

## Your hidden mercury burden: A likely root cause of the other root causes of anxiety - part 1

- chronic mercury poisoning effects at the molecular level: blocks enzymes, displaces minerals
- chronic mercury poisoning effects the cellular and organ level: mineral transport, destroys barriers like gut and brain, mitochondrial dysfunction
- effects on hormone imbalance, blood sugar regulation, food sensitivities, GABA/serotonin levels, autoimmunity
- why mercury toxicity is complicated and hard to test for
- subjective signs of chronic mercury poisoning



*Trudy Scott:* Welcome to *The Anxiety Summit* Season 2. I'm your host, Trudy Scott, food mood expert, certified nutritionist, and author of *The Antianxiety Food Solution*. Today's topic is Your Hidden Mercury Burden: A Likely Root Cause of the Other Root Causes of Anxiety. Kris Homme is our speaker. A very big welcome, Kris.

*Kris Homme:* Thank you, Trudy.

*Trudy Scott:* Thanks so much for being here. I just want to share why Kris is here. Kris approached me during Season 1 of *The Anxiety Summit*, and she had concerns that mercury toxicity could be the root cause of many of the issues that we talked about in Season 1, like low zinc, like low neurotransmitter levels, like digestive issues, food sensitivities, hormonal imbalances and so on. And I know mercury toxicity is a big topic, it's a big issue. It's also a controversial topic, certainly when it comes to chelation and we're going to talk

a little bit about that, but the more that Kris and I talked - and we spent a number of hours on the phone chatting about this and brainstorming, and she shared all the research that she's done and all the activism that she's done - the more that I knew I wanted her to come and share this extensive expertise in Season 2. So here we are, and I'm just really, really pleased to have you here.

*Kris Homme:* Thanks, Trudy. I'm happy to be here.

*Trudy Scott:* Let me read your bio and then we'll get started. So Kris Homme is a retired engineer turned science writer. She has graduate degrees in public policy and public health, and she has chronic mercury poisoning. She is the lead author of a peer-reviewed journal article entitled *New Science Challenges Old Notion that Mercury Dental Amalgam is Safe*, published in *BioMetals* in February 2014, which describes the new science of genetic susceptibilities to low-dose exposures of mercury. She facilitates a chronic mercury poisoning support group in the San Francisco Bay area. As an activist, she is party to the ongoing legal effort to compel the FDA to restrict mercury dental amalgam. In 2013, she led a campaign in the city of Berkeley to improve the information given to dental patients about the risks of mercury dental amalgam, and you can learn more at [MercuryandMore.weebly.com](http://MercuryandMore.weebly.com).

So let's get started. *Your Hidden Mercury Burden: A Likely Root Cause of the Other Root Causes of Anxiety*. So, Kris, you have chronic mercury toxicity, and I would love you to share your story with us.

*Kris Homme:* Well, as a youth, I had low energy, weight problems and extreme functional hypoglycemia. Then, as a young adult, I had an extreme need for caffeine and stimulants. At 33, I developed macular degeneration and later chronic fatigue and chemical sensitivities. My neurologist gave me a mercury blood test and told me that I didn't have mercury poisoning, so that delayed my getting a correct diagnosis for several years. Eventually I read a book called *Amalgam Illness* by Andrew Cutler, and it described all my symptoms and explained the physiology of mercury toxicity. At that point, I ordered a porphyrins panel - that's a test we can talk about later - and it was positive for mercury.

*Trudy Scott:* And you have, or had a lot of mercury fillings?

*Kris Homme:* Yes, I had twelve mercury fillings for 40 years.

*Trudy Scott:* Okay. Sounds like me. I had the same, and everyone in those days, in our youth were given mercury fillings, and I remember when we talked, saying “well, no one’s getting mercury fillings anymore.” And you said to me “that’s not true. It’s still happening.” So I was very, very surprised about that, and that was one of the other reasons why I really wanted you on so we can create this awareness about the problem and so we can stop people continuing to get these mercury fillings.

*Kris Homme:* Yes, they are still being used. There is a trend not to use them. Over half of dentists don’t use them, but almost half still do use them. They’re often used for posterior restorations, and they’re almost exclusively used in the Medicaid population.

*Trudy Scott:* Very, very unfortunate. And I, after our conversation, I remember contacting a colleague of mine who has kids, and I asked her “are you aware that mercury amalgam fillings are not a good thing”, and she wasn’t. So you’re right, there are a lot of people who aren’t aware, and this is one of the objectives of this - creating this awareness so we can stop it.

*Kris Homme:* Yes, and it’s so complicated. Mercury fillings are just part of our total load, but if we’ve got loads from other areas, from a prenatal burden and genetic susceptibilities, then these what-would-be-small amounts of mercury from our fillings can be toxic.

*Trudy Scott:* Great point. And you’re right. We’ve got our own unique biochemistry, so different people are going to be affected differently, and then we’ve got these other factors, but every little bit can have an effect. And as you say, chronic mercury poisoning can be the cause of these other root causes of anxiety, which is, I think, is a great way to put it. You know, we’ve got all these issues that we have when we’ve got anxiety. We’ve got these things that we say are the causes, but what if this chronic mercury poisoning is the issue? And this is what we’re trying to get to today, so let’s first talk about the effects that we see at the molecular level.

