Sawbones 443: Mononucleosis

Published January 24, 2023

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[theme music plays]

Justin: Hello, everybody! Welcome to *Sawbones*: a marital tour of misguided medicine. I'm your cohost, Justin McElroy.

Sydnee: And I'm Sydnee McElroy.

Justin: Um, some—some, uh, times I take a look at the notes you send over, and I kind of think, "Oh, that's interesting." And I'll have some thoughts about it, like "Oh, I should work out some fun jokes... about that."

Sydnee: Yeah?

Justin: I don't... I don't know what this word means. I don't know what this word means.

Sydnee: You know what this is. 'Cause you have a joke, and I was gonna let you get it out of the way early, in the—

Justin: Ohh, right!

Sydnee: —in the podcast.

Justin: Oh, it's—okay.

Sydnee: 'Cause I already know...

Justin: You used the long version, mononucleosis.

Sydnee: Uh-huh, not just mono.

Justin: Not just mono.

Sydnee: That's the long word.

Justin: You know, it's a funny—funny story about mono. I once thought I had mono for an entire month. It turns out I was just really bored.

Sydnee: Here we go! There it is. I knew. I wanted to give you space to make that joke, like, right away.

Justin: It's not—

Sydnee: Do you think you'll have to make it again? Like, do I need to...

Justin: It's not so much a joke as it is a reenactment of *Wayne's World*.

Sydnee: Yeah.

Justin: A scene in *Wayne's World*. One of the vignettes from *Wayne's World*.

Sydnee: It's not a—it's not "ha ha" funny.

Justin: Like much of Mr. Myers' work, it's not "ha ha" funny. But in a vacuum, in this specific context, I think it's very, very funny.

Sydnee: Now, how old—about how old were you when you first saw *Wayne's World*?

Justin: 12.

Sydnee: Okay. So you say it's not "ha ha" funny. But would 12-year-old Justin...

Justin: Oh, I was bustin' up.

Sydnee: Yeah, okay.

Justin: No question about it.

Sydnee: 12-year-old Justin would disagree.

Justin: Yeah.

Sydnee: I wanted to talk about mono, Justin, 'cause I was sick recently.

Justin: You had mono?!

Sydnee: Well, I don't think I had mono—

Justin: The kissing disease?!

Sydnee: But I honestly—I entertained the thought.

Justin: Okay.

Sydnee: Because I felt so lousy.

Justin: Did it turn out to be mono?

Sydnee: Have you ever actually had mono?

Justin: Not to my knowledge.

Sydnee: Really?

Justin: Yeah.

Sydnee: Well, I mean—

Justin: I thought—I thought that I had mono—

Sydnee: Oh, okay. No, no, no. Stop. I bet you, if we tested you for the antibodies, you have.

Justin: That's kind of, like, really judgmental of you.

Sydnee: Well, just statistically, the vast majority of adults have.

Justin: Okay.

Sydnee: Because it is—it's contagious, and for a lot of people you don't have symptoms, so you don't know that you came in contact with the virus.

Justin: Okay.

Sydnee: If you're like me, you did know. So, uh, I had mono. Here's my mono story.

Justin: Okay.

Sydnee: I was on spring break in college, my freshman year of college.

Justin: Where did you go, Syd?

Sydnee: This is very... this is like a ‘90s story. I was at the beach, totally MTV spring break—it was not MTV spring break. But I was at the beach for spring break.

Justin: Okay.

Sydnee: Um, with my... boyfriend at the time.

Justin: Oh my.

Sydnee: And some friends. And towards the end of the week, my throat was so sore. And I kept thinking, "Maybe this Corona will fix it." [laughs quietly]

Justin: Oh no!

Sydnee: No, it doesn't.

Justin: It doesn't, no.

Sydnee: Doesn't fix it. No. But, uh, I had such a sore throat. Probably had a fever, but I can tell you none of us had thermometers. And I remember the drive back from the breach, because I was just in so much pain. My throat. And then we got back. I was, like, in tears, told Mom and Dad. They took me to the urgent care, and I got diagnosed with mono.

