Sawbones 350: Don't Steal Your Dog's Worm Medicine to Treat COVID-19

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Intro(Clint McElroy): Sawbones is a show about medical history, and nothing the hosts say should be taken as medical advice or opinion. It's for fun. Can't you just have fun for an hour and not try to diagnose your mystery boil? We think you've earned it. Just sit back, relax and enjoy a moment of distraction from that weird growth. You're worth it.

[theme music plays]

Justin: Hello everybody, and welcome to Sawbones: a marital tour of misguided medicine. I'm your cohost, Justin McElroy. You didn't see it, but I just did a little hand wave, like, [posh voice] "Indubitably…"

Sydnee: And I'm Sydnee McElroy. I did not do the hand wave. I just said it.

Justin: Well, she's doing it now. With two hands— both hands?

Sydnee: No, I'm not. I'm not.

Justin: Sydnee, you can't do the m'lady hand wave with two hands!

Sydnee: I'm not doing that.

Justin: It doesn't mean anything. Hey, uh, this is— hey, finally things are turning around on planet Earth.

Sydnee: I think we got some really good news yesterday.

Justin: Yes.

Sydnee: The Pfizer COVID-19 vaccine was, well, it was recommended for emergency use authorization. I don't think it has, at the time of recording, has officially, like, started shipping out. But it was recommended that we do so. So, there's a vaccine!

Justin: Yaaaay!

Sydnee: There have been vaccines, but now we know that—

Justin: And look underneath your chair, listener.

Sydnee: [laughs]

Justin: There's one—

Sydnee: You get a COVID vaccine! You get a COVID vaccine!

Justin: There's one right there! Everybody's getting' COVID vaccines.

Sydnee: That's right. So, uh, I think we have made it very clear on the show, whatever vaccine we can get—

Justin: We have made it very clear on our human bodies.

Sydnee: Yeah.

Justin: We jabbed one in. [laughs]

Sydnee: Maybe have already gotten, I don't know, placebo versus real thing. One way or another we will be vaccinated, as will everybody that we have the power to make. Meaning our two children, eventually. [laughs]

Justin: Yeah.

Sydnee: That's it.

Justin: If we can catch them.

Sydnee: Although we can sometimes make our parents do things. Sometimes.

Justin: Yeah. It is hit or miss.

Sydnee: Yeah.

Justin: But hey, that's good news!

Sydnee: Yes. Very, very exciting. Very big day.

Justin: I mean, it's the first good news since…

[long pause]

Sydnee: Anyway, moving on. Uh—[laughs] the— just because this vaccine is on the horizon, or is here, and other vaccines are on the horizon, just because that has happened doesn't mean that doctors have stopped looking for other treatments for COVID. Because people are still going to be getting this virus and then coming down with the disease COVID-19 that you can— that can follow, and some people will be getting very sick.

Justin: Yep.

Sydnee: Even as the vaccine is rolled out to everyone. And it is imperative that we continue to look for new treatments that might help, um, people either prevent or survive the disease. And sometimes, we find things that work, and sometimes… we don't.

Justin: That's science.

Sydnee: Um, one that I've gotten a few emails about, and that also I have been following closely and reading a lot about, that has interested me, is a drug called Ivermectin.

Justin: Mm.

Sydnee: Now Justin, before I told you we were going to do a show on Ivermectin, had you heard that word?

Justin: I had never heard of Ivermectin.

Sydnee: I would say a lot of people haven't. Aren't familiar with it. Depending on where you live in the world. Unless you have— now, I mean, some people with animals may know what I'm talking about.

Justin: Oh, yeah?

Sydnee: They may be going, "Do you mean the thing that I gave to my dog," or like if you have horses, "Do you mean the thing that we regularly give to our horses?"

Justin: Oh, is it a heartworm thing? Yeah, okay, you know, now that you say that, maybe long ago we gave it to Nessie, our Scottish terrier, perhaps.

Sydnee: So, some people have heard of it in a veterinary context and don't realize that it is also a drug that human beings do take. And the history— I wanna talk about the history of Ivermectin, and I will at the end kind of cover what we— what people are thinking, why people are talking about it in terms of COVID. I will go ahead and say at the top that I am not going to— the end of this podcast is not, "And now there's a surprise COVID cure," unfortunately.

Justin: Yeah… nah, this one doesn't twist it on ya. It's pretty much heading [through laughter] where you think it's going.

Sydnee: No, you know, I think that this— we may be on another hydroxychloroquine story here.

Justin: Oh, man.

