Sawbones 474: Pineapple

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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.

Sydnee: And I'm Sydnee McElroy.

Justin: And, uh, you know, we get great ideas from everywhere for Sawbones, uh, but this one came from the most unlikely of places.

Sydnee: Yeah. Can I say, though, we do get great ideas from everywhere, because a lot comes from either my work or just the media or, like, pop culture... Just stuff we're talking about. Um, most typically come from you wonderful listeners. I just— Shout out to everybody who consistently...

Justin: Sometimes the J-man. You didn't mention the J-man...

Sydnee: Oh, well, you too. I just mean most of our ideas this days come from you all and I really appreciate it and I just want to say thank you. That— You didn't provide this one. So you don't get credit for this one. But typically it's from all of the emails that I am the one who reads.

Justin: Yes.

Sydnee: Not Justin. But I do tell him about them. This idea came from one Charlie McElroy.

Justin: That's true.

Sydnee: That's right. Uh, I was at a loss as to what to talk about this week.

Justin: Mm-hmm.

Sydnee: Um...

Justin: And then Charlie stepped up.

Sydnee: She did. Uh, and she said that she saw a YouTube video— Now, she has the YouTube that you pay for.

Justin: Yes.

Sydnee: [laughs] I don't.

Justin: Yes.

Sydnee: How does she get to watch YouTube videos without ads and I don't?

Justin: Uh, because she's watching YouTube kids, so there's— They don't do ads.

Sydnee: Well, on YouTube kids, they like to show her a lot of, uh, educational videos. Charlie will frequently recount historical things or science facts or something to us...

Justin: The Radium Girls was one.

Sydnee: Yeah. She learns a lot. I— She has crafted an algorithm that is teaching her, which says a lot about her, I think.

Justin: Yes. I think so too.

Sydnee: A lot of good things about her. Yes.

Justin: It's— And! And, if I may... Credit to the algorithm, too. Want to go ahead and get out in front of that. Giving a lot of credit to algorithms and AI, just so they remember me as, like, a good egg. You know what I mean?

Sydnee: Oh, when they take over...?

Justin: Yeah.

Sydnee: Especially your... When your profession gets dominated by AI.

Justin: Yeah. Which is, just, months away. I would like them to think of me as, like, a friend, you know what I mean? Like, a pal.

Sydnee: Mm-hmm. Mm-hmm. Uh, they're coming for me too, you know.

Justin: Yeah?

Sydnee: Doctors, yeah. They're coming for us, too.

Justin: I— That explains the robo-doc outside a Harmony House I saw. They're— I can't be the government is paying robots to take care of the homeless population.

Sydnee: No, I— You know what? Actually, I may be the last one standing. Like, as actual human doctor, because there's just no money in what I do.

Justin: Yeah.

Sydnee: So there's no interest in that one.

Justin: It doesn't have money for a robot. Robos ain't cheap, folks.

Sydnee: No. Uh, anyway...

Justin: There's nothing good to tell you about robots taking over, so I'm just gonna pay for these damn things.

Sydnee: No, we've got robots in the hospital, though, that surveil our patients.

Justin: We saw a robot at the dang restaurant.

Sydnee: Yeah.

Justin: That restaurant in DC...

Sydnee: A robot that bussed tables.

Justin: Bussed tables in a restaurant.

Sydnee: Anyway, uh, she watched a video about pineapples.

Justin: Yes.

Sydnee: About eating pineapples and specifically, she said, "Did you know that pineapples... While you're eating pineapples, pineapples are eating you?" [laughs]

Justin: It's... Yeah. It was a really unhinged way to start a conversation.

Sydnee: Uh-huh. Well, that's... I titled this, 'Do Pineapples Eat You?' Um, and she said there's some sort of, uh, she said protein, which she was right, in pineapples that eats you. Sort of. Uh...

Justin: Sort of.

Sydnee: Have you ever— I was sitting here, thinking, have I experienced pain after eating pineapples before?

Justin: 100% absolutely. Absolutely.

Sydnee: I mean, I get heartburn, but that's with a lot of acidic...

Justin: No, I feel like a sore achey burn in my mouth.

Sydnee: Really?

Justin: Yeah. And it's good, I mean, it reminds me of that cool time I ate pineapple a few minutes ago, but...

Sydnee: I feel like there's something wrong with me that I don't... I mean, I guess— But maybe it's just because I'm so, like, I know the heartburn is coming and so I'm in fear of that and I don't notice...

Justin: I don't feel like you...

Sydnee: ... the mouth sensation?

Justin: ... uh, chunk out as much. That's what I call it when you eat a pineapple.

Sydnee: [simultaneously] When you eat a pineapple?

Justin: I don't feel like you—

Sydnee: I love pineapple.

Justin: I don't feel like you chunk out as much as I do, though.

Sydnee: But I love pineapple. Anyway...

Justin: But are you gonna go absolutely whole hog if you see a pineapple? One of those beautiful spiny boys, you're gonna get it right in half and just...

