

Sawbones 297: Auto-Brewery Syndrome

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[theme music plays]

Justin: Hello everybody, and welcome to Sawbones, a marital tour of misguided medicine. I'm your co-host, Justin McElroy.

Sydnee: And I'm Sydnee McElroy. Justin, this was a tough one for me this week.

Justin: Why's that, buddy?

Sydnee: Well, a lot of what we cover on this show—

Justin: We're married, by the way. We never mentioned that. In the intro, we never say like, "We're married doctors, and we—"

Sydnee: Well no, you're not a doctor. And it is called a marital tour of misguided medicine.

Justin: Yeah... I didn't know if I needed to clarify like, we're not like, brother and sister or anything. Like, we're married. And I'm rounding up on the doctors thing. Is that not...

Sydnee: That's not how that works.

Justin: Okay. So, some of us are doctors on the show, and some of us aren't. And sorry, Syd, I didn't mean to interrupt you, bud. You can continue now. I'm very sorry.

Sydnee: Thank you. Uh, Justin, usually when we go into topics on the show, I have a pretty clear picture of the truth of what the evidence is. What the science is. Because it's something... we're covering something old, and it's something that has either been figured out, or proven, or disproven or whatever by now. Right? Or it's something that, while it's new, it is pretty clear that it's fake or not, or... or it's evolving in a direction that's very obvious.

Justin: Sure.

Sydnee: This topic this week really has me scratching my head, 'cause it's a strange one, and I went into it thinking one thing, and now I'm kind of starting to think another.

Justin: Okay.

Sydnee: But I could be wrong. This is very stressful. This has been a very stressful research week for me.

Justin: I've been seeing a lot of this conflict play out in our home, and I'm happy that it can now spill over into the listeners' daily lives.

Sydnee: I like to know the answer, and I'm not sure.

Justin: I know. I know. Like today, we had to hang a bunch of pictures on the wall, and I said, "Syd, I gotta be honest – I have no idea how to do this well." And Sydnee then said, "Oh, honey, me neither." And then literal moments after I hung the first picture, Sydnee suddenly got very concrete ideas about how picture hanging should be conducted, vis-à-vis placement, height, eye lines... very concrete ideas that apparently were not there moments before.

Sydnee: [amused] Well, it wasn't until you started doing so bad that...
[laughs]

Justin: Sure, then you decided to have concrete...

Sydnee: I—here’s what I don’t understand. Maybe we didn’t know going in, but once you did the stuff you did, and then looked at it, how did you not go, “Okay, well, not that. Scratch that option out. Let’s go to plan B.”

Justin: I said it looks—I said, “I think it looks nice, like an art gallery.” And Sydnee said, “That is the opposite of what we want.”

Sydnee: It’s like a really wack art gallery where the pictures are hung at strange, sort of equal, like, spacing, and sort of the same height, but not quite. It looks like you just, like, didn’t measure, as opposed to like, haphazard, intentionally. It looks like you didn’t measure. That’s what I didn’t want.

Justin: [quietly] So what’s the topic, Syd?

Sydnee: Anyway. Uh, thank you to Holly and Elizabeth and Katie and Greg, Andy, Meredith, Mary, Oliver, and Brandon for all suggesting... auto-brewery syndrome. Have you heard of this?

Justin: I mean, is this the part where I lie and pretend like you haven’t been talking about it?

Sydnee: Well, it’s been in the media a lot.

Justin: Have you heard about this one, folks?

Sydnee: Had you heard about it before I told you?

Justin: No. But your dad had, and that’s something. But your dad watches a lot of oddball stuff. He keeps track of like, weird things in the news.

Sydnee: You wouldn’t have to, uh, watch oddball stuff to find this. This has infiltrated the... what do people like to use? The MSM? Mainstream media?

Justin: Yes, the lamestream media in my book.

Sydnee: Oh, is that what you call them? [laughs]

Justin: That's where I'm at.

Sydnee: See, I don't. I love the mainstream media. Love the media. Love it. Love journalists.

Justin: Thank you.

Sydnee: I'm on the pro side.

Justin: I used to be a journalist. [laughs]

Sydnee: I know. That's why I married a—well, no. I married a guy who worked at Best Buy, and he became a journalist.

Justin: Uh, I prefer games editorialist. I really was more about bringing my own fun, funky, uh, take to things than I was like, real hard news, y'know?

Sydnee: I uh... so there have been a ton of articles in various news outlets on the internet. I think this has made some like, news stories on TV, and then, newspapers and stuff, because it's a really interesting idea. And it's all based on an article that was published this past summer, and this is not the first case of this ever, or the first article that was ever published on this. It just seems to be the first one that has kind of captured the attention of the public.