Sydnee: But, uh, but I will go through the data at the end, of what we know so far and where things are going, and why people are even interested in it. But I wanna talk about Ivermectin's story, because it is an amazing, life-saving drug. It is a hugely important drug on a global scale, that maybe you aren't familiar with. And it has nothing to do with COVID, why it is so important.

Justin: There's lots of good stuff that doesn't cure COVID.

Sydnee: Yes. [laughs]

Justin: Pudding.

Sydnee: Pudding was the example you came up with?

Justin: Most Hold Steady records. There's a couple I'm not crazy about, but most of the Hold Steady stuff holds up.

Sydnee: I was gonna say, like, penicillin.

Justin: The laughter of children. I mean, anything can be medicine, Sydnee, if we've proven anything.

Sydnee: No… no. That's— mm-mm. No. Not medicine. Just like, a nice thing that brings you joy. How about that?

Justin: Okay.

Sydnee: But that's not medicine. The story though, that I wanna talk about with Ivermectin, starts with a Dr. Satoshi Omura. Dr. Omura is an expert in bio-organic chemistry. He has degrees in pharmaceutical science and chemistry, but his fascination— and you can, he's still alive today, you can read the things he's written and the papers he's published—

Justin: Tweet at him. Let him know that he's popping off on Sawbones.

Sydnee: [laughs] I think he already knows… well, I'll just go ahead and say, he gets Nobel Prize in this story, so I think he already knows that he's done some good stuff.

Justin: Yeah, but—

Sydnee: He's already been awarded, like—[laughs]

Justin: Sydnee. Being featured on American's number one, the number one medical podcast on the planet? That's recognition, baby!

Sydnee: His fascination, and he talks about this very eloquently, I think, was always with the idea that the natural world holds these answers, these medical answers. You just have to find them. You have to look for them, and eventually with time and skill and knowledge, you can locate these answers—

Justin: You see a cauliflower, it looks like a brain, that's nature's way of telling you it helps your brain.

Sydnee: No, not like that. He— see, this is where we've talked about on the show, like, to have that sort of open mind to ask that question is incredibly important for science. But then what follows that question has to be a rigorous set of protocols in order to answer it correctly and not just answer it in a way that makes you happy. And that is what distinguishes science from... well, everything else, I guess.

Justin: [laughs] Not Science.

Sydnee: But that is exactly what Dr. Omura does, and did, is look to the natural world for answers and then go through a rigorous scientific method to see if he has, in fact, found them. His particular area of interest became studying soil samples for substances that were made by bacteria but could be useful to humans in some sort of— or to anyone, could be useful in a pharmaceutical sense.

Justin: Substances made by bacteria seems like a real long way of saying bacteria poopy.

Sydnee: [laughs] Not necessarily poop.

Justin: Oh?

Sydnee: Not necessarily.

Justin: No?

Sydnee: Well, honey, don't you make a lot of substance that aren't feces?

Justin: When they make these substances, do they need them, or do they disperse them into the, uh, environment?

Sydnee: Well, again, there are a lot of substances you can disperse into the environment.

Justin: Yeah, but—

Sydnee: Let's not, let's just not—

Justin: They don't have noses and ears, they're bacteria, Sydnee. You know this, you did organic chemistry.

Sydnee: [laughs]

Justin: They— it's just poopy!

Sydnee: Okay. Anyway, no. Let's go back to the early 1970s.

Justin: Okay.

Sydnee: Okay.

Justin: [sings guitar riff]

Sydnee: I knew this was coming.

Justin: [laughs loudly] [sings] Scuse me! What gives this guy… [stops singing] no, that's the song that instantly transports you to the 60s.

Which— what— oh, wait, what song takes you to the 70s? Probably, um, [sings] People all over the world, everybody, join hands!

Sydnee: Is that it?

Justin: [sings] Start a love train!

Sydnee: I thought you just play the Forrest Gump soundtrack.

Justin: Yeah. Well see, that feels more 60s to me. Funkytown is probably a universal transports you back to the 70s?

Sydnee: Uh… anyway. In the—[laughs]

Justin: Superfly.

Sydnee: In the early 70s, he was working in this area by basically going all over Japan— I think, in my mind, when I hear this story I imagine him personally, like, travelling all over Japan and collecting these soil samples himself. I don't know that he physically—

Justin: The tiniest tweezers.

Sydnee: He worked in a lab with other people, so I don't know if he was the one who actually went out into the world to, like, dig up some dirt and put it in a cup and bring it back. I like to imagine he did.

Justin: This seems like something you outsource, right?