Sydnee: I ate a bunch of it. I tried the, and I knew this didn't work, but I did it anyway when I was pregnant with Charlie and I was past dates and I really wanted to go into labor. Do you remember that?

Justin: You were— Yeah.

Sydnee: I tried that. I tried everything they said. Like, everything to... And I knew it wouldn't work, but I did eat a bunch of pineapple and got heartburn.

Justin: [laughing]

Sydnee: Um, if you've experienced this pain after eating pineapple, it is from a substance called, uh, I double checked the pronunciation and I got broh-malin or brom-alin.

Justin: Okay.

Sydnee: Or bro-muh-lane.

Justin: Okay.

Sydnee: Apparently, whatever you feel like. Just go with it.

Justin: Yeah, let the spirit...

Sydnee: Let it guide you. Bromelain, uh, extract is a mixture of... It's not just one enzyme, actually. It's a couple different enzymes that are in pineapple…

Justin: Okay.

Sydnee: … uh, that break down proteins and so this, these enzymes that are in pineapple, that are in the whole fruit, uh, they break down proteins. So are they eating you in a sense? Are they kind of digesting some proteins in your mouth? Yes. That is probably why you're experiencing that sensation.

So, are they... I don't know if you would call that eating you but, like, yes. Pineapples kind of eat you. And so, Charlie suggested this and I was, like, "Well, that's a really interesting little fact, I don't know if it's a whole episode."

And then I started looking into bromelain and, uh, it has a whole medical history all of its own.

Justin: Alright.

Sydnee: So, we're gonna talk about...

Justin: Good find, Charlie.

Sydnee: ... the way that pineapples might eat you.

Justin: Okay.

Sydnee: Okay. And we'll talk a little bit about enzymes too, because I'm gonna get into that.

Justin: Yeah, I would like some clarity on that.

Sydnee: Yeah. Um, so... Sometimes the word bromelain, and I think it's important to note, like... So that term isn't an enzyme itself. It's, like, the word we use for the extract from the pineapple that contains a couple different enzymes and then some other substances too.

And it also has been used to refer to a lot of different, like, similar plant enzyme kind of things. Really, bromelain, what we're focusing on are these mainly two enzymes you get from a pineapple.

And the two enzymes, we usually just refer to as the fruit bromelain and the stem bromelain. One comes from fruit. One comes from...

Justin: The other comes from the stem.

Sydnee: ... the stem. Yes. The stem one is the one... We're gonna get into some of the commercial uses of this, because this has an application.

Justin: Oh, okay.

Sydnee: There's a— We know all this about this extract because we extract it and use it for things.

Justin: [laughs]

Sydnee: Um, most comes from the stem. Probably for a very practical reason.

Justin: Why?

Sydnee: We eat the fruit.

Justin: Oh, right. So we just have all these stems lying around, might as well extract them.

Sydnee: Yeah. So... Yeah. So, if you're gonna— I mean, if you're gonna extract an enzyme from one or the other, I mean... You could extract it from the fruit no problem, but it's yummy.

Justin: So I eat the fruit.

Sydnee: So you eat the fruit. And then you extract it from the stem. We first figured this out, by the way, back in the 1800s. In 1891, there was a Venezuelan chemist who figured out a lot of things. I actually found him as I was trying to dig into, like, who was this person? I always try to do that, like, who found this.

Justin: Mm-hmm.

Sydnee: Um, Vicente Marcano is his name. And he was on a list of, like, neglected scientists. People that, like, made a lot of discovery specifically in the field of, like, chemistry— He analyzed a lot of different, like, fruit and plant components, you know? To look what's in there and what do they do and how can we apply them and that kind of thing.

Um, but he was on a list of scientists who, like, make these important discoveries and, specifically, bromelain is considered a pretty important discovery. But then don't, like... You don't ever really hear their name or know who did it in the first place.

Justin: Well, look at us!

Sydnee: I...?

Justin: Pat ourselves on the back.

Sydnee: Oh, we should pat ourselves on the back? [laughs]

Justin: Yeah! Now we're... We're history! We're taking note! Of an unappreciated scientist!

Sydnee: Yeah.

Justin: There you go!

Sydnee: I think, well... I think it's important to...

Justin: Take him off the list. He got on Sawbones, the world's most popular medical podcast! He's huge!

Sydnee: Well, and it's one of those things where I was reading about it and so, in 1891, he had some fermented pineapple and was isolating different substances from it to figure out what was in there and found that there was this enzyme.

It— Did not give it the name bromelain. That actually came, like, the following year. Other chemists were building on the work. You know, that's what scientists work. They build on the work of each other.

Justin: Yeah.

Sydnee: And, uh, were repeating and confirming all of these findings and actually named it bromelain and that was, um, Russell Henry Chittenden who, like...

Justin: That— Sorry, one more time. Let me get that name again.

Sydnee: Chittenden.

Justin: That's a good one. Russell Henry Chittenden.