Justin: Wow. And you were like—

Sydnee: And it sucked.

Justin: "No one else should ever suffer this way. I want to become a doctor. And, um, I'll—"

Sydnee: Cure mono! [laughs]

Justin: "Cure mono. And this will never happen to anyone ever again."

Sydnee: No, that wasn't it, but it sucked, and I was tired. A lot of people when they get mono get tired for quite a while. It was a rough, um... it was a rough few weeks of college.

Justin: That sounds rough.

Sydnee: Yeah. But anyway, recently I had a sore throat again—I think we talked about it on the show—and some swollen lymph nodes and a fever, and then Rileigh did.

Justin: Yes, I do remember that a little more clearly.

Sydnee: Yeah. And I started thinking like, gosh, it feels like it's—it dragged on so long. Because when Rileigh told me I was like, "Oh, I wonder if you have mono. Huh, huh? You been kissing somebody?" [laughs quietly] 'Cause...

Justin: You are a doctor.

Sydnee: I'm also her older sister, though, so I'm supposed to say that. Like, "Ha, ha. Were you kissing somebody?" That's what I'm, like, legally supposed to say.

Justin: Right.

Sydnee: But then I thought like, "Well, heck, did I have mono again?" Like, it's not likely, but did mono reactivate? Did I come in contact with it? Like, did I get mono again?

So I couldn't believe we've never talked about the kissing disease, as it is colloquially... colloquially... colloq—I hate that word.

Justin: Colloquiauia. Colloquiauiauia.

Sydnee: [through laughter] It's a tough word to say.

Justin: It's a tough one.

Sydnee: Mono's caused by a herpes virus called the Epstein-Barr virus, usually EBV is how it's... you know, shortened.

Justin: Mm-hmm.

Sydnee: It's largely spread through saliva. So there you go, the kissing thing. It had an incubation period of four to eight weeks, so it can be hard sometimes to know exactly... well, depending on how much kissing you're doing.

Justin: Ay.

Sydnee: When you were exposed. Um, and you can stay infectious for quite a while. Like months.

Justin: Ugh, really?

Sydnee: Mm-hmm. Which is why, I already said, the vast majority of adults have had it. Whether you know it or not, if you're a grown up, and whether you feel like it or not, if you are legally a grown up, you probably have the antibodies to mono in your body. Like, we could find EBV antibodies in there.

Um, I read old journal articles about mono, and when they talk about the mode of transmission, like back in the '50s, it's really fun. There was one—

Justin: It was illegal to say "kissing" in the '50s, right? Like, you couldn't print that. It was illegal.

Sydnee: Well, no. It's not just—it's just so—and maybe—you know what? This doesn't change. 'Cause, like, some of the journal articles from more recent years are similarly, like... it's like a very buttoned-up science-y way of talking about making out. And they're like, it was—like, one article from the 50's said, "It is only spread by deep kissing."

Justin: Eww!

Sydnee: That's in a journal article.

Justin: That's the worst way of saying it!

Sydnee: A scientist wrote that. "Deep kissing."

Justin: "Deep kissing!" Ugh!

Sydnee: "The episode of deep kissing." There's one from 2015 where they call it "Intimate oral contact among teenagers and young adults." [laughs quietly]

Justin: Bad!

Sydnee: "Intimate oral contact."

Justin: Also bad.

Sydnee: There was another one—"Intimate oral contact of such a nature as to permit direct transfer of saliva." [wheezes]

Justin: Oh no!

Sydnee: These are—like, people just wrote—like, you could just say kissing!

Justin: Just say kissing!

Sydnee: Or frenchin'. [laughs]

Justin: "Frenchin'!" No! [laughs]

Sydnee: Or I believe our British friends would say "Snogging."

Justin: "Snogging."

Sydnee: Now, I've always wondered that about snogging. Is snogging just like you kissed, or is that like a whole—

Justin: I think it's like making out.

Sydnee: It's a make-out sesh.

Justin: I think making out is snogging.

Sydnee: Yeah, okay.

Justin: This is my understanding.

Sydnee: I'm—you know what?

Justin: Do not email us.

Sydnee: No, you can email us.