So, this past summer, the BMJ Open Gastroenterology journal... so that's a— it's an online, open access journal. So, this has captured a ton of media attention. It was a case report and a literature review that tells the story of a 46-year-old pretty healthy guy who started having issues. He traces it back to a finger injury in 2011. He had some sort of wound on his finger, and some sort of complicated injury that required a course of an antibiotic called cephalexin, or you may have heard the brand name, Keflex.

Justin: Okay.

Sydnee: Um, so he took the whole course of the antibiotics, and after he completed it, he started having these strange episodes. And he described them as kind of a brain fog. And you'll hear that term throughout this diagnosis and this syndrome. And I always think that—I always get nervous when I hear the term 'brain fog,' because you find it attached to a lot of other diagnoses that are more questionable. Things like chronic Lyme, you'll hear brain fog tied to a lot.

Justin: I prefer to go with, having a senior moment. That's what I go with.

Sydnee: [laughs] Brain fog is more like, I just feel, uh... the way people tend to describe it is like, I can't... y'know, like you feel fuzzy.

Justin: Sure.

Sydnee: I would think about it like the times in my life where I've taken cold medicine.

Justin: I feel like that if I had the mental capacity and state I do now, if I just woke up one morning in my like, late teens or early 20s with this mental state, I would think that I suddenly had brain fog. I can feel my cognitive abilities like, dwindling as I age into decrepitude.

Sydnee: [laughs] Having small children creates permanent brain fog.

Justin: You ain't far off.

Sydnee: Well, I'm hoping it actually is temporary. I'm hoping it will wear off once they sleep.

Justin: Sleep. Yeah.

Sydnee: Like normal humans.

Justin: Yeah.

Sydnee: Anyway, he started having those symptoms first. It progressed until he was having some actual like, mood changes. Like, depressive symptoms, and his mood was very labile. Some personality changes, even. And he finally sought care for this in 2014. So this went on for quite a while before he went and saw a doctor and discussed these issues, and the physician he saw felt it was largely a psychiatric issue, and so, treated him with some antidepressant and anti-anxiety medications for what appeared to be some sort of depressive or anxiety or both kind of diagnosis.

This didn't really help. And everything kind of culminates in this story in an early-morning arrest for a DUI. So he's pulled over, he appears intoxicated, he refuses a breathalyzer, he's sent to the emergency room, and his blood alcohol level is found to be 200 in the ER.

Justin: Yikes!

Sydnee: So, it seems pretty straightforward at this point, right? You find, a lot of times, if you can find substance use disorders and things like depression or other mood disorders, or other psychiatric diagnoses, can be comorbidities. They can run together. You may find a slightly higher rate of one with the other, or vice versa, especially when one is being—um, is not being managed. The medications were not working for his symptoms.

Justin: Uh-huh.

Sydnee: So, on the surface, it seems pretty straightforward. He is, y'know, trying to get a hold of these medical conditions. He's trying to get treatment. He's still in the process. It's not successful yet. He has had some alcohol. He got caught.

Justin: To try to get on top of it. I get it.

Sydnee: Yes. He's self-medicating, and he got caught in a DUI as a result. Now, what's interesting is that he insisted he had not had a single alcoholic beverage.

Justin: `Kay.

Sydnee: Even prior to this episode, he says, "I was never much of a drinker. Occasionally on social situations, but very rarely." And in the past couple of years, he hadn't been drinking at all because of all these symptoms he'd been having. He didn't want any more brain fog than he was already experiencing. So he is adamant, "I did not drink."

Justin: So as people that have been doing Sawbones for many years, we would, at this point, default to something... if not skepticism, maybe something approaching a realistic practicality.

Sydnee: And a lot of—a lot of the physicians who encountered him agreed with what my, probably initial skepticism would be. Well, a lot of people deny.

Justin: Sure.

Sydnee: That they have a problem at first. It would not be unusual to be embarrassed, or feel guilty. Realize that, y'know, if you had been drinking, I shouldn't have done that, I could've hurt myself or someone else, I wish I hadn't, I need help, this has become an issue... all of those are huge things to be able to say out loud and seek help for, and so, it's very natural to think, "Well, he's just not telling the truth."

Justin: Sort of like when I come home, and I'm like, "Syd, I don't know how that oatmeal cream pie double decker wrapper got into the car."

Sydnee: [laughs]

Justin: "It doesn't make sense to me. If you have any ideas, please let me know, 'cause I'm freaked out, too. I'm freaking out with you about this oatmeal cream pie double decker bar right after I went to Dollar General."

Sydnee: We're in this together.

Justin: Yeah, we're in this together.

Sydnee: Solve this puzzle.

Justin: Yeah, help me crack this one open.

Sydnee: Well, even though the physicians he saw, the healthcare professionals he saw – which, he saw several – did not really believe him, his aunt did. And his aunt got him a breathalyzer and said, “I heard about something like this over in Ohio. I want you to check on this breathalyzer every once in a while and see if, even if you're not drinking, y'know, it looks like you're drinking on this breathalyzer. See if you've still got, y'know, alcohol in your bloodstream, even if you hadn't been drinking alcohol.”