Sydnee: I don't know! I don't know. I like to imagine him doing that part too. He seems like the kinda guy who would do the whole thing. Like, just hands-on, part of the whole process.

Anyway, so he was looking for substances that might be bioactive, and his lab at Tokyo's Kitasato Institute has this agreement with Merck research labs in New Jersey that basically he would go around, get these samples, scan them to look for something that might be useful, isolate a bacteria that might have some sort of property that could be, you know, useful in a pharmaceutical sense, and when he found stuff he would then ship it to New Jersey, to the Merck lab, to further investigate, refine, and test against different… whatever, to see if it worked, right?

Justin: Right.

Sydnee: They were very specifically looking for a new antiparasitic drug. An anti-helminth, anti-helminthic drug. Which means kills worms.

Justin: Got it.

Sydnee: They were looking for a drug that would kill parasitic worms, more or less. Because at the time there weren't really any good ones. I mean, there were drugs that worked, but there were always issues with, like, toxicity and like, how many different worms they could cover, they weren't like broad spectrum. They were actually kind of just looking for a brand-new thing. It wasn't building on previous compounds that they knew had this sort of activity. It was like, let's just go out into the world and see if there's something.

Justin: Let's get these worms!

Sydnee: That we haven't found yet. Uh, so they— and at this point, they were mainly looking for, like, veterinary use. That was very much the idea, that, you know, parasitic worms were devastating for both, like, farm animals, animals that were meant for, like… you know, consumer production type facilities, and pets. Like, animals at large, they needed a good antiparasitic for.

So, Dr. Omura found, in a sample of soil that was taken from a golf course that was somewhere southwest of Tokyo, in this sample he found an interesting substance. And he cultured the bacteria that he found in it, he saw that it had some potential, he shipped it to Dr. William Campbell and all of his research, uh, you know, technicians, assistants, whatever in New Jersey.

Justin: Is he the bad guy?

Sydnee: No! No.

Justin: It feels like he's gonna be the bad guy who steals everything.

Sydnee: No, these two work together.

Justin: For now.

Sydnee: No, they work together.

Justin: We'll see.

Sydnee: Um, they, I mean, they seem— I've read both of their accounts of this, and it seems… pretty similar. [laughs]

Justin: Okay, alright.

Sydnee: And he tested it against some parasitic worms and found that it was very effective. The early tests, it was like, ooh! We found something new, something that nobody had discovered before, and it seems to work. And this is all very exciting. The bacteria was then named Streptomyces avermitilis. Avermitilis.

Justin: [snorts]

Sydnee: Let me say that right. Streptomyces avermitilis.

Justin: I woulda gone with Wormex. Because it's just real easy to remember.

Sydnee: Uh, well… they kind of did.

Justin: Mm?

Sydnee: A-vermitilis. Vermis is Latin for worm.

Justin: Like, uh…

Sydnee: A-vermis. A-worm.

Justin: Like verma— vermicomposting.

Sydnee: Yeah.

Justin: Got worms in it.

Sydnee: Yeah, vermi-, that means worm. So yes, exactly. And the substance that they found in it that had the biological effect— because just because, like, if you have a bacteria that seems to do something, it's usually not like the entire bacteria that does it, right? There's one substance from it. There's one compound that you can—

Justin: The cilia, the golgi bodies, uh…

Sydnee: Well, not an orga— not an organelle. But like, an actual, like, chemical. This is where you get— this is why— this is why it's not just,

um, biology or chemistry, it's both together. Because you have these organic things— you have this bacteria, which is like, the biology realm, but it's making these chemicals, in the chemistry realm.

And you have to understand both to know what is it from— we don't wanna necessarily infect animals with this bacteria so that we kill the worms. Why don't we just find the thing that kills the worms and give that? That's like at the heart of discovering these natural pharmaceuticals.

Justin: Makes sense.

Sydnee: Is that concept. So, anyway, he, they find this substance that actually does this is avermectin. And they did some refinement on it to make it, like, just find the compounds in the avermectin that were most effective, to make them less toxic, to make them most potent. And they dubbed what resulted from all that Ivermectin. And that is how they made the drug Ivermectin.

Justin: So, all the times that you've heard Ivermectin, the name, you're like, "That's a great name, but where did it come from?" Now you know, in detail, how they got to Ivermectin.

Sydnee: [laughs] From the outset, all these people involved in this were so excited about Ivermectin. I know you're not yet. I know you're thinking, like—

Justin: Are you kidding me? Can you not see me? I'm waving my arms and jumping up and down in the air.

Sydnee: There are people out there in the bacteriology world who totally get why this would have been— I mean, this was huge.