Justin: Email Sydnee. [laughs quietly]

Sydnee: We got so many emails about asafoetida.

Justin: Yeah.

Sydnee: Yeah. Should I mention that, by the way, thank you for the recipes. Thank you for sharing your experiences. I loved reading all those emails, and also we did get some.

Justin: Yeah, we got some, so we'll try it soon.

Sydnee: And it, uh—but we can already attest to the fact that you do not have to warm it up to smell it!

Justin: Yeah, it's right there.

Sydnee: It's right there.

Justin: For you to enjoy.

Sydnee: As soon as we opened it.

Justin: Yup.

Sydnee: Yup.

Justin: Yup.

Sydnee: I think it smells a little like wild onions.

Justin: It would be like if a human onion had BO. [pause] That—like it's a pungent—

Sydnee: A human onion?

Justin: Like if a onion was a human that had BO.

Sydnee: Like Onion from the cartoon?

Justin: It's like onion—like, intensity onion. It's like, "What's up! I am onion!" It's, like, attacking you.

Sydnee: It is—it is—it reminded specifically though of, like, wild onions that grow out in the yard that we pull up. I always used to find those and pull those and smell 'em, and I like that, except that to a degree where it's like, "No, too much, too much, too much!"

Justin: I didn't hate it. It was, like, kinda powerful—It was, like, impactful. I felt something, you know?

Sydnee: Yeah. We have not cooked yet.

Justin: And at my age, that's all it takes.

Sydnee: But, um—but I'm excited to try it. Anyway, it was thought that for a while that sex may increase the risk of transmission, but then they did a study that showed—here was their conclusion.

"Deep kissing, with or without coitus, had the same risk of primary EBV infection throughout their undergraduate years."

Justin: "Deep kissing" I still can't quite get past.

Sydnee: "Deep kissing, with or without coitus." [laughs]

Justin: That's what it says I'm looking for on my Tinder profile. "I'm after deep kissing, with or without coitus."

Sydnee: [laughs] There's also things like, uh, they spend a lot of time trying to figure out—because they wanted to figure out this—there is this long incubation period, right? So part of when you're studying a virus or studying an illness and you're trying to figure out, like, how long is it between when you get it and when you show symptoms? That helps us figure out how it's transmitted, and who gave it to who and whatnot.

Justin: The r-naught.

Sydnee: You have to ask questions to figure out the time from kissing episode... to onset of symptoms. Or time from "An incident of intimate kissing." [laughs quietly]

Justin: *Deep* kissing.

Sydnee: "Did you have an incident of intimate kissing recently?" These would have been the surveys. Can you imagine? You're on your college campus. You're, like, walking from your dorm to class. It's early. Maybe you're a little hung-over. You're, like, rushing so that you're not late for, you know, whatever.

Justin: Someone flags you down.

Sydnee: Calculus. And, like, some guy with a clipboard stops and you and is like, "Excuse me! When—when would you say was your last incident of intimate kissing?" [laughs quietly]

Justin: Ooh, let me think. That's a tough one.

Sydnee: And you're like, "I'm not gonna answer these questions." And then they're like, "We'll give you a free t-shirt."

Justin: Ooh.

Sydnee: And you're like, "Oh, hey."

Justin: "And by the way, the t-shirts says 'deep kissing' on it."

Sydnee: [laughs]

Justin: "What do you think?"

Sydnee: [laughs] Um, now, for those that do develop symptoms, there's a range, as I said. It can range from fatigue, swollen lymph nodes, fever, sore throat, for a couple of weeks to months. It can go on for months that you feel really exhausted, really fatigued. Not just like the normal, you know, if you have a viral syndrome, if you get the flu or something like it, you know, you're tired. You sleep more. If you had COVID, you probably slept more.

Um, but it can go on for a lot longer. Intense fatigue, intense body aches. One other thing that we specifically watch when patients have mono is that your spleen can get enlarged.

Justin: Hmm.

