinc deficiency. pyrrole disorder, low blood spermine, and were all very, very undermethylated. They had this unusual combination of bad chemistry and Pfeiffer was especially interested because they were all the same. He urged me to bring more criminals to his Princeton clinic so he could study them. .

Eventually, he and I jointly evaluated 500 patients, mostly violent adults and children. We got our best clinical results with the kids, young people with the same kind of chemistry who were mostly very, very violent young kids. We were much more successful with them than with the criminals. I have to say we didn't really succeed in finding a way to help the adult criminals. It seems that they would get better for six to eight months but then later on I'd find out they were back in prison. That probably had a lot to do with the fact that most continued abusing alcohol and illegal drugs and had an ingrained negative self-image.

By about 1990, we decided to focus on children and not on adult criminals and this has been very successful. If we could get a child before their lives are ruined, perhaps before puberty, our success rate was very high. We have published successful outcome studies for behavior in peer-reviewed journals.

If compliant with the nutrients, about 90 percent of the families and the doctors reported a striking improvement in behavior. Most of these kids, of course, were initially on drugs, everything from Ritalin to powerful antipsychotic medications. After their chemistry was balanced, most families reported they could discontinue the drug medications and be fine without it, which is especially good.

JM: Great. You transitioned from the violent criminals to children.

WW: Yes.

JM: Initially aggressive children. But then you expanded that to those with autism and attention deficit hyperactivity disorder (ADHD).

WW: Yes. An early surprise while working with Pfeiffer was that not only did behavior get better, but a lot of the children had been terrible students and their academics got better. This was when we learned our nutrient therapy could help people with ADHD.

By 1985, Pfeiffer started telling me every time we met, "What we really need is an outpatient clinic in the Midwest for behavior." Eventually I realized he meant me and I founded a clinic we called the Carl Pfeiffer Treatment Center in Illinois. Pfeiffer actually was going to evaluate and assist in the first six months of patients, but he died of a heart attack just before we opened in 1989. Our Illinois clinic had a very humble beginning but rapidly grew to a major center that treated more than 25,000 patients.

JM: How old was he when he passed?

WW: He had a nearly fatal heart attack when he was 55 years old. That's when he got really interested in nutrition. He died at the age of 81.

JM: Okay. That's not too bad.

WW: He said his doctors told him he wouldn't live that long, but he felt he proved them wrong because of his greatly improved nutrition.

JM: Yeah. [There are] probably a few things that could have been peaked since then, but that's fine. He still added 30 years or 25 years to his lifespan.

WW: He did.

JM: What were some of the most common observations that you were able to find? Because that's likely going to be an issue with many people watching this. Aside from the zinc, are there methylation defects too?

WW: I've always been a numbers person. I started amassing gigantic databases. I think I have the world's largest chemistry database for autism, depression and behavior disorders. When you look at these millions of chemical analyses of blood, urine and tissues, it's obvious that there are very great biochemical differences in these populations

One of the really fortunate things that we learned is that only about six or seven nutrients dominate mental function. There are hundreds and hundreds of important nutrients in the body, but with respect to brain function, there are about six or seven that dominate.

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Eventually, I found out why. We learned each of these nutrient factors is either involved in synthesis of a neurotransmitter or the functioning of a neurotransmitter. The list includes methylation – either undermethylation or overmethylation. In our database, 70 percent of the general population have normal, typical methylation. Twenty-two percent are undermethylated, and by the way, that includes most doctors, scientists, heads of industry and great athletes. Eight percent are overmethylated. About 70 percent of all people who have a mental disorder have one of these methylation disorders.

JM: Either over or under. Not normal.

WW: Either over or under. Yes. The symptoms are completely different, and the treatment they need is completely different. We also found that zinc depletion is the most common imbalance that we see.

I had an intern this summer check out 15,000 of our patients across the board for all these different mental disorders. It turns out that the median plasma zinc level was 76 micrograms per deciliter, whereas the ideal level's between 90 and 130. Virtually everyone with a mental disorder seems to need zinc and improve after taking it.

Copper is also really important. Copper is a major factor in the synthesis of norepinephrine, one of the major neurotransmitters. If you look at how it's formed, it's synthesized in the brain from dopamine. The reaction's enzyme needs copper in order to function. Divalent copper (Cu^{++}) is a powerful factor in the amounts of dopamine and norepinephrine synthesized in the brain.