Sydnee: Who is considered one of, like, the fathers of biochemistry and stuff like that who is remembered, I guess, in... Not by me, necessarily. This isn't my specific area of interest.

So, like, there are doctor scientist people that I immediately recognize, but when it comes to some of the, like, more laboratory based scientists, I don't always know. But it seemed to me that, like, if that is your vibe, you would know this guy and maybe not have heard of Vicente Marcano. So, there you go.

Justin: Fair enough.

Sydnee: Anyway. So, anyway, they also found these substances, they found that they were enzymes, and began to, like, formalize, kind of, what is in pineapple, what does it do, what could it be good for, what effects could it have? Named it bromelain. Um, and what they figured out is that these enzymes are proteases, meaning that they're the kinds of enzymes that break down proteins, okay?

Enzymes, let's take a step back so that we can talk about enzymes because I think if you understand what an enzyme is and what, like, a protease is as

opposed to other kinds of enzymes, it would help you understand why it would do certain things, but would absolutely not be applicable for other areas of medicine. Right?

Justin: Yeah, 'cause honestly, Syd, I'm a little embarrassed to admit I don't, um, I don't know what an enzyme is. I don't know what an enzyme is. And when I told you that, you looked at me, like, trying to figure out if I was messing with you.

Like, if I was joking with you or not. Like, you looked at me to see if I was serious about not knowing what an enzam... Honey, I have no idea what an enzyme is.

Sydnee: What— Can I be honest? When you first said that, I had already included a little bit about what an enzyme is in, like, my show notes. Like, what I was going to explain. Um, and so I was more thinking, "Uh-huh. I wonder if I should explain it in more detail." So that was more it.

Justin: Oh, okay. Got it.

Sydnee: Yeah, no. I don't expect you to know what an enzyme is. I took a lot more science classes than you.

Justin: That's fair.

Sydnee: Like, by necessity.

Justin: Yeah.

Sydnee: That's okay.

Justin: And I don't expect you to know that you have to camp Dyllin Starsine to find the last page of the Testament of Vanear in Everquest. So it's just different things.

Sydnee: That's a video game.

Justin: There you go.

Sydnee: I know that! Uh, okay, so an enzyme is... It's something that your body naturally makes, so it's just in there. Your body's making lots of them. You've got lots. You're just full of them.

Um, and it's a type of protein that's gonna speed up some kind of chemical reaction. So our bodies are big, giant... Not giant, they're just big...

Justin: [laughs] I mean... Giants are big— Giants bodies, the bodies of giants are big, giant—

Sydnee: We're just big chem labs.

Justin: Yeah.

Sydnee: Actually, now that I put it that way, we're small chem labs, because...

Justin: Whales are big chem labs.

Sydnee: Yeah. Like, my body is smaller than an average chemistry lab, which is, like, a whole room, at least.

Justin: Yeah, not a person.

Sydnee: Not necessarily smaller than a meth lab. A meth lab can really just be, like, a bottle.

Justin: That is not a lab. It's a bottle.

Sydnee: No, but we say, like, meth labs and, like, you can have, like, a meth lab in the trunk of your car.

Justin: That's a— That's— Okay. That's a trunk of a car that's a meth lab, though.

Sydnee: But like, no— But like, the components that make it the meth lab can be smaller— Anyway, my point is...

Justin: A certain—

Sydnee: ... our bodies are chemical labs.

Justin: At a certain point, if you can't call it a lab with a straight face, it's not a lab, right?

Sydnee: [laughs]

Justin: You can just put it...

Sydnee: I always thought when people said that they had a meth lab, like, they found a meth lab in the house, I always assumed, like, "oh, my gosh, they built a whole lab!"

Justin: A lab!

Sydnee: But it's not necessarily...

Justin: That's like saying that the windowsill where we're currently trying to get rock candy going is, like, a candy factory.

Sydnee: Exactly. Or, like, when we brewed beer in the guest bathroom?

Justin: [cackles]

Sydnee: We didn't have—

Justin: Welcome to the alehouse!

Sydnee: [laughing] We didn't have a brewery!

Justin: [laughing] We had a bathroom!

Sydnee: We had a bathroom with a big...

Justin: It's an extremely low gravity...

Sydnee: ... giant glass—

Justin: ... possibly tainted, handcrafted beer.

Sydnee: That was supposed to taste like pumpkin. So, anyway, inside our body, chemical reactions are constantly happening. This is important. Our body is always at chemical imbalance.

Justin: Right.

Sydnee: We are constantly, like, unbalanced and then unbalanced in a different direction, like, going in different directions... And that is important because when you finally reach chemical equilibrium, we call that death.

Justin: Right.

Sydnee: Uh, so enzymes make these things go.

Justin: So don't look for perfect, I think is the metaphorical thing here, right?

Sydnee: Yeah.

Justin: Don't go for perfect.

Sydnee: Okay. I like to live my life constantly imbalanced.

Justin: Yeah.