*Kris Homme:* Yes. Mercury is really a broad spectrum toxicant. It binds sulfhydryl, which is reduced sulfur, or sulfur that still has its reactive electrons. And sulfur is everywhere in the body. If you’ve had biology or biochemistry, you can appreciate this. Sulfhydryl is a common active site for many biomolecules, including enzymes, receptors, ion channels, transport proteins, cytokines, other signaling molecules, DNA and RNA transcription factors and structural proteins. Mercury also targets the sulfur in

disulfide bonds, which are the main means of stabilizing the three-dimensional structures of large biomolecules, including enzymes. And, as you may know, in the body, everything is about biochemistry, and biochemistry is about enzymes, so altering their structure means that things don't work.

*Trudy Scott:* So what happens when mercury blocks these enzymes?

*Kris Homme:* I think the worst aspect is that, by blocking the enzymes in the mitochondria, mercury causes an overproduction of Reactive Oxygen Species in the mitochondria, including free radicals, which are the worst type of Reactive Oxygen Species, and this causes tremendous oxidative damage and also impairs the production of ATP energy in the mitochondria, so no wonder you're tired. And, even worse, mercury also depletes glutathione, which is the most important antioxidant in the body, and it blocks the enzymes that regenerate glutathione, so it's a double whammy. It creates more oxidative damage and then it blocks the ability of the body to correct that damage. This means that mercury blocks detoxification in general, so you can't detoxify your normal byproducts of normal metabolism, the normal levels of Reactive Oxygen Species, and you also can't detoxify other toxicants that you may be exposed to, including mercury.

*Trudy Scott:* Wow. That's just making things much, much worse.

*Kris Homme:* Yeah. It's a vicious cycle. Another problem with mercury is that it displaces essential minerals like magnesium and zinc and it also displaces copper and iron in a manner that causes them to become dangerous free radicals themselves within the mitochondria.

*Trudy Scott:* This is big. This is really big because, you know, I'm hearing you mention things like detoxification, and we need to have good detox capabilities so we're not being affected by other chemicals that we might be exposed to. We've got this oxidative stress going on. We're depleted of these minerals that are so important for anxiety. Magnesium is a key mineral. I'm actually going to be interviewing someone talking specifically on magnesium. Zinc is so important as well. And then iron and copper, these are all co-factors to make our neurotransmitters, so I can see how if we've got this mercury toxicity, it's displacing these minerals, it's creating all this oxidative stress, and how that could be a root cause of some of the anxiety issues that we're seeing.

*Kris Homme:* Yes. People who understand a little bit of molecular biochemistry can really appreciate how significant mercury toxicity can be, how insidious it can be.

*Trudy Scott:* So we've talked about the effects at the molecular level. What about the effects at the cellular and the organ level?

*Kris Homme:* Yes, at the cellular and organ level, there are many toxic effects. Since mercury blocks sulfhydryl active sites in ion transport channels within cell the membrane, this alters the transport of essential minerals into and out of cells. This can cause functional deficiencies of minerals, as well as functional overdoses of some things like copper. But more commonly, functional deficiencies, meaning that you may be consuming enough of a particular mineral but it's not getting to where it's needed.

*Trudy Scott:* We've got a double issue here because you just talked about how it's displacing some of the minerals, but you also have got this problem where it's affecting how the minerals that you may have are actually getting in and out of the cells.

*Kris Homme:* Yes. A lot of these toxicities form a sort of positive feedback loop in a vicious cycle. In addition, and this is really terrible, mercury damages biological membranes. It promotes free radicals, which then start the destructive chain reaction called lipid peroxidation that damages cell membranes. And mercury also activates the phospholipase enzymes that break down membranes. Cell membranes can withstand so much damage and then the cell is going to die.

In addition to damaging cell membranes, mercury destroys other important barriers, including the gut lining, the vasculature, the blood-brain barrier. It does this by destroying the "tight junctions" between cells, by activating an enzyme called MMP, matrix-metalloproteinase.

So in blood vessels, mercury causes vascular endothelial dysfunction, which causes reduced blood flow to the brain and other organs.

*Trudy Scott:* I want to just go back to your comment about the blood-brain barrier. So it's causing damage to the blood-brain barrier, so then we are more likely to get more toxins going into the brain?

- Kris Homme:* Yes, exactly. The body has designed these cells to have tight junctions with specialized proteins, and mercury activates the enzyme that breaks down those proteins.
- Trudy Scott:* Wow. And then it also causes leaky gut, correct?
- Kris Homme:* Yes, by the same mechanism.
- Trudy Scott:* And that's going to lead to food allergies, which is then going to cause inflammation and a whole host of other problems.
- Kris Homme:* Yes, and a leaky gut and food allergies can also trigger autoimmunity.
- Trudy Scott:* Wow, okay. Are there more aspects that we need to know about?
- Kris Homme:* Yes. Mercury causes sulfate deficiency, and that can slow the body's ability to repair itself, among other things. In the brain, mercury causes microglial activation – that's an immune response – as well as neuroinflammation in general. Mercury alters the redox balance within cells, pushing it toward oxidation rather than reduction. And the redox balance is important because it determines the activity of many brain enzymes, meaning that, with mercury, your brain is always “on” and it doesn't get enough rest.
- Trudy Scott:* So would this be like a sort of a wired feeling, when you say the brain is “on?”
- Kris Homme:* Yes.
- Trudy Scott:* Okay.
- Kris Homme:* Yes, and there are rumors that mercury affects intelligent people more – more than less intelligent, but I don't know if it's just that people with mercury tend to have their brains always turned on and tend to want to be learning and active, at least in the early stages until the brain gets over damaged.
- Trudy Scott:* That's interesting. Where did that rumor come from? Do you know?
- Kris Homme:* Yeah, I shouldn't get into these rumors. It's within the mercury community, there's just some observations made, but they're not based in science, so we should probably stick to what's known.
- Trudy Scott:* Okay, but that's interesting.