In animal studies, two separate research groups found that if they starved animals of copper so that they only have 25 percent of the normal amount of copper in their blood, the ratio between norepinephrine and dopamine is altered by more than a factor of three. Copper overload can have an extraordinary impact on brain function.

Most of us have the ability to homeostatically control copper but many people don't have that capability. It all has to do with an enzyme called metallothionein that is genetically expressed. Some people have an impaired metallothionein system and the result is copper overload. This imbalance is present in most patients diagnosed with autism, schizophrenia and postpartum depression. Copper overload is a recipe for very high norepinephrine and low dopamine. Elevated norepinephrine is associated with anxiety and depression. Dopamine is a feel-good neurotransmitter and low levels are a hallmark of ADHD. Copper overload produces a nasty combination of neurotransmitter imbalances that are found in millions of Americans.

JM: Do you ever see low copper levels?

WW: Yes, we do occasionally see low copper levels. For example, most undermethylated persons exhibit low-normal serum copper. We've learned that most sociopaths innately have very low copper levels. We must identify each patient's biochemical individuality and provide treatments that will normalize their chemistry. There are great, great biochemical variations in humans. An advantage of nutrient therapy is that normalizing just seven or eight nutrient factors can help 95 percent of the patients we see challenged by mental disorders. .

JM: We could go into a few of the others in a moment. But I'd like to stick with the zinc and the copper since those are the two you've mentioned in the methylation pathways. But as a chemist and someone who's got extraordinary clinical experience in this area, you – I'm sure – have evaluated a whole variety of different assays to make that determination. What is your conclusion as to the best way to measure zinc and copper status?

WW: Well, the zinc experts of the world meet about every eight or nine years. They evaluate the different lab tests for measuring zinc status. For the last 40 years, they have believed – and I agree – that plasma zinc is the best, red blood cell zinc is next. At the bottom of the list of tests that have some value is the taste test, which is the least reliable.

Lab testing of copper is not too much an issue since most labs throughout the world do a really good serum copper assay. I think it's especially meaningful if you also do ceruloplasmin at the same time, because then you could find out how much free radical copper you have, how much of it is loosely bound. That gives you a really good indication of oxidative stress. By the way, oxidative stress runs through every single mental disorder we see, without exception. Every mental disorder generally involves extraordinary elevations of oxidative stress, including schizophrenia, bipolar disorder, violent behavior, and autism.

JM: There are a lot of good reasons that they would have that. Three I could think of would be the food they're eating, which is a bunch of crap – the terrible vegetable oils, the excessive carbohydrates, excessive protein. It's just going to cause a reduction in ketones and a radical increase in reactive oxygen species. Exposure to EMFs, glyphosate, you name it. Those are a few of the things by itself, even with everything balanced, is going to be a problem.

WW: Our environment's getting worse every year. .

JM: Yeah. We definitely are. Our exposures are just profound. But I'm wondering what you would observe for healthy ceruloplasmin levels. When did you become alarmed when they're too high, which seems to be one of the indicators of excessive oxidative species? I mean I imagine it, also along with high sensitivity C-reactive protein (CRP), would be useful.

WW: Exactly. The CRP is something else we routinely test for as a marker for inflammation. But generally, copper and ceruloplasmin tend to be high or low together.

JM: Okay. Interesting.

WW: The ideal level for copper in a human being, with respect to mental health, we know is somewhere between 75 and 100 micrograms per deciliter. The ideal amount of ceruloplasmin has to do with whatever your level of copper is. Ideally, the amount of copper in ceruloplasmin should be around 85 to 90 percent, meaning that only 10-15% of the copper is loosely bound or present as free radicals. It's really great to do both simultaneously, because then you have a really good picture of not only the copper status, but also the level of oxidative stress.

JM: Okay. Great. What's your analysis for the methylation pathways? Or do you do any genetic analysis like 23andMe to figure that out? Are the pathways gone specifically or you just measure the end products?

WW: Actually, I believe I was the first person to really alert the world to the importance of methylation in mental health. Back in 1999, the great Dr. Bernard Rimland knew I had the world's biggest chemistry database for autism.

JM: He's another person who's passed. There's like five that you've mentioned so far.