Sydnee: Imbal— Not in balance. Out of balance. Unbalanced.

Justin: Out of balance is good.

Sydnee: [laughs]

Justin: Unless it's, like, you're gonna fall.

Sydnee: Um, enzymes make these things go. Okay? There are different kinds of enzymes that do different things. So for instance, an amylase breaks down carbohydrates. A lactase breaks down...

Justin: Breaks down milk.

Sydnee: Lactose, the sugar that is found in milk that is of dairy, yes. You've probably heard of lactase because lactase is in the supplement Lactaid.

Justin: Yeah.

Sydnee: 'Cause—

Justin: Lactase breaks down lactose.

Sydnee: If you need lactase because you don't have enough to help you break down lactose, you take extra lactase in the form of...

Justin: Got it.

Sydnee: Exactly. Lipase breaks fats, uh, there's sucrase that breaks down sucrose, which is another kind of sugar that you can find it in, like, fruits and veggies. You get that 'ase' thing on the end, you're seeing that theme, and it tells you from the front part of the word, the first part, what it breaks down. So protease, which is what we're talking about, these enzymes that are in bromelain, are...

Justin: Breaks down protein.

Sydnee: They break down proteins, exactly. And it's important to understand that so, like, your body needs all of these enzymes. They're breaking down all these things and a lot of this has to do with digestion that I'm focusing on.

Justin: Are the enzymes alive? Are they a chemical?

Sydnee: They're a protein, yeah. But your full of enzymes, like, what I just named were a bunch of digestive enzymes...

Justin: Is that cells? Are proteins cells?

Sydnee: Are proteins— No.

Justin: What's a pro— I mean, what is a protein, then?

Sydnee: What is a protein?

Justin: Yeah. Come on. Like, I'm trying to get it down to the basic building blocks, right? Like...

Sydnee: It's a collection of amino acids.

Justin: Okay! Okay. Got it.

Sydnee: Yes. Okay.

Justin: Okay.

Sydnee: Does that make more sense?

Justin: I mean, I can go another layer down, but I'm just trying...

Sydnee: There are proteins in cells.

Justin: Amino acids are the basic building blocks of life.

Sydnee: Mm-hmm.

Justin: Some of those form into proteins.

Sydnee: Mm-hmm. Yes.

Justin: Some proteins are enzymes...

Sydnee: Yes.

Justin: ... but not all proteins are enzymes.

Sydnee: There you go.

Justin: Alright.

Sydnee: There you go. And these, uh, and like I said, I'm giving you examples that are from digestion because that's sort of, like, the world we're in right now. There are enzymes that catalyze, meaning make happen, all kinds of reactions in your body, all over, all the time.

Enzymes are constantly doing things and enzymes are helpful, uh, targets for us to know about in medicine. If we need to speed up or stop certain things. Enzymes are a good target to do that, right?

Justin: Okay.

Sydnee: Um, so, uh, anyway— For instance, there is a class of HIV medication called a protease inhibitor.

Justin: That inhibits the breakdown of protein.

Sydnee: It inhibits— Yes, an enzyme that breaks down proteins.

Justin: Okay.

Sydnee: Okay, so we naturally make enzymes in our body. They do different things and it's important to know that a protease, which breaks down— helps catalyze the breakdown of proteins... Like, that's how— It makes the reactions that break down proteins happen.

Justin: Okay.

Sydnee: Um, could it break down other things that aren't proteins? A lot of the basis of some of the pseudoscience that developed around... I mean, not just bromelain, but a lot of different enzymes, really, has to do with this idea that if— Well, if something can break down protein, it probably can break down fat, right?

Justin: Yes?

Sydnee: No.

Justin: No.

Sydnee: No, that's a different enzyme. We have those. That's not what this is.

Justin: That's a lipase.

Sydnee: Yes. So, even though that doesn't really make chemical sense, it doesn't stop people from marketing it that way. So, we figured out that... what bromelain is, you get it from pineapples, here's what it can do, it's got these enzymes in it, and it wasn't long before it—

Really, I mean, by the mid-1900s that people started saying, "Well, what else could this stuff do?" So I want to talk about all the different medical... I don't want to say applications. Theoretical applications. But first we got to go to the billing department.

Justin: Let's go.

[theme music plays]

[ad break]

Justin: So, Syd, what are people using this, uh, protein for?

Sydnee: Bromelain was one of the—

Justin: Enzyme.

Sydnee: Because, I think, pineapple itself had been used in different, like, medical traditions, like folk medical traditions, so not necessarily what we think of as, like, evidence-based, you know, medicine.

Um, because it was already used in those ways, I think once we started isolating these active substances, we have these enzymes that do something, from pineapples, it was really easy to start seeing, like, "Well, no wonder in this traditional use, you know, pineapples in this part of Central America have always been thought to be, you know, good for digestion." Oh, it must be because of this. That's really how these things start to build.

Justin: Yeah.

Sydnee: And you start to assume that there is a causation where there might just be a correlation.