*Kris Homme:* Yeah. Mercury also breaks the disulfide bonds that give proteins their three-dimensional structure, and one effect is the loss of tubulin within the brain. Tubulin supports the axons of the neurons, so mercury causes axon loss, especially of long axons which are found in sensory nerves and which also provide connectivity and integration for the brain. So it's a type of brain damage.

*Trudy Scott:* Wow.

*Kris Homme:* And in addition, by breaking disulfide bonds, mercury also damages connective tissue in the body. That would be joints, vasculature, gut, heart, feet. Connective tissue is everywhere.

*Trudy Scott:* Wow, that's so interesting. It's interesting that you mention feet as well. You know, is it just feet or other parts of the body as well? Any area that you might have connective tissue?

*Kris Homme:* Yes, any connective tissue, and if that connective tissue gets a lot of wear and tear like feet and it's relatively fragile due to mercury, then you're going to incur symptoms in that area.

*Trudy Scott:* That's so interesting. And why I'm honing in on the feet issue is because I've tested myself. I know I've got high levels of mercury. I had mercury exposure myself. I had mercury fillings, and I played with mercury as a kid, can you believe it?

*Kris Homme:* Oh dear.

*Trudy Scott:* It's horrific to think about it. I can't believe it, and I did a lot of camping where I had some mercury thermometers actually break in the tent and we had to get the mercury out of the tent, so I've had some mercury exposure. I've actually had a lot of issues with my feet, so that's very interesting to hear that connection. And all these other issues too - I had issues with anxiety and I had terrible hormonal issues, and I really believe that mercury has played a role in a lot of my issues and may be the root cause of all these other factors that have been a problem with me. It's really very interesting.

*Kris Homme:* I would say it's a probable root cause of your issues, but fortunately, as I understand it, you're a success story and have been able to overcome those issues. So I hope we'll get into that a little later.

*Trudy Scott:* Yes, we will. And it's good that you mention that because we are talking about the terrible effects of mercury and, because of our own unique biochemistry, some people are affected at much worse levels than others, and then I think some people are affected later on in life and they think it's old age and things are just breaking down and going wrong, but I think we need to get to the root cause of all of these things and address it at that level if possible. And I know we're going to talk about susceptibility. I'm glad you mentioned that because some people can be exposed and can excrete the mercury and they can do okay. Others are more affected by the mercury.

*Kris Homme:* Yeah, and it's not clear if those people actually are okay. I mean, you can say they're okay if they live to a ripe old age and are healthy, but if they come up with the usual old age problems, whether it's neurodegenerative or other degenerative problems, it's not at all clear that they actually were doing okay with their mercury.

*Trudy Scott:* Right, because no one's going to die and be told, well, she died of mercury toxicity. It was a heart attack or it was Parkinson's or something else, and it could have been the mercury that was a factor.

*Kris Homme:* Yeah. I just wanted to add in one more of the toxic mechanisms. It's the effect on the mitochondria. When mercury causes mitochondrial dysfunction, that's equivalent to low energy or chronic fatigue, but it also causes metabolic acidosis when the body can't utilize the aerobic respiration pathways and switches to anaerobic, and the acidosis situation depletes minerals in another viscous cycle.

*Trudy Scott:* So there we've got the minerals again being affected by it. There are many different mechanisms that it's affecting. Very, very interesting. Wow. And I just love this quote that you shared with me that Boyd Haley says about mercury: "mercury is a biochemical train wreck," and just hearing everything that you've shared there, it really is. It's a biochemical train wreck. And for those of you that don't know who Boyd Haley is, for the last two decades, he's lectured throughout the world and testified before Congressional committees and the Institute of Medicine regarding the various aspects of mercury toxicity and the neurological diseases that are a result of mercury toxicity. So here we've got "mercury is a biochemical train wreck." Really, really a big, big factor when it comes to any kind of issues that you've got.

Now, some people may have these mineral depletions and all of these other factors causing anxiety. Someone else may have cognitive issues. Someone else may have other problems, so depending on you and how you handle this, you may be affected differently. I wanted to just go back to what you said, that some people do well, and I'm a success story, but maybe I could be feeling even better than I feel right now. A lot of people don't know how good they can actually feel until they feel better. So I think we always need to be looking to see if we can make sure that our health is absolutely optimal.

*Kris Homme:*

Yeah, and if I may add something to your comment about Boyd Haley, he's a rather unique scientist in that he, after studying this issue, stepped a bit out of his science role and into the advocacy role, and you don't see that often in science because science tends to attract a conservative personality that doesn't want to state anything that they haven't observed themselves in repeated studies to statistical significance over and over, and even then, they're very careful. It's kind of a peer pressure thing where, within the scientific community, you don't see a lot of people stepping out to say this is a real problem; we need to do something. This is partly why it's taken so long for global climate change to be acknowledged, and fortunately there is enough of a critical mass of scientists in that field now that it is considered socially acceptable for scientists to take a public position on that, but mercury is still pretty obscure and there's still a lot of timidity among the scientific community, partly because these studies are not funded by the government, so taking a position that you think it's important can alienate you from your funding source. But I don't mean to digress.