WW: A gentle giant. He was just a wonderful human being. Brilliant and just dedicated to autism. He invited me to one of his think tanks that involved 60 or 70 people from around the world, researchers [and] clinicians. He wanted me to report everything we had learned about autism, so I did. When I gave my first talk to this group, I reported that most autistics had elevated serum copper. They already knew that. After presenting data that most autistics also had zinc depletion, elevated pyrroles, toxic metal overload, oxidative overload, and inflammation, the group said they already knew all of that. But when I said 95 percent of autistics are undermethylated, and they all said, "What?" Nobody had any idea why that might be important. Rimland kept inviting me back to talk about methylation. Eventually, some first class

methylation scientists became involved – for example Jill James and Dr. Richard Deth. We learned that it was true that methylation was really important in autism.

After a while, people from the autism community got very interested in 23andMe genetic testing, because the No. 1 cause of undermethylation is a single-nucleotide polymorphism (SNP), that is a mutations in the enzymes for this complex methylation cycle, also known as the one-carbon cycle. The methylenetetrahydrofolate reductase (MTHFR) enzyme reaction is the rate-limiting step for that whole cycle, for most people.

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However, most human beings have enormous numbers of SNPs. They've already found 10 million snips or mutations in the human genome. Every human being has thousands of these SNPs. A really high percentage of people even have the most serious MTHFR SNPs – the C677T, the A1298C that cause the most mischief in methylation.

A common mistake by nutritional scientists is that homozygous double copies of C677Tt do not necessarily mean a person is undermethylated and certainly doesn't mean that they will benefit if you give them methylfolate. That's one of the common misconceptions that we're finding throughout the nutritional field..

The reason is epigenetics. You have to consider the epigenetics and the methylation at the same time, The nutrient factors that dominate epigenetics include folates, methionine, SAMe and acetyl coenzyme A. These have a really powerful impact on epigenetic gene expression.

Folates are serotonin reuptake promoters by an epigenetic mechanism. If a person is undermethylated and has depression or anxiety or some problem related to low serotonin activity, you cannot give them folates -- because if you do, their methylation would improve and the patient would get worse. The reason is that epigenetically, folates act as what's known as deacetylase inhibitors and sharply lower serotonin activity.

Fortunately, most autistics don't have a problem with serotonin and they thrive on methylfolate. Many autism families and doctors are doing these genetic tests and it appears most benefit from it. However, at least 10 percent of autistic children and adults will get extraordinarily worse if you give them methylfolate. The reason is they happen to also have a serious serotonin issue.

We've evaluated more than a thousand undermethylated patients among our 3,000 cases of clinical depression. The largest depression phenotype in our large database actually is undermethylation. But if you give any form of folate to one of these persons, most would get worse. Their methylation would improve, but depression would get worse because folates enhance serotonin reuptake quite dramatically.

We know that methionine and SAMe are natural serotonin reuptake inhibitors. They do essentially the same thing that Prozac and Paxil do. Folates have the opposite effect. Folates are wonderful if you want to knock dopamine level down in schizophrenics, for example, or people who have high anxiety, overmethylated people.

This was a mystery for 30 years that bothered Carl Pfeiffer, Abram Hoffer, myself and a lot of other people. Why is it that some undermethylated people are intolerant to folates? Why is it that some overmethylated mental patients thrive on folates that improve methylation? It finally got solved in the year 2000 with the emergence of epigenetic science.

JM: Thanks for expanding on that. But it sounds like it would not be a wise strategy for someone to take these bits of information and try to apply them themselves, because it could be a prescription for disaster because it's easy to mix up. There are just so many different variables. You have to be seen by a professional, I think, is the bottom line. But this is a good piece of information in your armory. In turn, they could help guide you to find the right professional to do this, because you've gotten so many good results over the years. You've treated about 6,000 autism patients?

WW: 6,500 cases.

JM: Yeah. That's a lot.

WW: I think at one time we had the largest autism population in the world.

JM: Yeah. You said that if they're compliant, you're getting somewhere close to 90 percent improvement rate. Is that [correct]?

WW: Not with autism. That was behavior disorders -- the violent children who usually recovered.

JM: Okay.

WW: I believe a major challenge with autism is that it's what I call an epigenetic disorder. It hasn't been proven yet, but autism fits the major criteria for an epigenetic disorder – One that can appear suddenly and remain a lifetime. For example, we now know that most cancers are epigenetic in nature. In addition there is growing evidence that schizophrenia is epigenetic. These are disorders that appear rather suddenly, like an autism regression, and are complex disorders involving many dysregulated genes.