Justin: Makes sense.

Sydnee: Um, weight loss was one of the first things that it was thought bromelain, I think by modern marketers, would be helpful for. Um, in traditional folk use, pineapples were not necessarily for weight loss, even though I would say that's switched now.

That was really the way it was built— And I think it's hard, like, weight loss is one of those areas where I feel like everything that has ever been

marketed as a supplement, they've also said weight loss at some point, right?

Justin: Yeah.

Sydnee: Like, I mean, it's just, like, people lie about what works for weight loss constantly, um, and prey upon people. So, um, the claims were based on the idea, and this used to be, like, a popular misconception. Pineapple has stuff in it that can break down fat.

Justin: Yes.

Sydnee: That was the thought. It doesn't. But that's what people thought. So if you take this supplement from pineapple, it can burn— I mean, they used to say, like, 900 grams of fat was...

Justin: That's random. That's a random pick.

Sydnee: ...how one— Yeah. How one supplement was marketed. And this spilled over to the idea of pineapple itself. So, have you ever heard somebody tell you, like, if you want to lose weight eat a piece of pineapple every day.

Justin: Yeah. More grapefruit, but yeah. For sure.

Sydnee: Yeah. Well, and again, a lot of different fruits have... So, pineapple isn't the only thing that has an enzyme like this. Like, there are other fruits like kiwi and papaya that have similar enzymes.

And so you see this kind of spill out to other fruits too. If you eat this fruit, it has this special enzyme. It'll burn all your fat instantly, so just eat this fruit all day.

And, you know, part of what makes these things kind of stick is that, also, if you eat nothing but fruit all day, you'll probably get diarrhea.

Justin: Yes.

Sydnee: And that might dehydrate you.

Justin: Yes.

Sydnee: Which may actually cause the number on the scale to go down a little bit. This is not healthy.

Justin: No.

Sydnee: This is not anything anyone would recommend.

Justin: No.

Sydnee: Um, in fact, if somebody tells me, and it's usually fruit juice, that they're drinking a ton of fruit juice, my first concern is you're probably gonna get diarrhea.

Justin: You'll get super diarrhea.

Sydnee: Yeah. You should just not do that. But that's— This is where this idea that pineapple is good for weight loss, this is where this comes from. It's because they contain this enzyme...

Justin: That gives you the squirts.

Sydnee: No, I'm not saying that this enzyme does, I'm not even saying pineapple necessarily gives you the squirts. I mean, am I— I don't know.

Justin: Whoa, I've never heard you say— [laughs]

Sydnee: [laughs] But if you ate enough...

Justin: I've never heard you say the squirts.

Sydnee: I would say that there is probably a giant list of foods we could generate right now that would be under the category, "If you eat enough, this will give you the squirts." Right?
Justin: Yeah. Yeah.

Sydnee: Like, there's a lot of things like that.

Justin: All food— Let's start here. All food makes you poop, by definition.

Sydnee: So, in terms of weight loss, the thought was really based on a misconception. So there was no, like, study done that said, like, "We gave a bunch of people bromelain," or, "We gave a bunch of people pineapple and they lost weight." And so we think— And so now we're marketing this supplement...

Justin: We're going with our gut. We're going with our gut.

Sydnee: Yeah, we just feel like this probably makes sense and so we're gonna market it. And since— And you can, by the way, if you google bromelain, the first thing that comes up is a bunch of supplements that are still for sale that are still on the market. This has not gone away.

And now, I'm gonna go through. They will tell you it's for other things too, but weight loss is still one of the things that they will tell you you can take this supplement for and that is based on nothing. It's actually based on a misunderstanding of what the enzyme fundamentally does.

It is— I will say that there are some actual, outside of some of these other medical applications I'm gonna break down. Um, it is extracted and used for cosmetics. Like, you'll find it in some— The idea being that it can breakdown and remove dead skin cells.

Justin: Hmm.

Sydnee: So you'll find it in some, like, facial creams and things like that. Um, it is also used as a meat tenderizer.

Justin: Oh!

Sydnee: This makes sense. It breaks down protein.

Justin: And meat's protein.

Sydnee: There you go. So... And I started to wonder, like, if you think about cooking, like, ham and pineapple together? Like, I wonder if that's where...

Justin: Yeah, that's a common— That's a not-uncommon— Your disgusting pizza is similar—

Sydnee: Well, I do chicken and pineapple, but...

Justin: But still, it's, like, it's a meat.

Sydnee: Yeah. Well, if you start thinking about, like, putting pineapple with meat not only makes sense, like, it's delicious, but also, um, it would tenderize. Like, the enzymes in pineapple do tenderize meat. They do. And we can extract this compound and it is sold as a meat tenderizer and it is used commercially to tenderize meat.

So it really does do these things. So this is why, like, the discovery of bromelain actually led to real-deal, real life commercial applications. However, in addition to investigating it for weight loss, um, a lot of, like, alternative medicine has tried to find other things it could do. And this, again, is not unique to just this enzyme.