Justin: There's no need to throw shade at me, but go on.

Sydnee: Well, I'm just saying, like, they didn't— usually if you're looking for a new compound that does something, you just build on, well, "We know that things with this sort of form tend to work, so let's just keep looking for things like that." They just serendipitously found this whole new substance from this golf course in Tokyo that—

Justin: That kills worms.

Sydnee: That kills worms. And they were very excited about it because it seemed to work on a wide variety of worms, it worked all throughout the gut, like, worms found in different levels of the gut, and a lot of different animals. And this is an interesting point that I was reading when Dr. Campbell was describing the discovery. He said one of the most important things was not just what it did kill but what it didn't kill.

Justin: Hmm.

Sydnee: The way he put it was if you wanted, uh, a new, um, anti-helminth to not work on something, it was the dog heartworm. And the reason for that is that if you— if a dog has a heartworm and you don't know about it, a worm in their heart, and you give them something that will kill that too, like you're trying to treat something else, but it also kills this heartworm, then that worm can actually cause a pulmonary embolus.

Justin: Oh gosh.

Sydnee: Like, a blood clot in the lung, after it dies. And then that could result in you losing the dog. So, you don't want to accidentally— you want to know. If that's there, you want to treat it very intentionally. You wouldn't want to give a dog a medication that would accidentally treat that. Do you understand?

Justin: Yeah, that makes sense.

Sydnee: So, it didn't do that. So, this was an amazing drug, because it did what you wanted it to do, it didn't do the stuff you didn't want it to do. It was all very exciting. And in addition, they started to test it against some insects, too. So, not just parasites inside the body, but ectoparasites. Parasites that can live outside your body. Certain kinda mites or beetles or lice and that kinda ting. And they found that it was useful against some of those, too.

And that was the first time that they'd found a substance that was both, like, toxic to endoparasites, parasites that live in your body, and ectoparasites. Parasites that live outside the body. So, it was an endectocide. This was the beginning of the class of endectocides. Again, very…

Justin: And here we are. I mean, I feel like I'm standing in Abbey Road studios right now. This is electric.

Sydnee: [laughs] And it seemed to have very little risk of toxicity, too. It seemed to be, like, well, once you're refined it to the Ivermectin and you give it, there's very little risk to the animal you're giving it to and a lot of risk to the parasites you wanna kill. Um, and the success was overwhelming.

It became the leading endectocide worldwide, it was a mainstay for vets, I mean it really just, as soon as it hit the veterinary world, it just overtook pretty much anything else they had for the most part, because it was so safe and effective and had such a broad spectrum of activity.

One thing that it was found to be useful for was a specific kind of parasitic worm, a nematode, that horses got. And it was called Onchocerca cervicalis. And that name is gonna lead us to the next chapter and why this drug is so important worldwide.

Justin: Folks, there's a lot more layers to this onion to peel, but I predict that my wife is gonna leave me in suspense about Onco-cherra… cervicalis and it's connection to this case.

Sydnee: Uh huh. First, we're gonna go to the billing department.

Justin: Let's go., I can't wait!

[ad break]

Justin: Our bills are paid, Sydnee, you gotta tell me what those two weird Latin words mean.

Sydnee: Okay. Along some fast-moving rivers, okay… just stick with me.

Justin: I'm with ya, are you kidding me?

Sydnee: You will find certain types of blackflies, okay? Of the simulium species. Various subspecies of blackfly. These flies can carry little teeny larva, or microfilariae. Larva, little teeny larva.

Justin: You had it on the first one, but you did have to circle back to show that you know the word, and I respect that.

Sydnee: [laughs] Of the parasitic nematode, Onchocerca volvulus, in their gut. So, are you following me?

Justin: Oh, yeah I am, but for the listeners…

Sydnee: Flies that have worm larva inside them, okay?

Justin: Flies with worm larva inside them. Okay.

Sydnee: These worm larva— the word is microfilariae, but we're gonna— should we stick with worm larva?

Justin: Maybe just stick with worm larva. For them.

Sydnee: Will eventually penetrate the stomach wall, they'll migrate to the head and proboscis of the fly, the part that bites you, and there, when that blackfly does bite someone, they can enter human skin. Okay?

Justin: Mm, okay.

Sydnee: These little worm larva can then go from the blackfly into the human.

Justin: Bugs, still the worst. Moving on.

Sydnee: They will then travel through the subcutaneous tissue all over the body. They will set up shop in little nodules in the skin. You can see these from the outside. That's not what's in your hand, you're freaking out now about what's in your hand.