I've worked with more than 6,000 families who've had an autistic child. Most stated their child was quite okay until they're maybe 20 months old and then in a matter of a day or two, they changed dramatically. What I think happens is that they have a disorder in which environmental stressors or environmental insults permanently change expression of several genes. That's why they're so complex and why there are so many different problems like immune function, brain function and on and on, with GI tract issues, with autism. I think it's epigenetic and appears rather suddenly.

JM: Yeah. Most likely one of the biggest causes of the epigenetic influence is mitochondrial dysfunction, which I just wrote a book on that is called *Fat for Fuel: A Revolutionary Diet to Combat Cancer, Boost Brain Power, and Increase Your Energy*. I'm quite familiar with some of these variables that can contribute to that. Let's discuss what some of them might be for autism.

From my perspective, there are a few. Obviously the food they're eating – they're not burning fat as their primary fuel, not generating ketones, which have less reactive oxygen species. They're exposed to electromagnetic frequencies, unhealthy nonnative ones. That is a major issue, which will clearly increase reactive oxygen species. And then glyphosate, Roundup, heavy metal toxicities and vaccines. Those are five that are most likely powerful variables in the manifestation of this. I'm wondering on your perspective on those and any others that you're familiar with.

WW: First of all, I've tested 6,500 of them. As a group, they have much higher toxic metal levels than even their own siblings or others in the same environment. They're overloaded in toxics. I believe the reason why is that they are born with a vulnerability to toxics that's higher than most. I think they have insufficiency in glutathione, in metallothionein and all these wonderful natural antioxidants that we have. They are born with this vulnerability to the environment and also vulnerability to a bad diet.

To me, the real issue was why does autism onset occur? Because once autism occurs, it's a striking, dramatic and really a horrendous kind of thing for a family -- to see a child change so totally, sometimes, in just a day or two. I think that the key really is what initiates it. How can we prevent it? Speaking with some of these groups of scientists that get together, one of the biggest mysteries is why doesn't it go away? Why is it that once autism rears its ugly head, it's a permanent issue the rest of their lives? There have been all kinds of therapies that fail to quickly reverse autism. This is the case with classic Kanner autism. However, about 1 out of every 3 autistics today diagnosed with autism don't have true autism. A lot of these children recover completely because they don't have the epigenetic variation of it.

But everything you mentioned is correct. Any kind of an insult in terms of the environment or a failure to have a proper intake of nutrients can really mitigate toward autism, and can prevent partial improvements or recovery from autism. We've seen hundreds of our severe autistics recover, but in most cases -- about 85 percent of the families from our clinic – reported a nice partial improvement. But as far as total recovery or being able to live a normal life, to have a family, have a job, become taxpayers, for true Kanner autism, the numbers are still quite small.

JM: What is the term you're using there? I'm not familiar with it. Kanter? C-A-N-T-E-R?

WW: Kanner was the doctor who discovered autism and gave it its name back in the '30s. He was that person. Basically, autism is a dramatic condition. The changes in these children from before and after regression are just astonishing.

JM: Certainly in the '30s and even as late as when I graduated from medical school in the mid-'80s, – actually early '80s – the incidence of autism was 1 in 10,000.

WW: That's correct.

JM: Now, it's 1,000 times higher. It's way under 1 in 100, probably closer to 1 in 50.

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WW: It's believed to be 1 in 65 for males, although I think that number's a little bit exaggerated.

JM: Sure.

WW: They've softened the definition of autism a bit.

JM: Yeah. And they haven't really reported on it recently. If you look at Dr. Stephanie Seneff, who's out in MIT, she's a big fan of the contribution of glyphosate and vaccines for this. She predicts that it could be as high as 1 in 2 or 1 in 3 in the next generation, which is a frightening statistic. I'm wondering if you're seeing a trend, if you're observing these statistics on a regular basis and seeing any other different statistics that's being reported by the public health authorities.

WW: I've seen 6,500 cases.

JM: Right. That's why I'm asking.