*Trudy Scott:*

No, that's good. I'm glad you shared that, and we appreciate him for that, and we appreciate other researchers and scientists who do that because there are some people who stick their necks out, so to speak, and it's good. It's good that people are doing it and often they are ostracized, as you say, so the more people that do it, the better things are going to be. Thank you for sharing that.

So let's get into some specific examples of how mercury could be the root cause of these other root causes of anxiety and, if you tuned in for Season 1 on *The Anxiety Summit*, you'll recall that many of these areas that we're going to talk about now were covered, and we're going to actually talk about some of them in this Season 2. So in *The Anxiety Summit*, I've got experts talking on these different areas and offering solutions, which is great because one of them we're going to talk about right now is

hormone imbalances.

If you've got hormone imbalances, there's things that you can do to try and balance the hormones, but some people might say, well, why have I always got thyroid problems. You know, what is the root cause of that? Why have I got this issue? And what we're proposing here is that maybe mercury is the root cause of some of these issues. So we're going to go into each one of them, and although we can address them at an individual level with different dietary protocols, maybe with bioidentical hormones, maybe nutrients that we need to add in, if we can get to the root cause of the problem, that's a better thing because that's what we always want to do. We want to get to the root cause of the problem. So the first area that I'd love you to talk about, Kris, is hormone imbalances and how mercury plays a role in this.

*Kris Homme:* Yes. Mercury inhibits methylation, which is the biochemical process that affects the production of many hormones and neurotransmitters. The particular enzymes that mercury blocks are the methionine synthase enzyme at very low levels, and it blocks other enzymes affecting folate, for example, and mercury also disrupts signaling by insulin-like-growth-factor-1, among other things. And mercury is known to concentrate in glands, including the thyroid and the pituitary glands. There, mercury blocks the enzyme that converts T4 to T3. Those are thyroid hormones. And regarding the adrenals, your mercury burden is a chronic stressor that seems to provoke symptoms of adrenal fatigue.

*Trudy Scott:* Wow. So this is thyroid issues, possibly adrenal issues, sex hormone issues, and then ripple-down effect to the neurotransmitters as well.

*Kris Homme:* Yes. Methylation is one of those global processes that affect a lot of things.

*Trudy Scott:* Right. And then we've also got blood sugar problems.

*Kris Homme:* Yes. Mercury blocks the insulin receptor. So if you wonder why you're always hungry even though you're eating enough. , It also blocks many enzymes that are required for cellular energy metabolism, which can give rise to functional hypoglycemia. If you're familiar with the Krebs cycle, there are a number of enzymes required to convert food to energy, and mercury blocks many of those enzymes. That's why fats can be useful for mercury-poisoned people. They require fewer enzymes.

- Trudy Scott:* Great. Now, you mentioned functional hypoglycemia. Is there any relationship to high blood sugar and diabetes?
- Kris Homme:* Yes, there are a number of ways in which mercury causes or exacerbates diabetes. One is by blocking the insulin receptor, which is a sort of mechanism of diabetes itself. Also, the stress on the adrenal glands causes the sugar cravings that people feel in order to get the body into fight-or-flight mode. This adrenal response is actually protective for mercury damage to neurons. A certain level of adrenal hormones is protective, but then chronically high levels become damaging to the brain, so the body's in a difficult situation. But back to diabetes, I don't know if I can add any more to that.
- Trudy Scott:* Okay, that's good. And then we've got this issue with poor digestion and, very interestingly, the connection to the DPP-4 enzyme. So let's talk about digestion.
- Kris Homme:* Well, mercury alters the gut flora. It poisons a number of good bacteria, and you can end up with a mercury-resistant bad flora in your gut. Mercury also, as you mentioned, blocks the DPP-4, the dipeptidyl peptidase 4 enzymes needed to digest gluten and casein. It can block other digestive enzymes, but those are the most prominent. And I guess I've already mentioned the chronic stress issue in which mercury keeps you in the stress mode and leaves you unable to rest and digest in the parasympathetic mode.
- Trudy Scott:* Okay, so that's going to affect how you digest food. You're just in this sort of chronic fight-or-flight where you are on overdrive the whole time, and you'd mentioned that earlier where you said you have this wired tired feeling. And I wanted to just go back to two points that you mentioned. One was the DPP-4 enzyme, which is needed for gluten and casein. And, of course, we're seeing so many people with gluten sensitivities and dairy sensitivities, so those in turn could have a ripple-down effect. I wanted to go back to your comment on the mercury-resistant bad bacteria. Could you just explain that to me, what that means?
- Kris Homme:* Well, there are some studies in the PubMed literature by Anne Summers, et al, that show bacterial colonies intended to mimic the gut end up with altered gut flora that includes mercury-resistant bacteria.
- Trudy Scott:* Okay, and does that mean that we hold onto mercury? Because I've heard that if you've got candida, you've got mercury, and it's

going to be hard to deal with the mercury while you've still got the candida. Is this related to that issue?

*Kris Homme:* I don't think we have enough evidence to make statements about that. There are rumors that the candida in your gut can be protective against mercury. I'm not sure that's true. I think that the candida is an opportunistic fungal infection that is present when you have suppressed immunity due to mercury suppressing your immune system, as well as altered gut flora, so there are also issues about mercury interconverting among different forms, methylmercury and organic mercury. It's complicated and I would not be one to say that candida is protective against mercury. Candida produces its own set of toxic byproducts that affect the brain when you have a leaky blood-brain barrier, so maybe we're getting too far astray for something that there's not enough scientific knowledge about.