So, he did that, and he, y'know, ostensibly, found that he was blowing positives on the breathalyzer, even though he wasn't drinking. And he located this clinic in Ohio, and he went there. And the doctors there had seen a patient with a similar situation before. Like I said, this wasn't the first case, just kind of the first one that seems to have caught media attention. And they, uh... they felt like they knew what was going on.

So they checked his stool, and they found *saccharomyces cerevisiae*, and another yeast species. And that one, specifically, is better known as brewer's yeast. And from here, they diagnosed him with auto-brewery syndrome. So what this basically means is that some people get filled up with a kind of yeast. It's mainly been yeasts that have been implicated; although, a couple bacteria have been thought to possibly cause this as well.

But mainly, yeast that have filled up the intestines, and we want yeast when we're brewing to turn sugar into alcohol, right? That's the whole idea. That's how you brew beer or whatever. Any kind of alcohol. But in this case, the carbohydrates and sugars and everything that this patient is eating will go into the stomach, into the intestines, the yeast will gobble it up, turn it into alcohol. That alcohol will get into your bloodstream, and you get drunk.

Justin: Okay.

Sydnee: So that is the basic theory behind auto-brewery syndrome. And the idea that we could find elevated levels of this yeast in the stool was

thought to be proof, right? Because you might have a little of this in your GI tract, but you shouldn't have as much as a lot of these patients are, y'know, are finding.

Justin: Okay.

Sydnee: So, that was the—that was what this man was diagnosed with. And like I said, the docs at this office in Ohio felt like this was the likely cause, because this wasn't the first time that they had seen a case like this.

Justin: Where else had they seen a case?

Sydnee: Well, Justin, I'm gonna tell you about that, right after we go to the billing department.

Justin: Let's go!

[theme music plays]

Justin: If you've ever tried to hire somebody to work at your place of employment, if you've ever been in charge of that, you know how rough it can be. There's a lot of people just sending in resumes that don't actually have anything to do with... or at least, that used to be the case when I would hire people to write about video games. It would say, "I love football." It's like, I don't—I can't use you. Why are you telling me this? Why are you mentioning football right now?

Sydnee: I love football.

Justin: Okay, Sydnee. That's not true, but let's move on. [laughs]

Sydnee: [laughs] It might be. Maybe it will be from today on.

Justin: You need someone to help you sort the wheat from the chaff. That's a terrible way to think about human beings, but the idea is sound. You need someone to help you find the right people for the right gigs. Who are you gonna turn to? Well, Zip Recruiter, obviously. Their technology finds people

with the right experience, and invites them to apply to your job. It seeks out those people. It—it jukes past the people with football expertise, and dives right for the true, 100% gamers.

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Sydnee: Hey Justin, can I tell everybody about Stitch Fix?

Justin: I would love that, Syd, thank you.

Sydnee: So, everybody has their own style. My style right now is hurry, throw on a sweatshirt that's thick enough to hide the fact that you're not wearing a bra, 'cause the in-laws are coming over.

Justin: [laughs]

Sydnee: But I have better styles throughout the day that I like to wear. And uh, sometimes you need some help figuring out how to express that style. What pieces do you need? What items would make you look your best?

Justin: You obviously can't turn to me for this problem. Who can you turn to?

Sydnee: No, you can turn to Stitch Fix. They're an online personal styling service that will deliver your favorite clothing brands right to your door. Um, I can attest, I have used Stitch Fix. It's a wonderful service. I often feel overwhelmed when I go to the store. I don't know... I know kind of what I like and what I don't like, but I don't know how to put it together, or which piece would look best. And after answering some questions about my personal style and sending them into Stitch Fix, my stylist really nailed it. Really got it.

I got some boxes full of stuff that, maybe I wouldn't have known right away were me, but they totally were. And to get started, you go to [StitchFix.com/Sawbones](https://www.stitchfix.com/sawbones). You just answer some questions, and your personal shopper will ship you a box. There's no commitment required, and you only pay for what you keep. Shipping, exchanges, and returns are always free.

So get started to day at [StitchFix.com/Sawbones](https://www.stitchfix.com/sawbones) and get an extra 25% when you keep everything in your box. That's [StitchFix.com/Sawbones](https://www.stitchfix.com/sawbones).

[music plays]

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Justin: So, Sydster, you were gonna tell me about some other cases of auto-brewer... I have a real hard time with this one.

Sydnee: I do too, actually, in all honesty. Brew... brewery.

Justin: You've been crushing it, though.

Sydnee: I gotta do more exercises before I record. Uh, like, the vocal ones. Y'know, like the actors do.

Justin: Sure.

Sydnee: So this is a—

Justin: Rubber baby buggy bumpers.