WW: I can tell you that thousands of these parents -- thousands of them -- believe vaccinations are responsible. Many told a very sad story of how they had a child who was developing normally, was beginning to speak and was singing and charming their grandparents. Then maybe the child got sick. They took him to a pediatrician and the pediatrician said – I've heard this story hundreds of times – "Oh, you're behind on your shots. You're behind on your vaccinations." They took a sick child and gave them multiple vaccinations, at that time, with thimerosal and mercury. Hundreds of these families said that within a day or two, their child changed forever. Stopped and lost all speech, their personality changed. They became sick. They became intolerant to several foods. They were just very troubled little human beings. When they sought medical help, eventually they wound up with the diagnosis of autism and were told that it was incurable and that there was no hope really for recovery. We saw a lot of human misery when talking to these parents. Autism is just a shocking and terrible thing. But the condition, what I call Kanner autism, is true autism, the severe epigenetic disorder autism, which is what afflicted most of the patients we saw before 1995.

I've done a number of experiments on toxic metals. I was bothered by all this debate about mercury and whether mercury was still in these children's brains because of the vaccinations. I decided to do an experiment to find out, and I was the first person to actually measure mercury levels in autism brains. I received nearly 400 tiny samples of brain tissue from Johns Hopkins. Using an Argonne facility called the Advanced Photon Source – by the way, it cost 1.6 billion dollars for this device – we obtained more than a million accurate chemical analyses of autism brain tissues and compared the levels to those of typical children. One thing we looked for was mercury. Every one of these autistic children that we studied had had thimerosal from vaccinations. The mercury was gone. We couldn't find it. But this was years later. The half-life of mercury in the body is 42 days. The half-life of mercury in the brain, ethyl or methyl mercury, is 70 days. I think what it amounts to is that mercury is a terrible poison. It can be a terrible insult for these vulnerable kids who should never be exposed to it. However, mercury doesn't stay in

the body and it doesn't do continuing damage. After a year or so, nearly all of the mercury has left the body. Unfortunately there are tens of thousands of families who continue therapies aimed at taking the mercury out of their child's brain when it's no longer there.

JM: Have you found any detoxification interventions that have been particularly helpful? Like near-infrared sauna, detoxification foot baths, a variety of chelators. In conjunction with that, have you found anything that's particularly useful?

WW: Yes, I have. Because these children also have extraordinary copper-zinc imbalances, that means that the metallothionein protein is not functioning. Metallothionein has the job in the body of homeostatically controlling copper and zinc. It's radically abnormal for autistic kids as a group and I presented that at the American Psychiatric Association about 15 years ago.

What I developed was a metallothionein promotion nutrient therapy, a formulation of 22 nutrients that we know enhance the genetic expression of metallothionein and also enhance the function of metallothionein once it's in the body. Our doctors used that on more than 2,000 autistics. We found that it certainly made an improvement in the outcomes that we got with our population.

JM: So it's a supplement. They use that in conjunction with the other more conventional detoxification strategies a lot of clinicians are using?

WW: The most important antioxidants in the brain are somewhat different than the rest of the body. I call them the three musketeers. They are glutathione, metallothionein and selenium. It's specific to the brain. Glutathione is the first line of defense.

JM: Selenium is not an antioxidant, though, it really is an indirect one because it increases glutathione levels.

WW: It also enhances the function of metallothionein, the joint function of glutathione and metallothionein, which work together hand in hand, especially in the brain. Glutathione is the first line of defense. The problem is we don't have a large supply of glutathione which comes from our diet. For example, many autistic kids have very low glutathione partly because of a poor diet. It's hard to get them to eat anything.

The thing is, in the case of a major oxidative overload, we quickly run out of glutathione. What happens when you run low in glutathione in your brain, the brain senses this and you genetically express and shower the brain with metallothionein. Metallothionein doesn't work unless you have oxidized glutathione. It's a hand in glove situation. It's the backup system for glutathione in the brain. We know that without selenium, that whole system doesn't work well.

You're right. It's indirect. It's not an antioxidant by itself but selenium, for brain function, is especially useful. Of course, we have catalase, we have N-acetyl-L-cysteine (NAC). We have a whole army of wonderful natural antioxidants.

JM: I believe one of the other bottlenecks of nutrients to have your body produce glutathione would be cysteine or the sulfurs. Do you use that like in the form of NAC? Do you use that as well?

WW: NAC is a great way to do that. There are a lot of nutritionists who feel that you need the methylation cycle to function to get enough cysteine, and therefore enough glutathione. It really isn't true. You could have a complete blockage of cystathionine, which then leads to cysteine and then glutathione and still have a normal amount of cysteine and glutathione. There are two processes in the liver that homostatically normalize cysteine, regardless of what happens in the methylation cycle.