*Trudy Scott:* Okay. I appreciate you saying that because we do hear that a lot, and it's really good to hear your perspective and that there isn't science behind it,— and it makes sense, so thanks for sharing that. And then we've also got issues with food sensitivities.

*Kris Homme:* Yes. We've talked about how mercury damages barriers like the gut, making it leaky. And then large foreign proteins enter the bloodstream and can provoke the immune system. And we've talked about mercury blocking metabolic enzymes. An example would be the phenolsulfotransferases, and that would be the enzymes that are needed to metabolize phenols, which are in fruits and other foods. So if you have this blocked phenolsulfotransferase, you can only partially metabolize phenols, and they become toxic intermediates. So you can have severe brain reactions to consuming too many fruits or other phenols.

*Trudy Scott:* Very interesting. Wow. And then this can also, obviously, lead on to autoimmunity.

*Kris Homme:* Yes, mercury is well-known to provoke autoimmunity.

*Trudy Scott:* And then, when we talked, you shared some very interesting information. It was actually an initial e-mail correspondence that we had going back and forth, and this is what really piqued my interest initially when we started corresponding. You talked about how mercury has a direct effect on production of GABA, and I found that fascinating. So let's talk a little bit about how it can impact GABA and then we'll talk about serotonin next.

*Kris Homme:* Yes, mercury disrupts GABA in the brain in several ways. It blocks the enzyme glutamic acid decarboxylase, or GAD. That's the enzyme that synthesizes GABA. And mercury also blocks certain GABA receptors. And more tragically, mercury causes a selective loss of Purkinje neurons in the brain which produce GABA. I don't know if they can be regenerated. It's the insidious nature of mercury toxicity that is the reason I'm so passionate about prevention. You can unblock your disrupted enzymes with enough nutrients. You can push through blocked enzymes, but when your cells that produce GABA are lost, I don't know what you can do. I understand GABA doesn't reach the brain if you take it orally. I'm not sure about that. That's your area, I think.

*Trudy Scott:* Yeah, a lot of people will say, "Oh, GABA's not going to make any difference and it doesn't cross the blood-brain barrier." I've heard people say, well, it does work on people unless they've have a leaky blood-brain barrier, and you've talked about mercury possibly being a factor there, so maybe that's a factor. I do know personally that oral GABA was my lifesaver when I initially had my anxiety, so it definitely works. Since then, I've done some reading, and it seems that GABA may have a calming effect at a cellular level and it may not be the fact that it's getting into the brain. It definitely does work with the majority of my clients, so what the mechanism is, I just don't think that we really know. But it's interesting that you say that it could be causing this permanent damage so you cannot produce GABA. Maybe people with this damage would need to be on supplemental GABA or making sure they've got their diet optimized so they are able to extract GABA from some of the other raw materials to get it in their diet. So interesting, very interesting. Lots of things to think about. What about low serotonin?

*Kris Homme:* Yeah, this one's a little less clear. Mercury affects the enzymes that both synthesize and degrade serotonin, so it's hard to predict what the net result will be in any individual. I knew you were going to be asking about GABA and serotonin, so I did look up – this was in the toxicological profile for mercury by the Agency for Toxic Substances and Disease Registry, and they have a statement on these enzymes. "Activities of several enzymes associated with central neurotransmitter metabolism in the cerebellum (e.g., acetylcholinesterase, tryptophan hydroxylase, monoamine oxidase and, catechol-O-methyltransferase) were depressed in mercury-poisoned rats." So that's typical of the kind of science we have about mercury. It's typically animal studies or cell studies, so we don't often have enough human studies to give our regulators enough undisputable evidence to say that mercury is toxic in all

these ways, even though, if you've had any biology, you appreciate that animal models and cell cultures really do tell us things about the human body and they should be given weight in the regulatory arenas. But back to serotonin, so one of those enzymes, the tryptophan hydroxylase is the rate-limiting enzyme in the synthesis of serotonin.

- Trudy Scott:* Very important. Wow. And then we've got these mineral imbalances that we talked about earlier, and many of these minerals help with actually feeling calm and are co-factors for making GABA, serotonin and the other neurotransmitters. So tell us a little bit about how mercury affects some of these minerals.
- Kris Homme:* Yes, I remember that you are interested in zinc. Mercury displaces zinc in the metallothionein storage molecules, meaning that you'll have trouble storing zinc and you'll need to replenish it frequently. And mercury does seem to cause high copper, at least anecdotally in the mercury community, but I don't know the mechanism. It may have to do with altering the mineral transport channels in cell membranes.
- Trudy Scott:* Very interesting. I would love to know if there's a correlation between people who are more affected by mercury people with pyroluria. With pyroluria, you have low zinc and high copper, and it might be that combination and then the heavy metals that may make things worse for some people. I wouldn't be surprised if we saw that.
- Kris Homme:* It does sound like it's related to mercury, but I don't have any evidence about that issue.
- Trudy Scott:* I might start asking those questions in social media, on my blogs, and that, and see if we're seeing a correlation.
- Kris Homme:* Yeah, a lot of people don't know they have mercury toxicity.
- Trudy Scott:* They just don't know why they feel so bad or why they've got all these issues.
- Kris Homme:* Or they blame it on their thyroid or their bad gut and don't look at mercury. Or they think that mercury is one of many problems they have and they have too many so they're not going to worry about the mercury when, in fact, it might be the thing they should worry about because it might be the root cause.