Justin: No, I'm not. No, I'm not.

Sydnee: That's a ganglion cyst.

Justin: That's a ganglion cyst. Thank you.

Sydnee: You're fine, that's not what this is.

Justin: Thanks for making that public knowledge too. Looking forward to a thorough discussion of that on Twitter.

Sydnee: [laughs]

Justin: Thank you.

Sydnee: I'm sorry, I didn't know it was private.

Justin: Thank yooooooou.

Sydnee: It's just a ganglion cyst. Uh, anyway, so they'll set up shop in these little nodules around the body where they will mature into adult worms. And mate. And produce more little worm larva that will then continue to migrate throughout the body. Okay?

Justin: Okay.

Sydnee: Uh, the— and by the way, in case you want to finish out this life cycle. At some point, this human that now has these little microfilariae, or worm larvae, living in their skin, can get bitten by another blackfly who will suck up some of those little larva and carry them on to another human. Just to complete the life cycle, in case you're curious.

Justin: Yeah, thank you. I knew that, but, go on.

Sydnee: Anybody who has ever studied parasitology knows these life— you gotta, you gotta know these life cycles, you know the pictures. Anyway. So, importantly, these little larva, when they go all over the human body, are just kinda there until they die.

Justin: Okay.

Sydnee: When they die different places in the human body is when they really start to cause trouble. Wherever they die, they will cause inflammation, irritation, you can get itching, you can get skin lesions from this. And some of these will actually make it to your eye.

Justin: [sucks in breath]

Sydnee: And this is where they cause the real problem. Because if these little larva make it to your eye and then die there, the inflammation and everything that can result from that can cause visual loss or blindness. This is why these things are so important, because of that.

Onchocerciasis, also known kinda colloquially as River Blindness, because the blackflies live near these rivers, and that's why all that is important, is the second leading infectious cause of blindness in the world. Now, about 99% of these cases occur in 31 African nations and then the rest in Yemen, Venezuela and Brazil, and as of 2017, there were 20.9 million infections worldwide. 14.6 million of them, of the people infected, had the skin disease and 1.15 million had vision loss.

Justin: [sharp exhale]

Sydnee: So, this is a big problem, okay?

Justin: Yeah, absolutely.

Sydnee: So, I wanna set that up. That this is— and as you may notice, this worm that causes this big problem is Onchocerca volvulus, and you may remember the horse nematode was called Onchocerca cervicalis. So something's in common there, right?

Justin: Yeah?

Sydnee: This dawned on some researchers. Because up until 1981, the only drugs available to treat Onchocerciasis were not great. They had really high toxicity, so they were dangerous to the humans that they were treating as well as the worms that had, you know, that were inside. You needed a lot of doses, which could be cumbersome depending on what part of the world you were in and who you were trying to reach. And they had a high rate of something called the Mazzotti reaction.

Justin: Hmm.

Sydnee: Which is basically, it's a constellation of symptoms that happens after you're treated for one of these filarial diseases, um, and you can get, like, fever and itching, and your heart can race, your blood pressure can drop, you can get pretty sick. The thought is that it's like an inflammatory reaction from the death of all these larva all over your body.

Justin: Okay.

Sydnee: Okay?

Justin: Right.

Sydnee: That's kinda like the basic idea behind it. And the treatment could be just as likely to cause vision loss as the disease itself, because you take the treatment, you have these little larva in your eyes, as they die there's all this inflammation, and then—

Justin: That's bad! It's a bad medicine, Sydnee.

Sydnee: Yeah. And so, so they didn't have great treatments for Onchocerciasis. So, seeing how successful Ivermectin was against this horse nematode, some of the researchers, specifically Dr. Campbell takes a lot of the credit for this, thought—

Justin: Wait, sorry, what did you say?

Sydnee: Dr. Campbell takes a lot of the credit for this. I think he was—

Justin: Huh!

Sydnee: He was the one who first thought of it.

Justin: interesting!

Sydnee: I think he was! [laughs] No!

Justin: There is a little heel-turn from Dr. Campbell! I sensed it and you delivered!

Sydnee: No, that is not the case!

Justin: You just didn't wanna ruin your surprise too early…

Sydnee: That is not the case, there is no, um, headbutting between any of these researchers that I am aware of.

Justin: [doubtful] Well, somebody did take a little credit. [laughs]

Sydnee: As far as I know, they all got together. But anyway, he was the one who said, like, "I think maybe, you know, if it works against this one Onchocerca, could it work against this other one?"

Justin: "And maybe we should call it Campbellmol, just a thought. Just a thought I thought of just now."