Sydnee: [laughs] This is a relatively new diagnosis in the Sawbones scheme of things. But there have been case reports dating back to the '70s, mainly from Japan. There was one case series in 1972. Iwata reported on 12 people with what has been called throughout the years, drunkenness disease, endogenous ethanol fermentation, gut fermentation syndrome, and then, of course, auto-brewery syndrome. Which, it's no surprise to me, if you look at these different, um, choices.

But auto-brewery syndrome is, you've become a brewery, which is an evocative...

Justin: Yeah, I mean, it really makes you sound like you're something between brewery and man. You are half brewery, half man.

Sydnee: This is the future that the Terminator was warning us about.

Justin: Right.

Sydnee: Uh, a lot of the early cases were tied to some sort of preexisting gastrointestinal...

Justin: Thought you were gonna say preexisting beer. Like, yes, that would make sense.

Sydnee: A lot of the early cases were people who were drinking and didn't want you to know. No, they were people who already had some sort of um, maybe motility problem in their bowels, or they had, for instance, something called short gut syndrome.

So, this would happen if some of your intestine had been removed. It's literally what it sounds like – your gut's too short. Your small intestine is shorter than it should be. Short gut syndrome.

Justin: So it doesn't have enough time to like... see, that's a good name, too. Long as we're on name quality, that's a good one.

Sydnee: Short gut syndrome. It's exactly what it sounds like. And it could've either been because you weren't—there was just a genetic difference at birth, or because some of it has been removed, or... or some of it is there, but it's not functional. It's how much intestine is actually functional.

Either way, there was a case report of a 13-year-old girl who had short gut syndrome, and after eating a lot of carbs, would appear to be intoxicated. And she actually was sent to like a detox and rehabilitation center for substance use disorder related to alcohol.

Justin: Out of curiosity, how short are we talkin'?

Sydnee: So do you know how long the small intestine is?

Justin: See, again, you gotta stop askin' about this stuff beforehand. 'Cause I will tell you, with confidence, that it's 20 feet.

Sydnee: That's right, Justin. I'm so impressed.

Justin: You—I mean, you did tell me.

Sydnee: Well... it's an impressive fact.

Justin: It's impressive that I retained it. And I listened! That's impressive.

Sydnee: And you—a lot of that—I don't want to say it's redundant, 'cause I mean, it's good that you have all that. But you can get by until you have about 6.6 feet or less, and that's when things start gettin' kind of dicey.

Justin: Okay.

Sydnee: But it's best, if possible, to keep as much small intestine as you can.

Justin: Sure. I'm holdin' onto all of it.

Sydnee: Uh, there were also cases where people with things like crohn's disease, or other inflammatory bowel diseases, uh, could also have this auto-brewery syndrome, because the idea was that, if you have inflammation in your intestines, there are places where you can form strictures. Like, tightening, due to like, scarred tissue and damaged tissue and that kind of thing. Strictures can form.

And you can also have sort of partial blockages, where stuff can't get through for a little bit, and then it can. And that can result in like, pooling of like, fecal material.

Justin: So basically, things aren't going through the old gully works as quickly or efficiently as they should.

Sydnee: And as stuff sits there...

Justin: It turns into beer.

Sydnee: Yes, that is the thought, because a bunch of yeast will grow. And these are also—

Justin: Not beer, right? Alcohol is really what we're talking about.

Sydnee: Alcohol, yeah. We're talking about alcohol. Ethanol production. Uh, in addition, in some of these other conditions we're talking about, you may, as a result, have to take more courses of antibiotics in your life than the average person without one of those conditions would have to.

And there has been a lot of thought that these are tied to people who have taken courses of antibiotics, especially multiple courses, because... and we've

said this on the show before. When you take an antibiotic, it's going to kill bacteria. It doesn't know to just focus on your sinuses, or your ear, or that foot wound you have, or whatever. Right? It's just killing bacteria.

And in that process, it can kill some good bacteria that you have in your gut that you need to help you digest stuff. The other reason that you have that good bacteria is that it helps keep things like yeast at bay. It out-competes the yeast.

Justin: Out-competes the yeast is catchy. You should trademark that.

Sydnee: You like that? Out-compete the yeast. If uh, you have too much... if you have antibiotics that wipe out too much of that good bacteria, the yeast can just flourish, right? It's a yeast party, because the bacteria is not there to keep it at bay, and then, it's thought that can also lead to this, 'cause yeast grow, and then they ferment, and then you got alcohol, and then you seem drunk, but you never drank. Auto-brewery syndrome.

There have been, uh, scattered cases throughout the years since then. Throughout the '70s when this was first kind of recognized. Um, and some of these people do have one of these underlying diagnoses. Other people appear to be totally healthy before being diagnosed with this. Sometimes, you can trace it to like, the patient we mentioned in the beginning, with like a course of antibiotics that was thought to maybe, possibly trigger it.