There are lots of things that are sold as enzymes out there, as supplements. You will find lots of different, like, naturally derived or synthetically, you know, replicated enzymes out there that they will tell you you need to take for various things. Um, when it comes to bromelain, there have been claims that it will help with osteoarthritis, with heart disease, with asthma.

Sinus infections is a huge area, the thought being that it, like, reduces swelling in, like, your sinus cavity and, like, in your nasal passages and so

it'll reduce, like, some of the inflammation, the symptoms associated... The idea that it can help with autoimmune disease has been floated. Um, cancer...

Justin: Ugh.

Sydnee: And, obviously, the worst of all these things, diarrhea.

Justin: Yeah, a serious problem.

Sydnee: You know. That's what you really don't want. Of all this list that I just said, you know. Diarrhea's the worst.

Justin: Diarrhea's the worst.

Sydnee: Um, and like a lot of supplements, it has very limited research. Like, if you go through all of these claims, a lot of people have, a lot of people have gone through piece by piece to evaluate the different claims. If there is any research, and sometimes there's none. Sometimes it's like... Kind of like I said about the weight loss.

Justin: Mm-hmm.

Sydnee: Well, it's got an enzyme.

Justin: That sounds complicated.

Sydnee: Maybe that breaks down fat?

Justin: Go for it.

Sydnee: Take it.

Justin: Yeah.

Sydnee: That's— I mean, that's really, like, the basis for some stuff. Other stuff there is... Somebody tried to do some research at some point.

Justin: Yeah.

Sydnee: For the most part, they're either in vitro studies, meaning we put some cells in a petri dish and put some bromelain in there and we observed this effect.

Justin: Right.

Sydnee: So, that is interesting, but doesn't necessarily mean that it will do anything in your human body. So those are where research... That's where you begin to look for answers to questions, but that is never where you end your search for answers to questions.

Same thing, there are a couple where you'll find some, like, mouse models for a couple of these things. You know, does this do something in a mouse? Um, again, that doesn't mean it works in a human.

Justin: Right.

Sydnee: Uh...

Justin: Mice are much smaller than us and love cheese.

Sydnee: [laughs] That's— There are other differences between us and mice. Um... But— Because I also love cheese.

Justin: That's true.

Sydnee: Yeah. So... Anyway, the point is there aren't any huge robust studies for any of these things. I'm gonna get into, like... There are a couple human studies that have actually been done, but when we talk about, like, if we know a medicine works or not, it's based on a ton of research that started in a lab, started in a petri dish, moved onto animals, moved onto humans, was rigorously, you know...

What we call double-blinded, meaning the patients don't know what they're taking, the doctor's don't know who's getting what. Randomized, controlled, make sure that your different study groups are the same and there's not other confounders.

And large enough to eliminate the possibility of coincidence. Because stuff just randomly— Like, sometimes, things just happen.

Justin: Things get better, yeah.

Sydnee: And if you have enough people that you're testing it in, you should be able to eliminate the likelihood that that's why you're seeing that. But if you don't, then it's nothing more than, "Huh. That's interesting." More research is needed. That's the conclusion for all that. So, I even found one that was trying to claim that it would probably have the ability to fight COVID.

Justin: Oh, God.

Sydnee: Which I feel like is gonna be the new... Like, this is now the trifecta. You find that when it comes to something that has no real basis in evidence that it does anything, people will claim that it does weight loss.

Justin: Mm-hmm.

Sydnee: That's, like, a big one. Because that's very profitable.

Justin: Right.

Sydnee: People will claim the cancer thing.

Justin: 'Cause they're butt heads.

Sydnee: Yes. Which is just the worst but, like, people jump to it.

Justin: Sure.

Sydnee: And I think it's also because, again, you're preying on people who are really desperate.

Justin: Of course.

Sydnee: Because we know that there's a lot of stuff in cancer that we don't have the cure for.

Justin: Of course, yeah.

Sydnee: Not all cancers, but there are lots of cases we do. And so there's an opportunity to really exploit people. And so, throw it at cancer. And then I feel like COVID is now the big— That's the big three right now. Now I'm assuming this is because of when we live.

Justin: Yeah.

Sydnee: I hope that that will end at some point, but a lot of people will just start throwing these supplements at COVID, like, "Well, I don't know. We don't understand this." It's, like, well, no.

There are scientists actually studying and seeking to understand it. We don't need to throw every weird fruit enzyme at it that we've got. So anyway, none of that has really held up with any evidence. I mean, even the COVID stuff was sort of based on, like, theory and, again, like, we put it on some cells in a dish and... I don't know. Seemed good.

Um, one of the human studies I found for this, I kind of wanted to break it down. So when I talk about, like, why a human study was underwhelming, I feel like it's helpful for me to give an example.

Justin: Yeah, please.