Sydnee: And that doesn't—you probably wouldn't notice that. Um, so it's not like that's causing you a problem inherently. But what it can lead to is that if you then are, like, involved in a contact sport or some sort of accident or, I don't know, you get in a fight, your spleen can rupture. And that is a big deal, because if your spleen starts bleeding and it doesn't stop... well, generally any bleeding that doesn't stop—

Justin: Yeah, any bleeding that doesn't stop in the body from organs and stuff is all bad stuff.

Sydnee: Is a bad thing. So, um—and generally it's gonna resolve on its own. Like, the spleen is gonna go back to its normal size, all by itself. But for a while you have to limit things like that. So because of the age group that can get this, teenagers and young adults, this is relevant. 'Cause, like, as an almost 40-year-old, I don't engage in a lot of contact sports regularly. [laughs quietly]

Justin: Mm-hmm.

Sydnee: I'm not a professional athlete, so why would it? But for younger people who are playing contact sports, who are in high school sports or college sports or, you know, that kind of thing, this could be a much bigger deal. Even really heavy lifting can be discouraged, you know? So that is something that I remember them telling me. That, like, don't play any contact sports. I was like, "... I'm a biology major." [laughs]

Justin: "So I am good on that front."

Sydnee: [laughs] "I am fine."

Justin: I have self-selected for not getting head injuries.

Sydnee: [laughs] If they'd asked me in high school, "I'm in show choir. Does that count?" No, that's not true. I played soccer. That—see, soccer. That would've been bad.

Justin: Yeah.

Sydnee: Um, there are rare serious complications. That is true for a lot of viruses like this. But for most people who have had it, you were, like, really tired, and you were achy for a while, and you couldn't play a sport. Um, I told Rileigh when I thought it was possible she had it—she was like, "Well, do I need to know?" And I said, "Well, honestly right now there's not a huge value in you knowing one way or another, you know. But don't engage in contact sports and try not to get punched or kicked in the stomach."

Justin: Yeah.

Sydnee: She said, "Sydnee, I live my entire life [through laughter] trying not to get punched or kicked in the stomach."

Justin: [laughs]

Sydnee: And I said, "That's fair." Um, the first description of mono going way, way back was written in 1887. That's how long we've known about the

syndrome. Not the virus yet. We didn't know about what caused it, but we knew there was something that we would eventually call mono. Um, it was written by a Russian doctor who's also known as, like, the founder of Russian pediatrics, Nil Filatov. And he wrote about the condition after observing it in patients, and it was called Filatov's disease for a while before it was called mono. He didn't call it that.

Justin: Yeah, maybe he doesn't want a disease.

Sydnee: Other people called it. He called it idiopathic Adenitis. So...

Justin: [clicks tongue] Should've known that wasn't gonna catch on.

Sydnee: Yeah. Big lymph nodes, don't know why. That's how I would interp—idiopathic Adenitis? Big lymph nodes, don't know why.

Justin: Okay. [wheezes] [through laughter] Okay.

Sydnee: That's what that means!

Justin: Okay, I got it!

Sydnee: I was translating!

Justin: No, I—it's not a different language, right?

Sydnee: Medicine?

Justin: I guess so, yeah.

Sydnee: Medicine is a different language.

Justin: Yeah, fair enough.

Sydnee: And that's part of what I do is I translate...

Justin: Big lymph nodes, don't know why.

Sydnee: Yeah, that's what—idiopathic means we don't know why. Yet. That was just me. That was just me saying "Yet." I don't know, I'm hopeful. Um, other people named it after him. I don't know why I'm defending him. I mean, maybe he was arrogant. I don't know if he was arrogant or not. But, like, as far as I know, he just called it that, and then other people were like, "Filatov's disease." But that didn't stick.

Justin: I think that's a mixed bag, man. I don't know. I wouldn't want it. I don't need that to be my legacy. 'Cause everybody's like, "Ughhh. I got Filatov's again. Ughhh, hate this. Hate that guy, whoever that guy is. I know he's long dead, but I have bad feelings towards him." [laughs] That sucks!

Sydnee: I would love for something to be named after me. I don't really care what it is or why. You know? I mean, well, the why is probably—hopefully I had something to do with it in a positive way. Now, I don't want something named after me if it's, like... [laughs] I don't know. I accidentally created it or something?

