

Episode 86: Silver Toxicity: Medical Uses, Argyria and Anaemia

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Transcript

Hi everyone, welcome back to the Tox Lab. I'm Rebecca. I'm Rob. Paul Karasin from Washington State started drinking a homemade colloidal silver solution and rubbing a silver preparation on his skin to treat dermatitis, acid reflux and sinus problems. He claimed it cured his acid reflux and arthritis, but there was one unmistakable side effect.

His skin turned permanently blue. The media dubbed him Papa Smurf and in 2008 he appeared on Today in the Oprah Winfrey Show as one of the world's most recognisable cautionary tales about alternative medicine. And I don't know if anybody's ever seen pictures of this man. They possibly have, even if they don't realise.

He became an internet sensation because he had the most striking skin colour, to the point where it didn't even look real. It looked like make-up and bad make-up. I think now people would probably think it's AI generated. Oh yeah, easily.

Yeah, easily. And obviously this was pre the days of AI generation. But I mean, he was a real cautionary tale. We don't know quite how much colloidal silver he drank.

But estimates put it at something like 300 mL a day. Over the course of something like what, 10 years, litres and litres of colloidal silver. Of which, I don't think how many grams of actual elemental silver that might have been. Possibly worth a bit actually, given the price of silver has gone up quite a bit in these last few years.

So this week we're going to be taking a look at that phenomena, the phenomena of silver actually depositing in skin and also the toxicity symptoms that can come with silver. Because it's certainly not a compound that creeps to the top of my mind when I think about poisonous compounds. No, definitely not. But actually, silver poisoning is a thing.

Before we dive into today's episode, if you want to stay up to date with our content, you can find us on Instagram at [@the_tox_lab](#). We also have a page on LinkedIn and we're fairly active over there. And for those of you who don't use social media but still want to get in touch with episode suggestions or comments about episodes, why not get in touch through our new website at thetoxlab.co.uk. Why don't we unpack, first of all, what Paul Karason was taking?

What is colloidal silver? So colloidal silver is a liquid preparation that contains silver particles. So elemental silver. Yeah.

And so it's more of a suspension of actual silver particles in a liquid form. And typically it's silver with an oxidation state of zero, although what actually happens is those nanoparticles will actually oxidize the surface. So colloidal silver isn't even necessarily one thing. It can be a real mix of particles of silver, probably of different sizes, of which some of those will oxidize at different rates.

So silver has actually been used for medicinal purposes since about the eighth century. And legitimate uses include its use in wound dressings, creams, and as an antibiotic coating on medical devices due to its ability to damage key enzyme systems in pathogen cell membranes. And it is a really good antibiotic

as a sort of surface decontamination thing for, as you say, for sterile materials. Yeah.

And it can also be really good on, as you say, wound dressings for particularly really open wounds like burns. It can actually do a really good job of keeping bacteria at bay. It has also been marketed as a dietary supplement with unsubstantiated claims suggesting it is an essential mineral supplement or that it can treat a number of diseases such as cancer, diabetes, arthritis, herpes, TB, and HIV. Quite a mix of conditions.

Yeah, quite a broad range. And so in 1999, the FDA stated that over-the-counter drugs containing colloidal silver or silver salts for external or internal use are not generally recognized as safe and effective and misbranded. There is no substantial scientific evidence that supports their use to treat these disease conditions. And despite these warnings, colloidal silver remained accessible from two major online retailers including Walmart.

And a search on Amazon in June 2014 showed 24 different ingestible liquid products containing colloidal silver on the first page of the search results. 12 of these had an average rating of 4.38 out of 5 stars and an average of 51 customer reviews. So it does seem to be easily obtainable and the favorable reviews might lead to people being convinced to purchase this. And I tested that this afternoon and sure enough colloidal silver in bottles is available on Amazon.

Which is a terrifying thought. So that is colloidal silver and that is why people may choose to use it. And some of the claims, as you say, they're quite varied, aren't they? What they treat everything from cancer to herpes.

It's often put out there as being a wellness product. Along the lines, similar lines to things like methylene blue and some of these other compounds where, you know, it's not to say there's no evidence at all for silver. As we said, silver does have legitimate uses in certain external preparations. But there's no good evidence supporting colloidal silver taken internally for all of these conditions that it's claimed it treats.

And acutely, a single dose of colloidal silver, relatively, relatively non-toxic. Agreed? Yeah. But when you start taking daily doses over a long period of time, that picture changes.

So the 63 year old man was brought to the emergency department after a fall with a long lie of two days, urinary retention, acute kidney injury and peripheral neuropathy. His past medical history included chronic fatigue syndrome and he didn't take any prescribed medications. A physical examination showed blue-gray discoloration of the skin, which was most prominent on sun exposed areas, including the face and neck, and he had a gray pigmentation of his fingernails.