JM: Okay. Good. So you like NAC and selenium. I think most people would benefit from being on a selenium supplement. It's kind of foolish not to be. It's something I take every day. It's a trace mineral, so you don't need much. It's easy to overdose on, so we're talking about micrograms. It'll be 200 micrograms or 250 micrograms a day.

WW: Yeah. Of all the metals, it's the one with the narrowest division between deficiency and overload. Selenium overload can be a terrible thing. It's only about five times what you need to be normalized. You've got to be really careful with selenium.

JM: Yeah. It's a beautiful one, though, because we all need glutathione. That's the magic puppy. No question.

WW: Especially in Australia. I've been to Australia 15 times. They have almost no selenium in their soil.

JM: Yeah.

WW: It's not available to them unless they take supplements.

JM: You can eat some Brazil nuts, but then again it depends on where the Brazil nuts were grown. If they were grown in selenium-deficient soil, they're not going to be high in selenium.

WW: I eat a few Brazil nuts every night.

JM: It depends on where they're grown.

WW: Yes.

JM: If there's no selenium in the soil, it's not going to be in the nuts. That's for sure.

WW: Absolutely.

JM: Have you done work with far-infrared saunas to accelerate the toxic metal exposure or load that these kids have?

WW: No, I haven't. We've had great success with the therapies we have. For one thing, you could do a lot of good just by normalizing zinc, because zinc is the No. 1 factor for enabling this metallothionein antioxidant to function, and therefore support glutathione. We find that we can get the job done quite nicely with that. I think the demarcation between what's best for the body and what's best for the brain is very important – The brain is quite separate from the rest of the body --. Our focus has been on the brain.

JM: Okay. One of the side effects of using these interventions, especially chelation therapies, is you tend to deplete zinc, making supplementation even more important. But let's talk about doses for a bit. In the past, there has been a tendency, I believe, to overdose on supplementing zinc. It's not [inaudible 39:40] to see people taking 30 or 50 milligrams a day of zinc, I think that's maybe two or three times as high as they need. In my experience, 50 milligrams is closer to the sweet spot. I'm wondering what you're seeing in your population.

WW: I've studied the population for a long time. I think a lot of people don't need any zinc at all. if they are born with good genetics and if they have a good nutritious diet, they don't need any.

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However, in our mental health population, many people are born with a genetic tendency for zinc deficiency. When I brought my first group of criminals to Carl Pfeiffer, he made me go through his blood testing. I found out that I was terribly zinc deficient. I know what my target is. I know that for mental health and for physical health, a person's plasma zinc should be between 90 and 130 micrograms per deciliter. I take 100 milligrams of zinc a day.

JM: You take 100 milligrams?

WW: I have to because for me, I'm fighting genetics. For me, that's what it takes for me to have a normal healthy level of zinc. It depends totally on each individual's metal metabolism.

JM: What's the normal healthy level of zinc? Because sometimes the referential ranges that the labs give are not the ideal ranges. In fact, that's more often than not.

WW: Exactly.

JM: What do you identify as the optimum healthy range for plasma zinc?

WW: Between 90 and 130 micrograms per deciliter in plasma.

JM: Okay. Then if you're lower, how long would you take between supplement patient regimen and retest before – Is it a relatively quick increase or?

WW: It actually takes two months.

JM: Two months.

WW: Yes, about eight weeks. It takes eight weeks.

JM: Okay.

WW: Then what we do with our patients, we test their zinc level. We then individualize and make our best estimate of what the dose would be to normalize it. After three months of taking this zinc dose, we test again to fine-tune the dosage. We really don't have to test them again if they're adults.

JM: That's good to know. It's a simple test. It's relatively easy to get done. I mean you probably need a doctor's order. But as I understand, it's easily ordered through the two most common labs in the U.S., which is Quest and LabCorp.

WW: That's exactly right.

JM: Those reference ranges you gave are pretty similar. Ninety for the zinc and 75 for copper. They're both tip-top out at 100 micrograms per deciliters.

WW: But the major labs, LabCorp and Quest, they might give you a normal range of 65 to 140. But those are two standard-deviation ranges. That's 95 percent of the population. If you're at the bottom of the range, only 2 1/2 percent of the population are that low. As you said, they are far from the optimal level.