Justin: Do something, yeah.

Sydnee: Other times, you can't. Uh, they're all different in terms of like, their age, and what their, y'know, health status is, and what they do, and where they live, with the exception of, they appear drunk, they have an elevated blood alcohol level, and they deny ever drinking.

Justin: It's weird, but that variety of things... well, okay, let's keep going. Let's finish this, because I want to talk to you generally about this. But keep going on the specifics for the moment, if we can.

Sydnee: Uh, so, there are some characteristics that can put you at risk. Um, some things that I already mentioned. But they did find some specific, like, people who have auto-brewery syndrome documented, generally – not all, but generally – they felt they were in poor overall health prior to this diagnosis, even before these symptoms started.

They had more food sensitivities, they tended to drink more water, less tea, coffee, dairy, candy, that kind of thing. They cook at home more. They don't eat out as much. They don't have as much starch, and they have a lot of GI problems already. I don't know, these were all things they found put you more likely to maybe be diagnosed with this later.

Justin: Mm-hmm.

Sydnee: There's been some thought that diabetes or liver disease like cirrhosis could be linked to it. And I found some research that was kind of equivocal on that. There was one study that suggested that uh, patients with diabetes naturally produce more endogenous alcohol, more ethanol, than patients without diabetes, but it never rises to a level that it matters. Y'know what I mean? There might be more alcohol in your gut, but it doesn't—it's not enough to make a difference.

Justin: Right. It's just suggesting that like, maybe it does sometimes. Like, that maybe for some diabetics, it is.

Sydnee: And maybe it is. That would be the thought. Although, there was another study from 2017 that said there is no correlation between diabetes or blood glucose level and blood alcohol level at all. So, I think that's still something we're trying to figure out. Like I said, antibiotics are a common theme. Exposure to antibiotics.

Justin: Is this something that's like a... I don't know the right terminology, but like, a symptom versus a condition? Like, a symptom of something else happening, or its own thing?

Sydnee: Well, I mean, these patients report a lot of other symptoms in addition to like, the drunkenness. So I mean, if the idea is that yeast has

overgrown in your intestine, it's gonna produce—I mean, that is the problem. And this is one symptom of it, but there are a lot of other, y'know, GI issues and general wellness issues. General health issues, I should say, that you can suffer from, I think in addition to the...

Justin: Okay.

Sydnee: Intoxication from the alcohol.

Justin: Makes sense.

Sydnee: Um, the—there was some thought that there was a genetic component, and that's why we saw so many cases early on in Japan. 'Cause that's really where a lot of the first cases were documented, and that was the question. Is this just... is it a genetic thing? Um, it's interesting, 'cause the thought is that it is and it isn't. Auto-brewery syndrome isn't genetic, but your ability to break down alcohol, how fast you can break it down, varies from person to person. And that is genetic.

Justin: So like, your susceptibility?

Sydnee: Well, so, there's an enzyme that turns alcohol into something called acetaldehyde, which is toxic. And acetaldehyde, the more it accumulates in your body, you get nauseous, you get flushed, you get... I mean, you just feel terrible. And you have another enzyme that breaks that down further into acetate, and then water, and carbon dioxide, and it's harmless. The more you have of that second enzyme, the faster you get through that toxic part, and for most of us, you don't even notice it, right? You drink and you don't feel bad.

For some people, if they have less of that enzyme, that toxic metabolite will build up pretty quickly, and after just a drink or so, they can feel really sick, really bad. So the thought was, if you're one of those people, and your body is making alcohol, you're gonna notice a lot faster.

Justin: Oh, okay!

Sydnee: Than somebody who has more of that enzyme, and I mean, they just feel off. Y'know, 'cause you wouldn't think, if you hadn't been drinking and you just felt kind of foggy and off, you wouldn't assume, "Oh, I must be drunk," 'cause you hadn't been drinking.

Justin: Right.

Sydnee: So the thought is, maybe we just noticed it in Japan first, because the symptoms were a lot more pronounced, and a lot more uncomfortable than for patients elsewhere in the world.

Justin: Makes sense.

Sydnee: I don't know. The diagnosis right now is a lot to do with history. Like, ask. And the big thing that a lot of the authors stress is, you have to allow in your head the possibility that someone appears drunk, has an elevated blood alcohol level, and did not drink alcohol. And just like, allowing your brain to accept that as a possibility is kind of the first step.

Justin: [laughs]

Sydnee: 'Cause I mean, well, a lot of healthcare professionals would just say, "Come on."

Justin: Come on.

Sydnee: "Come on, just be honest with me."

Justin: "So your belly is making the beer? Is that what you're telling me, sir?"

Sydnee: [laughs] And there's—I mean, it's good, in a sense, that there has been a lot of media interest in this, 'cause there's not a lot of awareness of it, I think. You can, if you really want to know for sure, you basically can put somebody in the hospital. This is—this has been kind of a diagnostic test that had been proposed, but this was all still pretty early, so I'm not gonna say it's like, the standard.