After talking with the patient, it was revealed that he'd started using a homemade silver solution to treat a flu-like illness during the 2019 coronavirus pandemic, because he had read claims online about the antiviral properties of silver. He stopped using this after two months, but continued to apply commercially available colloidal silver ointment to his legs for two years. He went on to measure his serum silver and his serum silver concentration was 297 nanomoles per liter. He had a 24 hour urinary silver excretion of 227 nanomoles per liter per 24 hours and a diagnosis of Algyria was made clinically.

So Algyria is characterized by slate gray to blue discoloration of the skin caused by cutaneous deposits of silver particles after long-term ingestion of colloidal silver or silver salts. And so let's break down the logic then. So people are drinking this colloid, this mixture of silver particles in presumably water. Silver is absorbed through the GI tract.

It then gets deposited as mineral silver again in the skin. And this discoloration is exacerbated by sunlight, which catalyzes the reduction of silver salts and stimulates reactive melanocyte activity. And

this is largely irreversible. And upon discontinuing the silver use for two months, there was no noticeable change in skin discoloration.

There is a little bit of evidence that laser therapy may have some benefit in these patients to partially reverse the discoloration, but it's never complete. So this gentleman went gray and he did have some symptoms actually, didn't he? He said he had some renal failure, renal impairment. So he did have an AKI, but I'm wondering whether that was put down to an acute kidney injury caused by Rhabdo potentially as a result of his long lie after his fall.

He did also have peripheral neuropathy, but this was attributed to type 2 diabetes as he had elevated HPO and C levels and his renal function did appear to normalize as well. So it didn't seem to be a long-term complication of silver use because he was continuing to take it. And after they discontinued it for those two months to see whether the skin discoloration would change. He expressed the desire to go back on it because he felt that it was beneficial for him.

That's interesting. So although he went gray, he wasn't actually that unwell as a result of the silver. Obviously he had other medical complications going on, which led to his admission to hospital. Interesting.

But there are cases where silver does pose a little bit more of an issue. Why don't we look at one of those? So a woman in her late 60s presented the emergency department with progressive fatigue and nausea. She had been feeling increasingly weak during the last few days and was unable to walk without support after previously being very healthy.

On presentation she was described as being lean and pale and a physical exam noted reduced breath sounds over the lower right lobe and generalized crackling and 550 ml of pleural fluid was drained from a right side pleural effusion. Blood tests revealed a low hemoglobin with an elevated MTV and MCH, a low platelet count but normal reticulate site and white cell count. She also had a low vitamin B12 but a normal folate and ferritin. So she was anemic plus had a low B12.

Yeah. Relevant? We will see. Her albumin was also low and she had an elevated AST, LBH, total bilirubin, troponin and pro-BNP.

And due to the low hemoglobin which was a concentration of 48g per litre so really really low. Really low. She was transfused with two units of packed red cells which increased it to 81g per litre. She also underwent a bone marrow aspiration which showed hyperplastic bone marrow but no evidence of hemosological disease and an echo showed a hyperdynamic left ventricle borderline enlarged right atrium and minor pericardial effusion.

So long term heart failure as well. Yeah and that would explain the raised pro-BNP and probably the troponin as well. She was then interviewed on the ward and revealed she had been drinking colloidal silver as a remedy for upper respiratory symptoms she had been experiencing over the last few weeks. The product she had been taking was marketed as a water disinfectant containing DI water and a suspension of 99.99% pure silver particles and she had been ingesting one tablespoon daily for two to three weeks.

Blood and urine samples were taken and analysed using inductively coupled plasma as a sector filled mass spectrometry and silver was found at a concentration of 185 nanomoles per litre in whole blood and 93 nanomoles per litre in urine. So these were still quite a bit lower than the last case. Yeah. And actually she hadn't been taking this for very long.

No it was the I think two to three weeks. The patient was then strongly advised to discontinue the colloidal silver and was discharged after 10 days. Her hemoglobin had returned to within normal limits

after about six weeks and silver analysis was repeated after 95 days and had decreased to 31 nanomoles per litre. So how much of her symptoms do we attribute here to the silver?

So silver has been shown to play a role in anemia so it's thought to have a direct toxic effect on the bone marrow and induce reactive oxygen species and DNA damage which may have led to this severe anemia. It is important to note though that she was B12 deficient and she did have a macrocytic anemia so a low B12 may have also contributed to the clinical picture we're seeing as well as the silver. I'm almost wondering if the silver's a red herring here given the short term use of it. It's tricky to know whether it has played a role.