JM: There's a range. That's why I was really careful in being certain to ask you for those.

WW: Exactly.

JM: Because we know that for so many of these other tests. The most common ones that really have a significant influence on human health from my perspective are vitamin D, which still many experts get wrong. The true experts know it, but conventional physicians are clueless.

We just published an article recently where some supposed expert was saying that even the levels as low as 20 nanograms per milliliter is normal. That's just severe outright deficiency. Then ferritin too. I don't know if you've looked at iron levels or ferritin levels.

I'd love to get your info on that, because from my perspective, it's a different population. Premenopausal women and children are excluded because they typically have low ones. But adult men and postmenopausal women, [it's a] different issue. So many of them are iron toxic. That manifests through high elevated ferritin levels. I'm wondering what your experience with that is.

WW: First of all, we test everybody for vitamin D and have seen most Americans are below the healthy range. I saw somebody with a Vitamin D level of seven two weeks ago. Seven!

JM: That's rickets, essentially. That person will get rickets.

WW: I've been training doctors in Norway. You could imagine what their vitamin D levels are. They're incredibly low because they don't get any sunlight.

JM: Chicago's not much better.

WW: Not enough sunlight certainly. But Vitamin D is something we have to test everybody for. We also look at ferritin. We find that ferritin is especially abnormal in people with, what we call, pyrrole disorder, people who have a genetic imbalance that tends to strip zinc and B6 out of the body. I think about 8 percent of the population have it to some degree.

JM: How do you test for a pyrrole disorder?

WW: There's a urine test that was developed by Abram Hoffer and Dr. Pfeiffer many years ago. That still is the gold standard test for pyrroles. It's a genetic disorder. It has to do with the biochemistry in your bone marrow and your spleen. If you happen to have this, you are producing maybe five or 10 times too much of this thing called pyrroles, which are just the byproduct of natural reactions, like the formation of hemoglobin. It's a byproduct the body just gets rid of. There's no value to it. But as it leaves the body, it has an affinity, a tendency to bind to anything that's an aldehyde. The No. 1 aldehyde in the body is B6. It just strips B6 out of the body. If a child has a pyrrole disorder, they're going to be extraordinarily low in B6, which affects memory, affects their ability to read. That's really common in children with ADHD.

Anyway, that gives you an idea of the chemical imbalances we test for. We are not experts on cancer, heart disease or things below the neck so much. We, of course, recognize the GI tract does have a lot to do with brain function. We're learning more and more about that. But our focus really is on brain disorders.

I'm absolutely convinced that the use of psychiatric medication is going to fade away from society. That as brain science advances, we're going to learn how to normalize the brain. Every one of these powerful drugs sold by pharmaceutical companies do not normalize the brain. They are foreign molecules that cause an abnormal condition. They might correct depression or anxiety, but you wind up with something that's not normal. That's what the side effects are. We'll never be able to avoid side effects with drug medications.

JM: The problem though is that the drug-based therapies have quite a bit of money behind them in marketing and kind of driven by the corporations that sell them, whereas nutrient-based therapies have very little revenue that's generated or any big support behind this. Although in theory, it seems to be a rational prediction, the reality is that I think we've got many more years ahead of battling to help the average person understand this and make a rational choice.

WW: That's true. You, of course, have been a leader in this battle. We're on the side of the angels here, doing the right thing. My organization's a public charity. We have no financial interest. Money doesn't matter to us. We've had great difficulty attempting to change mainstream psychiatry. I've tried at the highest level. I've given a talk at the Surgeon General's Office. I gave a talk at the U.S. Senate. I've talked to National Institutes of Health (NIH). I've been to the APA annual meetings four times.

JM: APA is the American Psychiatric Association where those [transpire].

WW: Although the last time I went there, they finally listened to me -- After three times of giving what I thought was important information and them not paying attention -- I was there about two and a half years ago and gave a talk on depression. I basically explained to them they're doing depression all wrong. They actually listened to me this time.

I showed them our huge chemistry database and explained that depression is a name given to at least five completely different disorders, each involving different symptoms and each involving different neurotransmitters that are malfunctioning. Then I described each one of these biotypes and showed them that if they would simply do some inexpensive blood and urine testing, they could identify which people would be good candidates for a selective serotonin reuptake inhibitor (SSRI) or which ones would do better on benzodiazepine, but even more importantly, how they could correct it with nutrients.