You would put them in the hospital, give them some glucose, and then check their blood alcohol level at certain intervals every few hours, right? And if, after a big glucose load, their blood alcohol level starts going up, and they're being monitored, so you know they're not drinking alcohol...

Justin: Yeah. Well, there you—but they haven't done this? Or they haven't done a lot of this kind of testing? Or...

Sydnee: Well, all of the cases have been case reports.

Justin: Meaning...

Sydnee: So, there are different kinds of journal articles of research studies of papers that are published, and the best, when it comes to something like this, or if you have a large group of patients who have a condition, or are thought to have a condition. And you can do some sort of randomized control trial of a test or a treatment or something, where some people get one thing, some people get another, you don't know who gets what... right?

Justin: Mm-hmm.

Sydnee: That kind of thing.

Justin: So like a clinical trial kind of deal.

Sydnee: Yeah, similar idea. These are not that. These are not big, cohort studies. These are not big, giant studies of a cross-section of the population, some of which have auto-brewery syndrome, some of which don't, and comparing things.

Justin: But have we demonstrated that the—

Sydnee: These are individual stories of singular, or maybe a handful of patients. And—

Justin: Have we demonstrated the phenomenon happens, though?

Sydnee: Yes. This has been done.

Justin: I mean, like, we know that this happens.

Sydnee: But it's been done so few times, it's not... it's not scientifically robust.

Justin: Okay.

Sydnee: But the case reports are powerful in that they are telling stories of patients that we don't see a lot. Very detailed accounts, and then, exactly what was done to try to figure out what was wrong. So they are interesting and certainly important to science, but they don't... you don't derive a gold standard diagnostic test, or a gold standard treatment, from a case report.

Justin: Hmm. Okay. Okay.

Sydnee: Right? 'Cause that's very individualized. Um, so, they've done things like uh, scopes. Upper scopes and lower scopes, and like, checked intestinal contents, or checked stool for yeast. That's been another way that they've tried to figure this out. Um, the treatment of it, again, it's varied from patient to patient. Everybody who has been diagnosed with this, they've tried a different approach.

Justin: Can they wait them out? I mean, does it go away, I guess is what I'm saying? 'Cause you're talking about your body processing the alcohol, right? If you processed it like... I mean, wouldn't—do you know what I'm saying?

Sydnee: That episode would go away, but the yeast are still in there. And the next time you eat a big carb load, it'll happen again.

Justin: Weird. Okay.

Sydnee: So the treatments have reflected that. One, antifungals, to try to kill the yeast. So that's been tried. A variety of different antifungal medications have been given to patients. Um, restrictive diets.

Justin: Lowering the carbohydrates.

Sydnee: Yeah, just don't eat carbs. That's been a big—that's been part of the treatment.

Justin: Hey folks, it's great if you can do it.

Sydnee: Probiotics have been thrown in there. So put the good bacteria back in there to try to keep the yeast at bay, to try to outcompete the yeast again.

Justin: That's hard, though. Gut bacteria can change so much, right?

Sydnee: It can, and like, you can replace it, but what if you...

Justin: So variable, depending on...

Sydnee: Yeah, I mean... right now, what most of the case studies seem to indicate is that the low carbohydrate diet, and then, a course of some sort of antifungal is like, the big mainstay of treatment. And then, probiotics have been proposed as a kind of adjunctive treatment.

Um, the—but it's been different for every patient. If you read through these different cases... I read through a case report of three different patients, and for each one, it was a totally different clinical course, and a totally different treatment regimen with variable levels of success from each one. So like, the first patient, a course of antifungals, and they were great. Six weeks later, they're great. The next one was put on a low carb diet and had extreme difficulty sticking to that, and had multiple episodes even after being able to stick to the low carb diet, and um...

Some of the patients were put on three or four different courses of different antifungals. Some of them were hospitalized and put on like, strong IV

antifungals. So it's been different. So it's hard to say which treatment worked the best, because it seems very individualized for each patient so far.

The case we first talked about had a very rocky course. He was seen by countless specialists and gastroenterology, psychiatry, neurology, all kinds of different subspecialties and general practice. He continued to have episodes, one which landed him in the hospital with a bleed in his brain from falling and hitting his head while he was intoxicated.

Justin: That's no joke. Yeah.

Sydnee: He was treated with a couple different antifungals. He was put on a low carb diet. It took him a while. The author has mentioned specifically that they had a huge setback, 'cause he ate pizza.

Justin: [laughs]

Sydnee: And that had a—he had an extreme relapse of auto-brewery syndrome after eating pizza.

Justin: I don't want my blood to turn to beer, but, I do want to crush that 'za real quick. So, the scientists in their ivory tower will just have to get used to it.

Sydnee: Just gonna—I'm just eating this pizza.