Justin: Well, you don't wanna fall—again, like, you—there's a disease—like Lou Gehrig's. If you're just a fam—

Sydnee: Because you had it.

Justin: If you're just a fam—that's not a—that's not great, I would say.

Sydnee: Well, obviously that is not what one would desire.

Justin: Yes.

Sydnee: Yes.

Justin: You don't wanna be, like, such a notable occurrence of this that it is named after you, either. I don't think anybody wants that.

Sydnee: I am talking from a scientific—like from the medical community perspective.

Justin: Unless it's like McElroy's Huge Muscleitis. Like if you have some sort of strength-based illness that makes you too strong.

Sydnee: I don't think there's any chance of a huge muscleitis ever being called McElroy's Huge Muscleitis.

Justin: But it's a disease. I get it, it's path—

Sydnee: Like, from any of us.

Justin: —but it's pathogenic. That would be the whole point is that it's pathogenic, you know what I mean? So you get it. It's a disease you get. It's not 'cause you naturally have huge muscles. You catch McElroy's Huge Muscleitis, and then you do have huge muscles and it's contagious.

Sydnee: I love that you think that if I named something after myself or if I get something named after me it's gonna be McElroy-something.

Justin: That was me. I was naming it.

Sydnee: It's gonna be Sydnee.

Justin: Sydnee, your first name?

Sydnee: If it's named McElroy-something, they're gonna think it has something to do with you, so it's gonna have to be named Sydnee.

Justin: "Bad news."

Sydnee: Nobody knows my maiden name.

Justin: "Well, guys, the research is done. I finally discovered it. Hepatitis-Doug. It's my own new brand."

Sydnee: There's a—at the university we both went to, at Marshall, a lot of the buildings are named after people. The science building is just named the

Science Building. And that's been a goal of mine... is that that's gonna be the Sydnee Building. [laughs]

Justin: So a goal of yours is to donate [through laughter] tens of millions of dollars to a university, right? 'Cause, like...

Sydnee: What if I just do something so great that they name it after me? I don't wanna give them that much money. I just want 'em to name it the Sydnee Building.

Justin: Yeah, that's how it works. You do something so great that people give you tens of millions of dollars—

Sydnee: [laughs]

Justin: —and then you give that to the university. That's how they honor you.

Sydnee: Sydnee Building, coming soon.

Justin: Sydnee Building?!

Sydnee: Yeah.

Justin: Okay.

Sydnee: Sydnee Building.

Justin: [laughs]

Sydnee: [laughs] I like my first name. Uh, anyway, let's—we have to get to the point that it is infectious, mononucleosis, caused by the Epstein-Barr virus. We're about to get there. But first, we gotta go to the billing department.

Justin: Let's go.

[ad break]

Justin: Okay. I'm ready for this to—to transform.

Sydnee: So at this point, it's 1920. Filatov's disease is the syndrome that is called mono. There were two other researchers in 1920 that observed this infectious disease that caused fever and these big lymph nodes and a really bad sore throat, and specifically looking on a blood film, so looking at a smear of your blood under a microscope.

Sometimes we do that, right? Like, a lot of things, labs, are automated. They just put some blood in a machine and it counts the cells and counts different components of the blood, and gives us a list of numbers, right? Sometimes we actually need a pathologist to look at the slide, smear some blood on the slide in a certain way with certain stains and then look at it and tell us what's in there. Back then, of course, that's what you would have done. You weren't using machines.

So anyway—so they looked and they noticed that there were atypical lymphocytes. Lymphocytes are a certain part of your white blood cells, a certain type of white blood cells. And they were large, and the nucleus of them looked different, and so they called them atypical. So they saw a lot of these, um, and these kinds of lymphocytes resembled another kind of white blood cell called monocyte. So as a result... mononucleosis.

Justin: Got it.

Sydnee: Yes.

Justin: What an origin story.

Sydnee: Is—is where the name—[wheezes]

Justin: I was on the edge of my seat for that one.