Sydnee: So, they started testing it out, doing all the things you do to a drug to see, like, okay, could it— is it safe in a human. They started those sort of lab trials, and then eventually in 1981, clinical trials, to test the theory. And by 1988, it was the mainstay of treatment, because it did in fact work and was not toxic to humans. So, it was a much better treatment than the ones that had existed previously.

In order to get it to all the communities that needed it most, the parts of the world that needed it the most, the Kitasato Institute actually agreed to forego any royalties, along with Merck. They made it free for the treatment of Onchocerciasis for as long as that is needed. And as far as I know, that is still the case.

It is interesting, Ivermectin doesn't actually kill the adult worms. It just doesn't. It doesn't do that. So, those can continue to mate and reproduce. So, it's sort of like a suppressive, maintenance kind of therapy. We don't have any other way to kill the adult worms right now.

Justin: Okay.

Sydnee: But, if you take it, uh, with some— and by regularly I mean, like, a couple times a year. So, not that regularly. Then you won't have any of the little worm larva and you're fine. You won't get the disease.

Justin: Great!

Sydnee: So, the worm might be there, but it's not gonna harm you. Um, in addition, what grew from this was this concept of community-based treatment, which is really essential with these kinds of— they're not communicable human to human, but they're passed through the flies, right, within a community.

So, instead of you think about, like, each dose is administered from a one-on-one interaction between a physician and a patient, which could happen, I mean, you could do it that way, but also you would give doses to a community to distribute as needed. And what they found is that they were actually able to lower transmission as well, by doing this.

So, this is a huge public health thing, to not only be able to treat individual patients with it, but to be able to treat a whole community. And you're gonna reduce cases this way, by— do you get what I'm saying?

Justin: Yeah. For sure.

Sydnee: If there's fewer people with it, there's fewer flies infected with it and then they pass it to fewer people and so on and so forth.

Justin: Yeah.

Sydnee: So, all of this work has resulted in a huge decrease in the global burden of Onchocerciasis. Four countries have been declared free of it so far, and there are others that are moving towards that elimina— the goal is global elimination of this disease. That is the goal. And it's one of those— we've talked about before, like, neglected tropical diseases that places like The Carter Institute are very focused on. This is one of those that, you know, we have a treatment for, it is effective. It takes a lot of work, but you could eradicate it if we keep moving forward.

Ivermectin was also found over time to be useful for some other things. Um, lymphatic filariasis, which you may know as, like, elephantiasis, heard that. Where the little— different filariae, different larva can clog lymphatic channels and things in your body, can cause swelling and that sort of thing. It's useful for that as well. Strongyloides, which is another worm infection. Um, some kinds of lice and scabies it can be used for.

So, it has other uses in humans. And there are also even some interesting projects that have looked at things like mosquitos that bite humans who have taken Ivermectin have shorter lifespans. So, the thought was even though Ivermectin doesn't treat malaria, if patients, or if people in areas of the world that have a high burden of malaria are treated with Ivermectin…

Justin: Maybe we can wipe out these mosquitos.

Sydnee: Can we wipe out some of the mosquitos, yes. So, it's a really, it's an amazing, life-saving drug that has been, you know, has had huge global impact. And in 2015, Dr. Omura and Dr. Campbell won the Nobel Prize in physiology or medicine for this discovery. It is one of the World Health Organization's essential medication. And it's, I mean, it's saved tons of lives and sight and, I mean, it's huge. So, Ivermectin is a hugely important medicine, both in the veterinary world and in the human world, for reasons that have nothing to do with COVID.

Justin: Well, there you have it, folks. Thanks so much for listening to our podcast. What a great story—

Sydnee: Wait—

Justin: And it's not gonna be perverted at all by anybody and—

Sydnee: No, wait. [laughs]

Justin: There's no, there's no bad part of it.

Sydnee: This is where— this is where I think… unfortunately, science is inherently political. I think it always has been. We can say it is now, but I mean, I think it's unfair to say that it hasn't always been to some degree.

Justin: Yeah. Galileo would like to…

Sydnee: [laughs] I think for a lot of us, we would make the case that in this pandemic, with COVID, it didn't have to be as political as it is. But here we are. And so, I think when you have something that is like this unproven treatment for COVID that gets touted, that there's a lot of skepticism now.

Justin: Yes.

Sydnee: Um, and fairly so. Because we have been led down the primrose path several times. Why would anybody think that this antiworm medication works for COVID? What was the thought?