Justin: I'm eating this pizza, and I know that—are there carbs in pizza? I'm sorry, doc.

Sydnee: It was cauliflower crust!

Justin: It was cauliflower crust!

Sydnee: It wasn't. I have no evidence of that.

Justin: And folks, don't let them zing you with the cauliflower crust. Ask for the ingredients, 'cause it's probably got flour in there somewhere.

Sydnee: It almost—I mean, a lot of them do. Anyway, uh, he—

Justin: If it tastes edible, it's got something else in there.

Sydnee: Hey, I love cauliflower. Don't hate on cauliflower in my presence.

Justin: Yeah, but you mix it up with eggs, and like... okay. That's fine.

Sydnee: So anyway, it took him a while. He did eventually manage to, it seems, clear the yeast, and he is able to, I think, eat a more normal diet, and he is symptom free at this time, or so the authors report. Uh, there's been some thought. Y'know, brewer's yeast is now a supplement people take.

Justin: Ohh.

Sydnee: So, is that something we might see more if people are taking it? I don't know. When I first—there was a—there was an article published about this in the year 2000. Which basically said, listen, we don't know—all the science behind this is shaky. It's all case reports. There's still not... as far as like, the mechanism. Like, the actual, like, on a molecular level, how everything is happening, it's still a lot of hypothetical stuff. We haven't actually proven a lot of it in a lab. Or in a human body. We're still guessing.

And so, based on all that, there was this big medical, legal article that was published in the year 2000 that said, this cannot be a defense against drunk driving. If you are arrested and charged with driving under the influence, driving while intoxicated, you cannot use this as a defense, because right now, we don't have a strong enough scientific basis for its existence. And we think you might be lying, basically, was the implication of this article.

Justin: Yeah. You could also, though, if you know this, and you're like, "Mmm, I'm feeling drunk. I know what this is. This is my auto-brewery syndrome that I have. I'm not going to drive." Like...

Sydnee: This argument has been made as well. If you know you have this...

Justin: You have to manage the disease, right?

Sydnee: Yes. You should refrain from driving. Is that, even if you—even if we accept, well, maybe the science isn't all there, but it is a real thing, and the science will come, we're just—we just haven't figured it all out yet. Even if we accept that premise, should you be driving if you know you have this? Maybe when you eat pizza, you should stay at home, just like you would if you'd drank some beer.

Justin: Delivery or Digiorno, it doesn't matter. Stay at your house.

Sydnee: Um, it's hard. When I heard about it, I'd heard about this years ago in passing. And I was vaguely familiar, and the impression I got from other physicians was, this isn't real. This is... this is people who are in extreme denial about their drinking.

Justin: Let's break this down for a second. And we're using, like... I mean, we have all the research. The facts you have, right? The facts we have presented. And so, a lot of it comes down to interpretation. But let me tell you, and my, after doing Sawbones for a very long time, I'll tell you my sort of read on it, and you can tell me where—what I'm missing, or whatever.

Basically, when you first hear about it, there's an Occam's razor thing of, "Well, you're trying to cover up your drinking." That's like, what—drinking it shameful in some parts of the culture. Some people are just trying not to. Whatever. Then there's like, an accident, or—like, I fell and hit my head, to use that example. So, Occam's razor would say, you're trying to cover up your drinking. That would be the obvious thing.

And the other thing that I would put in like the negative column is, when you're talking about the treatment for it differs person to person, that sets off alarm bells for me, too, of like... well, why? Y'know? Like, if this is a real phenomenon, we should be able to... whatever. But then, but it happens so broadly, and then you talk about kids having it and stuff like that, like, then

it starts to make me wonder, like, well, maybe it's just something that we don't understand very well that our bodies can do. Our bodies make weird smells when we eat asparagus for no reason. Like, our bodies do dumb stuff.

Sydnee: It's—I mean, the thing is, it makes a sort of sense on the surface. Now, and that is not always enough justification to believe something. There are lots of things that you think make sense, and that's now how the human body works at all. It might be the opposite.

That being said, if you read some of the—and I've read a lot of the case reports of this. Some of them are very compelling, and the... it seems like, from the way the diagnostic test was administered, they were being monitored. Blood alcohol levels that went up while the patient was in the hospital, which doesn't make any sense at all unless somebody was bringing them alcohol.

And I mean, it says they were being monitored. Obviously, we're not there in the room with these people, but I have no reason to think they're lying. I have no reason to think that people who published these articles, y'know, who took care of these patients... why would they be lying about it?

So, there's a lot of compelling argument to be made that this is just an underdiagnosed, unrecognized, real, clinical entity that we don't understand all of the pathophysiology behind yet. There's still a lot of questions. And I think because... I read some companion case reports from people who had tried to use this defense to hide that they... they were, in fact, drinking.