*Trudy Scott:* Yeah, very important. Wow. So you've given us all of these areas that are problematic, and you alluded a little bit to the fact that we don't have a lot of human studies, so is this one of the reasons why health officials are not, you know, jumping up and saying, okay, we need to ban mercury from dentistry, from flu vaccines, having fish tested and labeled? Is this one of the reasons?

*Kris Homme:* Yes, although there actually is a really good human study called the Children's Amalgam Trial that was reanalyzed to find many types of neurobehavioral deficits in children in a dose-response relationship that was associated with their level of mercury, but it's like the industry is so powerful that this study just showed neurobehavioral test results; it didn't rise to the level of actual disease, even though it seems to me that, if you're seeing such levels – if you're measuring attention deficit after seven years of exposure to dental amalgams, then that ought to be considered a significant finding. But it seems that no matter how much research accumulates indicting mercury for all kinds of diseases, there never seems to be enough absolute proof to sway the regulators against their deference to industry. Even the funding – and this is a real disappointment – we're not getting adequate funding for mercury studies, because our funding agency, the National Institutes of Health, is essentially run by lobbyists, just like lobbyists run Congress. So it's a bad situation.

*Trudy Scott:* Sorry, continue.

*Kris Homme:* Oh, I was going to talk more about why mercury toxicity is so hard to study, so hard to appreciate, so hard to understand. Rather than the politics, it's more that the science is pretty complicated. The toxicity depends on genetics and on epigenetics and on total load and on micronutrient status. So, many people seem able to handle routine exposures to mercury, but can they really? It may take decades to develop toxicity, and at that point, their symptoms may be blamed on aging, as you mentioned.

And regarding genetics, there are many common genetic variants that convey some level of susceptibility to mercury, and many more are likely to be discovered, because genes code for enzymes and the body has countless enzymes, and enzymes vary among individuals. So just within the past about ten years, we've had a dozen genes identified as conveying susceptibility to mercury in ways that can be measured in humans, so this is a significant new development, and the regulators still haven't responded to that. The whole society still hasn't responded to this new evidence of genetic susceptibilities to low-dose exposures to mercury.

And then another factor is that exposures in utero and in childhood can cause developmental damage that can affect the ability to handle mercury. So even though you may not have exposures as an adult, you may have had them in utero, and this may be causing problems for you.

And another reason that mercury toxicity flies under the radar is that our bodies have many defenses that prevent or delay mercury toxicity until the system eventually becomes overwhelmed. These defenses include the glutathione detoxification enzyme system, the metallothionein molecules that were intended to store essential minerals like zinc and copper but can also store mercury instead, and various repair mechanisms. Of course, they work better when we're young. And all the non-critical sulfhydryl binding sites throughout the body serve as reservoirs that can take on mercury in a way that it won't do the damage that it does when it binds to the active sites of enzymes and other important biomolecules. So because of this range of defense mechanisms, it can take many years or decades for our total load to overwhelm our defenses. And another factor that affects these defenses is our micronutrient status. So having adequate micronutrients can enhance our defenses and postpone the toxicities.

*Trudy Scott:* Wow. Very, very powerful. So how do we know if we've got this hidden mercury burden? You've got all these things going wrong, we're not feeling our greatest. Why would we suspect or what would make us think about this hidden mercury burden, other than this presentation, of course, this wonderful presentation?

*Kris Homme:* Well, there are some tests you can get if you are concerned that you may have a mercury burden. Some of the tests you may have heard of may not be the best tests. I wanted to bring up the porphyrins test because it's not widely known and it's really the gold standard in heavy metal toxicity. It's available through DirectLabs.com or your doctor can get it through insurance, but your doctor may order just one or two porphyrins instead of the full eight that come in the porphyrins panel, and your doctor may not direct the lab to handle the sample properly.

So porphyrins are a metabolic byproduct of a biosynthesis pathway for heme, which is hemoglobin, cytochrome, some of those important biomolecules, and when that pathway gets disrupted by mercury blocking the enzymes on that pathway, then some metabolic by-products are produced that are basically bad metabolites, and these are porphyrins. So when you see elevated

porphyrins, those are not good, and they can indicate toxicity. Each toxic metal has its unique footprint of elevated porphyrins, so many people have combinations of mercury poisoning, lead poisoning, arsenic and cadmium, those are the big four. But I do recommend the porphyrins test, whether you get it through your doctor and ask him to write out a careful instruction to the lab in which you use a dark cup for the urine sample and the sample should be frozen right away, or whether you do it yourself, which is a way to control the handling of the sample. You have to self-pay and send it to the lab.

This is a good test, and you can look online at, for example, the Metamatrix Porphyrins Interpretive Guide document, which discusses the heavy metals and the porphyrins, and that will help you decide, when you look at your own test results, whether any particular porphyrin is elevated relative to its precursor. It may not be elevated enough that the lab tells you that you clearly have mercury poisoning, but it may be elevated relative to where you'd like to see it. You'd like to see them all pretty low because they're bad metabolites. So that's a way to get your own assessment of your own toxic burden, by reading the Interpretive Guide yourself and looking at your own levels of porphyrins.

*Trudy Scott:* Great. And I'd love to just spell porphyrins for folks who may not have heard this before because this is a test, as you say, that is not frequently run. Can we just spell porphyrins for everyone?

*Kris Homme:* Yes, P-O-R- P-H-Y-R-I-N-S.