Well, it wasn't a wild thought. Ivermectin has a unique— it took us a while to figure out the mechanism of action. I'm not gonna get into all that, cause I think that can get tedious, but it was interesting, it was unique, why not try it against other things? Obviously, we have in the parasitic world, it jumped from, you know, animals to humans and then to other parasites in humans. Why don't we try it against viruses?

There have been some in vitro studies about, like, things like the Zika virus that showed some promise. Um, and other viruses. So like, mm, maybe it does work against virsues, right? Like, people have that question.

And like I said, I think asking the question, could this work against viruses, is a totally valid question. And then when you put it in a petri dish and see that it does seem to work somewhat against viruses, to continue to ask more questions is always valid. I don't ever think that that should be— those questions should be discouraged.

Um, because of that, it was tried in vitro against COVID, against Coronavirus, I should say, the virus that causes COVID. And it showed some effect. In a petr— in a lab, right? In vials, they put some Ivermectin in and it killed some viruses, and they said, "Woohoo!"

Justin: "Yay, we did it."

Sydnee: "Yay." Now, here's the catch: when they looked at how they were able to treat this coronavirus in these cells in a dish with Ivermectin, um, the levels of Ivermectin, of continuous, like, high-plasma levels of Ivermectin that you would have to achieve in order to replicate this lab result in a human body are beyond anything we've ever achieved in a human.

Justin: Mm.

Sydnee: They're like, 35 times what the plasma level in a human—

Justin: It's a very large pill. It would be a very large pill.

Sydnee: [laughs] It's questionable— even toxicity aside, because like, one question would be could you give that much Ivermectin to a human and they live? I dunno, I mean, it's a real safe drug. It has a pretty— I mean it has a very good profile, but most things have their limits. [laughs]

Justin: Yeah.

Sydnee: I mean, you can drink too much water, so everything has a limit. But even if, toxicity aside, just to, like, achieve those plasma level continuously, I don't know that you could do it. Like, the question has been could it even physically be done to replicate the success they had in the lab. No is the general consensus.

Now, people have tried it anyway. There have been, I mean, relatively speaking, few. There have been a handful of studies throughout the world. There are ongoing trials in the US, in India, in South America, different countries. There have been, you know, different trials and, like, retrospective studies, looking back at patients that were in the hospital.

There was one that was done in hospitals in Florida, looking at cases in Florida, that have shown maybe it helped some. Because it was early on, it was added to a lot of protocols, or just thrown at patients randomly…

Justin: In the low levels that we're used to, right? Not these wild levels.

Sydnee: No, exactly. And in, yes, in normal dosing. In normal dosing. The question, though, is that—[sighs] you know, we're in the midst of the

pandemic, we're not gonna get a ton of good data that quickly. We just can't. There haven't been the good, multi-center, double-blind, randomized control trials that you expect to show you if a drug works or not. The small studies sometimes show some effect, sometimes don't.

There are a lot of, like, confounding things that aren't controlled for. There are a lot of flaws, some are still pre-prints. There's not enough data that any sort of medical body has said this is a good idea right now. You know, the World Health Organization, the FDA, the CDC, the NIH, all of these sorts of organizations in different countries around the world all advise against its use at this time, outside of clinical trials.

You know, if you wanna design a study and get approval and do a clinical trial, you can do that with it, but don't just give it to patients.

Justin: Right.

Sydnee: Um, in South America, it was adopted really dramatically. It was added to a lot of hospital protocols. Some of that has been pulled back, because a lot of the— a lot of the early adoption was based on a pre-print that issued and then retracted, showing a lot of effectiveness of Ivermectin, that used that Surgisphere data. We've talked about Surgisphere on the show before. Remember the Surgisphere thing?

Justin: Yeah, remind me.

Sydnee: Which was just like this fake…

Justin: Oh yeah, like a wild, yeah.

Sydnee: Data collection, maybe based on nothing, kind of. Anyway, um, so because of that, that's been retracted and so now there are some places that are like, well, we kinda thought— that was kinda what we based our decision on, maybe this isn't a good idea."

Justin: Right.

Sydnee: Anyway, the stuff that is indicative of anything is pretty weak. This may be another hydroxychloroquine. I have no data that tells me otherwise right now.

I know that there are certain organizations, uh, that are very excited about it, certainly. Critical care organizations that are pushing it really

hard as, like, we need to be giving this to everybody. I know very, like, high profile, there was a doctor who pleaded before a senate committee just a few days ago that we should be giving this to everybody. But a lot of this is based on anecdote, a lot of this is based on doctors saying, "I gave this to people and I know it worked."

Justin: Yeah.

Sydnee: And…

Justin: We don't do things like that.