My talk was on a stage in a big auditorium full of psychiatrists. There were 17,000 psychiatrists at this meeting from all over the world. I was one of four speakers at the session. At the end, the moderator said that the speakers agreed to hang around afterwards if anybody wanted more information. There was a big rush of psychiatrists who came forward. All of them wanted to talk to me.

We've had an international doctor's training program for years. We are now getting a flood of psychiatrists learning our nutrient protocols. Last year in the USA I believe we have trained about 45 psychiatrists. We've now got 500 doctors throughout the world who are doing our nutrient protocols for mental illness. I think this is a ground-up way to get this done.

JM: That's good.

WW: Because you're right about the –

JM: We only have 15,000 more to go, or 20,000.

WW: It's a start.

JM: Yeah. It's a start. We've got to start somewhere. That's good.

WW: We've all got to do what we can, the best we can.

JM: I wanted to ask a question about the shooters too, the school shootings. There have been a number of them. I'm wondering what your take on it is. Is it a combination of these biochemical pathway operations? Or they're taking antidepressants? Or a combination of both?

WW: I've done a study, as others have, of the last 50 school shootings in the United States since 1990. There have been 50 major ones – Columbine and a few others.

[-----50:00-----]

What we know is that, based on research done by lots of people, 42 of these cases involved persons who did not have abnormal behavior until they were roughly teenagers -- these forty-two had been taking an SSRI antidepressant.

I actually discussed the high incidence of SSRI antidepressants in school shootings before the APA, in front of the psychiatrists. I tried to explain that they could do inexpensive lab testing to identify low-folate depressives who are intolerant so SSRIs – who may become suicidal of homicidal. I pointed out they can do a blood test and find out which children or which adults are more likely to become violent if they get an SSRI. I've written this several times, published it in magazines. I think that you and I understand this and believe it, but it's so hard to fight the pharmaceutical industry.

After the killings in Connecticut (was it Connecticut?), the chief of police said that he had found a lot of bottles and medical [paraphernalia] -- He had found that this young man had been taking medication – He said the cause of the tragedy might become known when this information was released However the information was embargoed and never released. You cannot find out what this young boy took before he went in and killed all those children and a teacher. I'm sure he was taking an SSRI. I'm almost certain he was an overmethylated depressive who should have never been prescribed an SSRI.

JM: Yes.

WW: If you buy Prozac or Paxil, the insert inside warns that some people, especially young males, may develop suicidal or homicidal behavior. We now know which ones they are.

JM: Clearly, it's not the cure for it. It's just a symptomatic Band-Aid for some. For others, it could be making the problem much worse. If someone wanted to find more information about what you're doing, you've written the book *Nutrient Power: Heal Your Biochemistry and Heal Your Brain,* which has been out for a while now.

WW: Yeah. It's now available in six languages.

JM: That's all? Six languages only?

WW: Yeah. You probably have some with 30. But it's growing. I'm told by Amazon that the sales keep increasing, which is good.

JM: Good. That's good.

WW: The book, *Nutrient Power,* tells a lot of this. Our website is walshinstitute.org. It's getting an increasing number of views. Maybe we've got one-hundredth as many as your website. By the way, I want to compliment you for leading the way in getting the word out to the public. I think that's great.

If people want more information, [they] could contact dana@walshInstitute.org. We're a public charity. Or there's a phone call, if somebody wants to call us. They won't get to me directly, but – Can I give the phone number?

JM: Sure. Absolutely.

WW: It's (630) 506-5066. They will get someone who will try to assist whoever calls. Our website does have a resources section that recommends quality labs, compounding pharmacies and a list of doctors who we've trained, who are now able to do this kind of therapy.

Just two weekends ago, we trained our 500th doctor. Our goal is to train another 500 or 1,000 in five years. We have doctors from, I think, 32 countries now doing this. We've got a great doctor from the Sultanate of Oman and doctors from Egypt and Nigeria. It keeps going.

JM: We certainly need them in all those areas. That's great to hear that you're creating awareness and educational information training that these clinicians can help their patients with. Thank you for doing that. We've got the resources that you've just provided. If anyone's interested in pursuing this and having this as an additional therapy that can be implemented, I would encourage you to contact Dr. Walsh's institute.

WW: Thank you for what you do.

[END]