Sydnee: So, I found a study that looked at its effectiveness on osteoarthritis of the knee. Osteoarthritis is what we kind of think of as, like, wear and tear

arthritis. Like, the arthritis that you get from, you know, it can be from just overuse of a joint or depending on what your career was, what your job was, what sports you play, that kind of thing. Right?

Justin: Like type-2 diabetes. Right? You get it later in life from, like, lifestyle stuff? Is it the same thing?

Sydnee: No... Well, actually, no. Type-2 diabetes is highly genetic.

Justin: But type-1... Oh, okay. Alright, that makes sense.

Sydnee: I mean, age of onset, you're right. Type-2, people get later in life and type-1, you tend to get younger. Um, generally speaking. But, uh, type-2 is not... I think that's— I'm glad you said it, because it's always important when somebody says, like, "Well, you eat so much sugar, you're gonna get diabetes." That's not really a thing.

Justin: Oh, really?

Sydnee: No.

Justin: Oh, good to know. Nice.

Sydnee: No. That's not— It's not gonna give you diabetes. There are other reasons to balance your diet and not only eat sugar. [laughs] I'm not endorsing the sole consumption of sugar.

Justin: Whatever, I'm already partying over here.

Sydnee: But, uh, not for that reason. Anyway, so, there was a study they did on arthritis of the knee. They had patients come in who were, like, "My knee hurt."

And they had about a hundred patients, they gave half of them an enzymatic supplement, so it was a supplemental pill that contained bromelain as well as other enzymes. Not just bromelain.

And the other half of the patients, they gave something called diclofenac, which is a, uh, prescription strength anti-inflammatory. It's similar to, like, ibuprofen or naproxen. But it's stronger and it's only approved— In this country, anyway, it's a prescription medication.

Justin: I bet that one would definitely work better.

Sydnee: So they compared the two groups. After six weeks, they brought them back in and were like, "So, how's the knee?" And what their conclusions were were, like, it worked the same.

Basically, everybody was pretty great. Everybody's knee pain was better. Not everybody, but the majority of patients responded. And they responded at the same rate. So what we can conclude is that this unregulated dietary supplement made up of a bunch of fruit enzymes works just as well as a non-steroidal anti-inflammatory medication that has been rigorously studied and whatever.

And the problem is— I think, one, that's a tiny amount of patients. Two, there was no placebo. Everybody got something.

Justin: Yeah.

Sydnee: Unless you include the enzyme as a placebo.

Justin: [laughs]

Sydnee: There was no control group, really. There was no placebo group. You need that. You would need a lot more people to have this mean anything.

Um, and I also have an issue with the fact that if you've got something like chronic arthritis, it's something that you, because we can't cure it or fix it, other than, like, replacing your knee.

Justin: Mm-hmm, yeah.

Sydnee: Uh, you learn to kind of live with it and manage it on your own and you have good days and bad days and there are lots of things in your live that will exacerbate or help calm that condition. And so to ask people six weeks later about the pain is a wild...

Justin: It's, like, maybe they've adapted to it more so they don't notice it as prominently.

Sydnee: Or they're just having a good day.

Justin: Yeah, I mean, you know.

Sydnee: Like, before my dad got his knees replaced, they were both completely degenerated. I mean, he had knee pain all the time. But he still had days where he felt better and days where he felt worse.

Justin: Yeah.

Sydnee: And things he could do in his life that made it better and things he could do that would make it worse.

Justin: Like take pineapple supplements.

Sydnee: None of that was really taken into consideration. So when I say, like, it's a study that's like, "Well, okay, but that's fine, you saw that. All that should do it make you want to do a real study."

Justin: Yes.

Sydnee: It wouldn't answer your question.

Justin: Interesting, but that's about all it is.

Sydnee: You can't conclude that this works as well as diclofenac from this.

Justin: Makes sense.

Sydnee: So I take issue with that. Um, there is one medical application that it does work for.

Justin: Okay.

Sydnee: This has been approved for use, this has actually been studied. Um, first in, uh, the EU it was approved. Something called NexoBrid.

Justin: Ooh, okay.

Sydnee: Which is... Basically, it's, um, a topical, meaning you put it on the skin, application of enzymes, including bromelain, that, uh, can help debride, which means remove, get rid of, dead tissue from burns.

Justin: Hmm.

Sydnee: So it has been used there. It was developed by a company, MediWound, and used for, um, burn patients.

Justin: Oh. That's interesting.

Sydnee: Yes. And in December of last year, it was approved for use in the United States as well. So pretty new here.

Justin: [overlapping] Oh, that's interesting.

Sydnee: Uh, anacaulase gel is the name that is used. You see that 'ase' at the end.

Justin: Hey, that's... Yeah.

Sydnee: You see that 'ase,' that means it's an enzyme. It's breaking stuff down. Um, and you can use it on deep, partial thickness, or full thickness burns. It should only be used in burn centers. This is not something you're

going to buy over the counter and put on a burn you got while you were cooking.