There is a little bit of evidence that it can cause anemia, it can also have renal hepatic and neurological complications as well. So possibly involved, possibly related. So let's go back to Paul Harrison. Other than the fact that he went silver, did he have any health complications?

He did die didn't he? Yeah I think he had a stroke if I remember correctly. It was a stroke or it was some cardiovascular complication. I think the irony with Harrison was that he took colloidal silver for many years to improve his own health but didn't quit smoking even after his previous heart attack and triple bypass.

I wasn't expecting that. But let's think a moment for him because you know just calling him Papa Smurf and turning him into an internet sensation, okay it made the medical story memorable but I don't know does it not sort of dehumanise him a bit? A bit yeah. I mean I get the feeling he was okay with his appearance on the grounds that he went on, Oprah and so on.

I think he probably enjoyed his five minutes of fame at the time. Perhaps, yeah perhaps. I think one of the tricky things about colloidal silver as I sort of said earlier on is that it's not really one thing, it's not defined, it's just silver particles in water but I don't think there's any definition as to how big the silver is, how pure the silver is, what oxidation state a lot of that silver might be in, whether there's dissolved silver as well as silver particles. And so when you go on Amazon and you buy colloidal silver I think there's no guarantee and so this could make studies of toxicity a bit tricky.

Yeah, yeah for sure. Because people are actually taking different things and that might actually possibly you know I've not really looked hard into the evidence for whether colloidal silver might have some fringe therapeutic benefit, it's possible that the fact that it's not one thing could make those studies harder as well. I think a lot of this stems from silver being a really good antimicrobial and it is a really good antimicrobial but the reason it's a good antimicrobial is because it interferes with enzymes because it produces reactive oxygen species. And that's generally not a good thing to have in the body, right?

Exactly yeah. Our body does a really good job of shielding us from reactive metals. I mean take how our body handles iron, you know it does a really good job of binding iron to proteins, carrier proteins, storage proteins because free iron is highly reactive and will generate reactive oxygen species. Silver isn't as reactive as iron but it's still a little bit reactive.

So why do people go blue-grey rather than shiny silver? They look more like a member of the blue man group than they do the terminator for example. I thought you were going to say the tin man but... Either works.

That's a good question. I think it's to do with where it deposits under some layers of the skin, it's sort of the deeper skin so there is a layer of skin above the pigment if I've understood it right. Yeah and you get do you get some mouse like reactivity so that might also alter how it appears. Yes so essentially people tan as well as go blue.

Yeah. Yeah that's interesting. Now silver isn't the only thing that can make you go that colour is it? I want to say no but...

There's a few things that can at least according to textbooks change people's skin colour to sort of a slight grey. Methemoglobinemia is a classic one and apparently amitriptyline. Apparently amiodarone can also turn you blue-grey as well. That's interesting.

So a few things can turn you that colour. Yeah. So why do people do it? You said it's available on Amazon.

Yeah. There's clearly a market otherwise people wouldn't sell it on Amazon. Very true. I think people always look for alternative remedies to things don't they and more holistic approaches and there isn't a wide body of evidence but I guess if you read enough on a certain side of the internet colloidal silver might be the cure to your arthritis or your acid reflux and if you don't want to take pharmaceutical medication for it then you might be swayed into trying something as odd as colloidal silver.

I guess actually sometimes people may have conditions that regular medications aren't maybe working for and so they want to try something. I just find it hard to believe people keep it up. What does it taste like? I can't imagine it tastes nice.

I guess it possibly doesn't taste of anything. Maybe slightly metallic-y. Okay the internet says it doesn't taste of very much. I guess because it's just silver particles in water in theory which probably doesn't interact much with taste buds.

I think one of the other things that silver does do at least in the Petri dish and this possibly has a little role in toxicology but it is actually very good at binding to sulphur. Oh okay. And it can alter protein structures that's the logic for silver. They're actually working as an anti-microbial.

So it's possible that there is an additional layer of toxicity beyond the reactive oxygen species. So interesting silver toxicity. It does seem to be a thing. It's probably not that toxic on a scale of the things we've spoken about on this podcast.

Yeah. And clearly Paul Harrison drinking litres of the stuff over the course of his lifetime is an extreme case. Yeah. Obviously other than going the characteristic colour that he went possibly didn't actually come to too much harm as a result of the silver at least compared to his cardiovascular disease.

But it is a thing and it is recognised that silver can be at least a little bit toxic and currently at least there's not huge amounts of evidence suggesting that it might be helpful for medical conditions. So a cautionary tale at least in terms of how it can affect one's appearance. Well I hope you've enjoyed listening to us this week. Do as always, if you've enjoyed listening, share it with your friends.

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