*Trudy Scott:* Thank you. Are we done with the prophyrins? Can we talk about the hair test?

*Kris Homme:* Yeah, I did want to talk about the hair test because that's also another good test and it's often misunderstood. People think that you do a hair test and then you look for toxic levels of mercury, arsenic, lead, cadmium, but in fact, if you're a poor excreter, you may be very sick with a burden of toxic metals and you're not excreting them in your hair, so you may actually show low toxic metals. So that's why the real insight in a hair test is your levels of essential minerals. Do you have good healthy levels of essential minerals? If you have mercury poisoning such that mercury is blocking your mineral transport into and out of cells, your hair minerals will look abnormal. The essential minerals will be either too high and/or too low. They'll just look wacky. They'll look deranged, so that's the most valuable information you can get from a hair test is how is your body processing its essential minerals.

And then, if you're lucky, it'll show accurate levels of toxic minerals and, if you have good levels of essential minerals, it's more likely that you'll be able to excrete your toxic minerals. It's more likely that your body is working as it should, but if you've got deranged essential minerals, you've probably got some blockages that are impairing your ability to handle toxic minerals.

*Trudy Scott:* Do you ever see the metals going up? Say you start being a little bit more proactive in trying to do some detoxification. I've heard of people saying, well, "you'll see the metals go up, like the mercury levels go up. That's a good thing. That shows that you're excreting them." What is your opinion on that?

*Kris Homme:* You know, I have seen my own levels of cadmium, lead and arsenic. They all started out very low, and over five years, when I was doing chelation and other detoxification methods, I saw those levels rise and fall, but I did not see that happen to the mercury. And I feel, with my own symptoms, that I still have a large burden of mercury. So I don't know if I will be able to see in hair tests if my mercury level might rise and fall. I don't know.

*Trudy Scott:* Interesting. And then you also mentioned at the beginning that you did the porphyrin panel yourself.

*Kris Homme:* Yes.

*Trudy Scott:* Okay.

*Kris Homme:* Yes, and I also had it done with my neurologist, and that's an example where my neurologist order through a commercial lab came back negative, and I believe that was because I brought in the urine sample to the lab and the lab clerk looked at it with disdain and shoved it into a corner to deal with later. So I think the sample was probably not handled carefully. That's why I recommend doing it yourself if you can stand to pay for your own labs.

*Trudy Scott:* Okay, good. And then we also hear about provoked urine testing. Can you talk a little bit about that?

*Kris Homme:* Yes. Urine challenge tests can be dangerous to people who are ill with mercury poisoning. They have leaky blood-brain barriers and so the provocation agent, whether it's DMSA or DMPS, those agents are supposed to be water soluble. They stay within the blood, they don't get into the brain, but if you have a leaky barrier, they can get into the brain and they can pick up metals and drop them and cause redistribution, which is damaging. But if you're

not very sick, they can possibly be safe. But as far as what they reveal, they basically reveal your kidney burden, which may have no relation to your body burden or your toxicity. So they're not really a useful test, but they can be very useful if you need to convince other people, whether it's your family member or your new doctor that you have a real illness. Sometimes it helps to have a lab test that shows something as shocking as elevated toxic metals in a urine challenge test.

And then blood tests are similarly inappropriate for diagnosing chronic metal poisoning. They reveal only recent exposure, so people who have low levels of chronic exposure, that won't show up in a blood test. And unfortunately, medical textbooks don't address chronic mercury poisoning. They do sometimes address mercury poisoning, and in their list of diagnostic criteria, they can require that a doctor find elevated blood levels of mercury – blood or urine. These criteria are not appropriate for chronic mercury poisoning, but our medical textbooks have not caught up with that reality, so our physicians are also not up to speed on this, at least within the insurance-based medical system.

*Trudy Scott:*

And I've heard a lot of people say they went to the doctor, they had bloodwork done and it came back negative, so now they're thinking it's not an issue. So I'm glad you brought that one up. And I just wanted to comment about the provoked urine. So for someone who may not know what that means, that's when you are given a chelating agent like DMSA or DMPS or EDTA and you take that and then you collect urine over the course of 24 hours and then it can measure the levels of mercury and other heavy metals and it is controversial. Certainly it's a test that I've been concerned about. I was not aware that it only revealed the kidney burden, but I was aware that these agents can be bad. I've heard that they can cause kidney damage because what you're doing is excreting the metals through the kidneys, and then it can actually damage the kidneys. So I've been very cautious about that testing. And then also, those chelating agents are often used as a method to actually detoxify people from the heavy metals, and I have some concerns about that. I know when you and I we talked, we had voiced some concerns about that. I'd love to just go back to your comment about it only reveals kidney burden. Can you talk to that a little bit more? Is the research supporting that?

*Kris Homme:*

Well, maybe that's an overstatement. It would clear the blood and the kidneys at that time that the agent is active, which is for a few hours in the blood. So with mercury, a lot of your burden is inside the cells and inside the brain, so it's not going to be able to access

any of that. It will just access the mercury that's in the extracellular spaces in or near blood vessels and kidney. But I did want to add a precautionary idea if someone does want to take this test, whether it's because the doctor wants to see it or you want to show your family members some proof. Andrew Cutler has recommended that, if you do take this test and you're given a prescription for this provocative chelating agent of DMSA, DMPS, -- I don't know if EDTA is used -- but you can divide up the dose into small doses that you can take every couple hours and that's less stressful on your system. It still may cause damage if you're very sick, but it's not as bad as taking the full dose in one shot.