This— Because you also have to put, like, other ointment on the surrounding skin, like, paraffin or something, so that it doesn't break down all the skin around it too. So you just want it to break down, like, the burned area.

So it can be used to debride or get rid of some of the burnt tissue, which is part of burn care. You've got to get rid of the dead tissue.

Justin: Basically, it eats the burnt ends. It eats the crispy bits and then leaves the good flesh that's left.

Sydnee: There you go. It's kind of like maggots, except not as gross.

Justin: Aw, man.

Sydnee: Which, maggots can eat dead tissue and can be used in medicine, as long as you get the right kind of maggots and they're sterile maggots. So don't, again, just like you can't buy this stuff over the counter and slap it on your burnt thumb...

Justin: Don't just go harvesting maggots.

Sydnee: Don't go grabbing maggots and putting them on a wound, you might get the wrong kind.

Justin: And don't get chasing waterfalls, as long as we're at it. Just giving away good advice.

Sydnee: [laughs] So there is, like, a real deal medical use for this that has been studied and is approved by regulatory agencies that look at drugs and say, "Do they do what they say they do?" And do they hurt people? No, this does what it says it does and, yeah, there are some side effects, but it is as good as other things we use to debride wounds.

Or, I'm sorry, to debride burns. But does it help with anything else, like weight loss? No. There's no evidence that supports any of this other stuff. The sinus infection claims, certainly COVID, cancer, heart disease...

There's just nothing, there's no robust evidence that would support any of it. So, when you see these supplements that you can buy over the counter, it's another one of those situations that we talk about a lot where, like, your best case scenario is you're wasting your money.

Justin: Yes.

Sydnee: That's the best case scenario. Um, and it's the same with, like, eating pineapple every day. I mean, if you like pineapple, I think that that's good for you.

Justin: Yeah, go for it.

Sydnee: But it's not gonna— It's not, like, you need to from a health perspective. Obviously, the other question is are these supplements dangerous? Is bromelain dangerous? Well, if you're allergic to pineapple, it definitely is.

Justin: Good note.

Sydnee: So don't... Please don't take a pineapple supplement if you're allergic to pineapple. [laughs] I think you know that though. Um, and, uh, it can interact with some medications. Like, a lot of these unregulated herbal, natural, organic, whatever word they want to use, supplements that are out there... Just because they don't actually do the thing they tell you they're gonna do, doesn't—

Justin: Doesn't mean they don't do nothing.

Sydnee: Yeah.

Justin: [laughs]

Sydnee: Some of them do stuff and they can interact with the way that your body metabolizes some other medicines you may be on. So, without going into detail, my caveat with any of these is if you really want to take one.

And I'm telling you I don't believe you should because it doesn't do anything, you really need to talk to your health care provider first so that you can go over your specific medical conditions, your allergies, and what other medicines you may be taking, because all of this stuff can interfere with other medicines you may be taking and you need to know that so that you can go in informed.

Um, generally, it's not very toxic, it's just, it's— Again, it doesn't— Pineapple is delicious, I love it.

Justin: It doesn't belong on a pizza, obviously.

Sydnee: It absolutely belongs— It belongs on— Here, can I tell you the best pizza? Can I tell them my pizza recipe before we go?

Justin: Yeah, please tell them your, and sorry, I forgot— You forgot the air quotes, or perhaps more accurately, scare quotes, when you said pizza. But go on.

Sydnee: This is what I order on a pizza, if it's just for me. I like a thin crispy crust. I like a lot of sauce, a red sauce.

Justin: Yeah. Extra sauce.

Sydnee: Extra sauce. No cheese. [laughs] Don't, and I hope I haven't lost you yet. No cheese, please...

Justin: They're already leaving the room.

Sydnee: Um, I love cheese, just not on pizza. That's not where I want it. I want it just to eat a block of cheese. Um, green peppers, red onions if they

have them. I'll take yellow or white or whatever, but red if they have them. Grilled chicken and pineapple.

Justin: I— My—

Sydnee: And then if you've got some, like, if it's a place that does fresh basil? Yum. If it's a place that will add some oregano? Yum! And if a little bit of red pepper flakes could make their way on there, that would be perfect!

Justin: My kids— Our daughters eat— Charlie eats no toppings, just cheese. Cooper eats no toppings, just sauce. I live in a pizza criminal house. I live in a house of pizza criminals.

Please send help. Um, whoever you used to get El Chapo, just send them to my house please and save me from this, this pizza prison that I find myself in. Thank you so much for listening to our show.

Sydnee: Thank you Charlie, for this recommendation. She doesn't listen to our show, but I'm gonna tell her that I thanked her on our show for asking if pineapples eat you because it turns out they kind of, uh, a little. They sort of, sort of they eat you.

Justin: Uh, thanks to the Taxpayers for the use of their song, Medicines, as the intro and outro of our program and thanks to you for listening. We appreciate it. Until next time, my name's Justin McElroy.

Sydnee: I'm Sydnee McElroy.

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

[theme music plays]