Sydnee: We just— right now, we would need a lot more actual clinical trials to show that this works.

Justin: Yeah.

Sydnee: Because I could pick apart the studies that are out there, but I mean, some of them don't have control groups, a lot of them don't tell us, like, when was it started in the course of the disease, and don't control for, like, differences between the groups of patients, and a lot of them are looking back and…

Justin: I like that, because you said, "I could pick apart the problems with the studies," in a way that indicated you weren't gonna do that, and then you were like, "Nah, you know what? I'm gonna circle back around and get 'em real quick. I cannot help it." [laughs]

Sydnee: I just think right now you have some things that go, "Huh. I wonder if there's something there." And from that, you have some individuals who are going, "There is definitely something there!" And that's not how science works.

Justin: Right. Even though the—

Sydnee: Just like with the, the story I just told you. They didn't immediately say, "We should give Ivermectin to humans because it killed a horse worm!"

Justin: [laughs]

Sydnee: They did years of study to make sure that it was a good idea and that it worked before they gave it to humans.

Justin: Yeah.

Sydnee: And that's how science works. You need some good trials. Uh, and also, please don't take veterinary meds. A lot of people as a result of this, have started looking at their dogs' heartworm medication and going…

Justin: "Hmm… "

Sydnee: "Well. Could I… maybe…

Justin: "Should I… "

Sydnee: Or like, people who own horses. I've seen that on the internet, like, "Well I have tons of Ivermectin for the horses." Don't take veterinary meds! They're not made for you, please don't take them. They're not for humans. Everything about them is different. The regulation of them is different, the dosing is different. Please do not—

Justin: The horse ones have a hay flavor, and you don't want that.

Sydnee: [laughs] If you need Ivermectin for an actual medical reason, a doctor will prescribe it to you. Go talk to a doctor. Do not take veterinary medicines for anything. This, or anything. I just feel like that should be said.

Justin: And it has been.

Sydnee: This isn't the first thing— I know people out there are taking fish penicillin, they told me about it. Please don't do that.

Justin: Stop it.

Sydnee: Please stop. [laughs] Stop taking veterinary medicines. Leave them for the animals for which they are intended.

Justin: Um, thank you so much for listening to our podcast. We hope you've enjoyed yourself. We hope you have decided to let your dog keep taking their worm medicine instead of you stealing it all for yourself.

Sydnee: That's so rude.

Justin: So rude.

Sydnee: [laughs]

Justin: Your dog doesn't want worms. [laughs] Thanks to The Taxpayers for the use of their song "Medicines" as the intro and outro of our program.

Hey, wait, don't go! Don't click on to the next podcast or whatever. We have to tell you something really important. Two really important things. We are once again doing the annual Candlenights spectacular. This time it is a live streaming— well, not a live stream, it is a streaming event that we have filmed many, many, many segments for. It is going to be a wild thing. If you have seen Sydnee and my, um, Hallmark movie, uh…

Sydnee: A Medicine Called Christmas. The last two years.

Justin: And A Medicine Called Christmas 2, then you will definitely wanna tune in for this. Bit.ly/Candlenights2020 is the, uh, is the address. It is $5, okay.

Sydnee: There's singing, there's dancing, there's podcasting.

Justin: It is $5 plus a $1.25 fee to our, uh, streaming partner, and that $5 is gonna go to Harmony House, which is a shelter in our area for people experiencing homelessness. So, it is for charity. It is going to be full of wild stuff. There is special guests, there's music, there's dancing, there's kids, there's adults, there's Santa, there's everything. Star… star king.

Sydnee: And it's just $5, but if you can and you wanna donate more, Harmony House is a wonderful organization. I work with them to provide medical care and I can't say enough for these people who are really doing good, hard work that the community needs so much.

Justin: bit.ly/Candlenights2020. One more address I wanna give to you; bit.ly/SawbonesPaperback. That's right, the Sawbones book's coming back with brand new content, sort of inspired by the events of 2020. New illustrations by Teylor Smirl, new words by us and a new cover by trees. That's soft and not hard, like the last one.

Sydnee: [laughs] Okay. Alright.

Justin: [laughs] Um, bit.ly/SawbonesPaperback. That comes out December 29th. Please, please, please, please, please, I'd love to do

another book like this some time, but we don't get to do it if a bunch of people don't buy it. So please, bit.ly/SawbonesPaperback. Uh, that is gonna do it for us for this week. So, until next time, my name is Justin McElroy.

Sydnee: I'm Sydnee McElroy.

Justin: And as always, don't drill a hole in your head.

[theme music plays]

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