And I think because of that... and then, because of, I have found in some of the articles, it starts to brush up against some pseudoscience and pseudo-medicine that is adjacent to this that I find concerning. Um, because I'll start to read this, and I'll think, "This all makes sense, yes, and this must be a real thing that we just haven't learned enough about yet." And then they'll start to talk about, on the side of that, um, the idea that we're overrun with yeast, and the idea that chronic yeast causes these problems.

There is a whole, uh, pseudo-diagnosis around systemic chronic yeast. I don't think we've ever covered that on the show. That has been used to

explain a number of ails, and is not, in any way, evidence based or scientific or accepted by medicine as a whole.

Justin: Or real.

Sydnee: Right. So it's hard, because I have found that it has brushed up against some of that. Some of the authors have dabbled in both worlds.

Justin: That's very human, though. It makes sense that people who are trying to get you to believe their dumb thing would glom onto any sort of daylight they could find regarding like, the unknown, or like, things that like, "Ooh, we're not sure about this." Well, y'know, if we could open up the idea that maybe this is real, maybe my dumb thing is real, too. You never know.

Sydnee: [laughs]

Justin: Like, I'm serious. The doubt that this sows, because it is not well understood, it seems like it would be a breeding ground for like... hey, maybe my thing that is not real could slide in there.

Sydnee: I—well, and I do think—I think that's why we've said on the show before, while it is very important to follow the evidence, follow the science, do things in a... we have a systematic way of approaching questions. In order to do that, you have to first ask the question: is it possible that, in the intestines of some humans, there is enough yeast that it is fermenting enough sugar to create enough ethanol that it can get into your blood stream and make you intoxicated? Is that actually happening?

And it seems like, right now, that that is... at least in some of these case reports, that has happened. Why and how and exactly what we do about it? I think we still have tons of questions. I had been concerned initially that this was the new spontaneous human combustion.

Justin: And you were just gonna do like a straight-faced history of it.

Sydnee: Well, no. I've gotta be honest, I'm picturing Sawbones a hundred years from now and what they're gonna say about me.

Justin: Sawbones 2, starring our great grandchildren.

Sydnee: There's the chance they're saying, "Can you believe we didn't accept that this was real? Obviously it was real, obviously this happens, obviously, and now we know the exact treatment and why it happened and all that." I also think that there's a chance that in a hundred years, maybe they're gonna laugh at me.

But for right now, I would say that what the author said is true. Obviously, there are going to be patients who come in, and they appear intoxicated, and their blood alcohol level is elevated, and it is because they have, indeed, been imbibing some sort of alcoholic beverage.

However, if a patient insists they haven't... keep your mind open. Give them the benefit of the doubt, and do a little more digging. Do a little more workup. Do a little more investigating. Don't just tell them they're lying and move on. That would be my... and that's a good general rule for medicine.

Justin: Sure.

Sydnee: Assume that your patients are telling you the truth, and let them prove you wrong. [laughs] Don't assume that they're lying to you and make them prove the opposite. So I would say, in this case, I am going to leave my mind open to the possibility that auto-brewery syndrome is something I'm going to see and take care of and manage and help patients with, and I would rather time prove me wrong.

Justin: Uh, well, Sydnee, that is not what I sort of expected when you went into this topic, but I'm very happy.

Sydnee: Me neither. Me neither. I had read that article from 2000, and I thought, "Well... oookay." But I mean...

Justin: Uh, I have some exciting news. If you want to see me and Sydnee live, and celebrate this most joyous of Candelights for 2019, you can come see us on December 21st at four PM at the Keith Albee Theater in

Huntington, West Virginia. Tickets for that show are gonna go on sale Friday, November 8th. They are general admission. Friday, November 8th at 12:00PM Eastern time.

Sydnee: On your birthday!

Justin: On my birthday!

Sydnee: And Travis' birthday!

Justin: Um, all proceeds from that show are gonna go to Harmony House, which is a... it provides shelter and resources to people who are experiencing homelessness.

Sydnee: A local organization that is run by really wonderful, heartfelt, caring people, and does a great service in our community, and could really use some help.

Justin: You could also, though, if you would like, uh, celebrate Candlenights from afar with our new line of Candlenights ornaments. There's a beautiful new Sawbones ornament. Have you seen this one, Syd? It's very festive.

Sydnee: Ohh, it is very festive. I love it.

Justin: Isn't that nice? The little snakes, but they've got winter hats on. Delightful. Uh, but you can uh, head over to McElroyMerch.com, and you can see that ornament. We've also got a special Candlenights ornament that is benefitting Harmony House on there as well. So uh, you can buy as many of those as your home can hold.

Thank you to the Taxpayers for the use of their song, Medicines, as intro and outro for our program. Thanks to you for listening. Thanks to Max Fun for having us as part of their extended podcasting family. And uh, we're so thrilled that you decided to join us this week.

And uh, that is going to do it for us. 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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