*Trudy Scott:* Okay, that's good to know. And I know we're going to share some resources, and Andrew Cutler's is one of the resources that we're going to share, so thanks. Okay, let's talk about subjective signs and symptoms that that might make us think we need to look into this hidden mercury burden.

*Kris Homme:* Yes. If you have unusual health problems, especially more than one, in the areas of autoimmunity, adrenal and thyroid, gut, Candida, Lyme (these are persistent infections), or neurological problems, psychiatric problems. If you have odd problems in those areas, that's a sign. Or if you have a need for a lot of nutritional supplements. They really do work. They help push through blocked enzymes, and if you feel benefits from a lot of nutritional supplements that, when you've tried a healthy diet and that wasn't enough, then that's a sign. And people with mercury have a tendency to space out. They have an above-average need for brain downtime. They can have hypersensitivity to sensory stimuli, noise, lights. And then there's a word that I think everyone might want to enjoy looking up on the Internet. It's erethism – E-R-E-T-H-I-S-M. It's the mercury personality, and that involves excessive timidity, diffidence, shyness, conflict avoidance, loss of self-confidence, anxiety, a desire to remain unobserved and unobtrusive a pathological fear of ridicule and explosive loss of temper when criticized. There are different versions of this definition and they're all fun and they really resonated with me, so that can be interesting to look that up on the Internet.

*Trudy Scott:* Very interesting. I remember you sharing that with me in our conversation. And going back to my comment about pyroluria, the shyness, the wanting to remain unobserved and unobtrusive. I relate to a lot of these because when I discovered that I had pyroluria, I had a lot of these issues. The nutrients – zinc and B6 and evening primrose oil and some of the other nutrients, being on a good multivitamin – has helped me overcome a lot of these, and

a lot of my clients as well. I'm fascinated about this possible mercury toxicity connection to people with this genetic susceptibility to some of these things, like possibly pyroluria and other factors. And the fact that they may be made worse by mercury toxicity. We know with pyroluria that stress makes things worse, and maybe the mercury exposure could be considered a stress, so it's fascinating. I love that term. Thank you for sharing it with us.

Kris, this has been an absolute wealth of information. Thank you so much for sharing all of this. I know that we've got more to cover, so what we're going to do is end this interview now, so you've got a nice hour of valuable information, and this is going to be Part 1. And then we're going to continue our conversation and do Part 2 of this interview so you can learn about some of these other things. And what we're going to talk about in Part 2 is how someone can get rid of their mercury burden. We're going to also talk about the kinds of diet and supplements that you might want to think about and if there are any foods or supplements that you want to avoid. We're also going to touch on chelation, and Kris has some amazing resources to share, and then some final takeaways. So I just want to say for now, Kris, thank you so much for being on this call of *The Anxiety Summit*. You're an absolute wealth of information. We appreciate your passion, and we really appreciate your efforts to get this information into the hands of those who need it.

*Kris Homme:* Thank you, Trudy. I appreciate your interest in this topic and your activity to create this forum to reach people and to provide this information that is pretty obscure otherwise.

*Trudy Scott:* Well, great. And I'm just so glad you reached out to me because now we have you on *The Anxiety Summit* sharing this information. So thank you very much, and a big thank you to everyone listening in on *The Anxiety Summit*. We're going to sign out from this interview. Be sure to tune into Part 2 of this amazing mercury discussion with Kris Homme, and enjoy the rest of the other interviews. This is Trudy Scott signing off.

Here is the speaker blog:

<http://www.everywomanover29.com/blog/hidden-mercury-burden-anxiety-part1/>

**Kris Homme**, MPH, retired engineer turned science writer



Kris Homme is a retired engineer turned science writer. She has graduate degrees in public policy and public health. She has chronic mercury poisoning. She is the lead author of a peer-reviewed journal article entitled, “New science challenges old notion that mercury dental amalgam is safe,” published in *BioMetals* in February 2014, which describes the new science of genetic susceptibilities to low-dose exposures of mercury. She facilitates a chronic mercury poisoning support group in the San Francisco Bay Area. As an activist, she is a party to the ongoing legal effort to compel the FDA to restrict mercury dental amalgam. And in 2013 she led a campaign in the city of Berkeley to improve the information given to dental patients about the risks of mercury dental amalgam. Learn more at [www.mercuryandmore.weebly.com](http://www.mercuryandmore.weebly.com)

**Trudy Scott**, CN, host of the Anxiety Summit, Food Mood expert and author of *The Antianxiety Food Solution*



Food Mood Expert Trudy Scott is a certified nutritionist on a mission to educate and empower women worldwide about natural solutions for anxiety, stress and emotional eating. Trudy works with women one-on-one and in groups, serving as a catalyst in bringing about life enhancing transformations that start with the healing powers of eating real whole food, using individually targeted supplementation and making simple lifestyle changes. She also presents nationally to nutrition and mental health professionals on food and mood, sharing all the recent research and how-to steps so they too can educate and empower their clients and patients.

Trudy is past president of the National Association of Nutrition Professionals. She was recipient of the 2012 Impact Award and currently serves as a Special Advisor to the Board of Directors. She is a member of Alliance for Addiction Solutions and Anxiety and Depression Association of America. Trudy is the author of *The Antianxiety Food Solution: How the Foods You Eat Can Help You Calm Your Anxious Mind, Improve Your Mood and End Cravings* (New Harbinger 2011).

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