Sydnee: —"Mono" comes from. So the two researchers, Sprunt and Evans, renamed it mononucleosis in 1920 because it's the same syndrome, but

specifically if you look on a blood film, you see that, and this could be a diagnostic criteria, right? 'Cause a lot of things can cause fever, a sore throat, swollen lymph nodes. Like, a lot of things could cause these other symptoms, but then also if you look on a blood film and see this, now you have a diagnosis.

Justin: I'm—I'm—I'm glad they went with mononucleosis, though. Because can you imagine if somebody's like, "Don't kiss me. I've got Sprunt's."

Sydnee: [laughs] Sprunt's would be a rough one.

Justin: "I got *Sprunt's*! Don't kiss—keep your distance! I'm just riddled with *Sprunt's*!"

Sydnee: [laughs] That is—Sprunt's is rough.

Justin: Sprunt's is rough! "I got the Sprunt's something fierce!"

Sydnee: Uh, the virus—the Epstein—

Justin: "I'm changing shirts four times a day! These Sprunt's are so—[wheezes]" [snorts]

Sydnee: Poor Sprunt.

Justin: Poor Sprunt!

Sydnee: Don't do this to poor Sprunt.

Justin: [through laughter] It's not Sprunt's fault.

Sydnee: I mean, I can't—my maiden name is Smirl, and I don't know that it's yards better than Sprunt, so we're in the same boat, buddy. Epstein-Barr virus was discovered—one of the researchers was Epstein, as you can imagine—in 1964.

Justin: Can I guess [wheezing] the other one?

Sydnee: [laughs quietly] Using electron microscopy. So now we could—we had the technology at this point to look more closely. Right? Like, that's what a lot of—when we talk about sort of understanding microorganisms and infectious disease and contagions and everything, as our ability to look at things that are smaller advanced...

Justin: We get better microscopes, we can see better.

Sydnee: Yeah, we can see smaller things. And so now, first, you know, that's great. We can see that the cells are different. Well, those are larger, so you don't have to have an electron microscope to look at, you know, white blood cells.

Justin: Mm-hmm.

Sydnee: Um, but you do when you're looking at viruses. So we get to a point in 1964 where we can use an electron microscope, and we can look at specifically in a kind of cancer, Burkitt's lymphoma is a specific kind of cancer, and they found this virus in these cancer cells. Um, and it's interesting because the story—and this is not tied to mono yet. They haven't yet attached it to mono. They're just discovering the virus that we would also understand causes mono. Epstein found this, but he, like a good scientists, thought that somebody else should repeat it. Because then that's good. It needs to be—you know, it has to be something that you can repeat.

Justin: [simultaneously] Gotta be repeatable.

Sydnee: Yeah. So he had reached out to other British virologists to look at it, and nobody wanted to work with him. They were like, "Nah. We're just not interested in this. This is not something that, I don't know, we want to spend time on." Maybe they had, like, disputes. I don't know what the issues were. So he was having trouble finding somebody to repeat these findings so that he could see if they were valid. So he sent some of the cells to Klaus Hummler in Philadelphia, who they had just had, like, a sabbatical together, so they were like buds. And he was like, "Hey. Will you look at these cells and see if you can also find this virus in these cells? And then we can say we

both did independently and it's, you know, we know that this virus is connected to this type of cancer."

Now, the problem is Hummler—and I don't know if this was because he was just on this sabbatical, but he had lost all of his funds, and so his laboratory had been completely dismantled, so he didn't have anything to look at it with. He was like, "This is really cool, and I'm very good at this. I don't have a microscope, though, and nobody's that good."

Justin: To see without a microscope.

Sydnee: Yeah, nobody's that good. You can't see a virus without a microscope. So he took the cells to a different laboratory in Philadelphia, Henley's laboratory. And he was like, "Hey. Would it be cool with you if we, like, had a little collabo... and you looked at these cells?"

Justin: "One thing you bring to this—what I bring to it is that I'm very good at science and everything. What you bring to it is very cool. You have a microscope. It's like the one friend who had his own car in high school, right? So you gotta hang out with that guy. Gotta hang out with Dylan, he's got his own car."

Sydnee: Well, but Henley brought more to the table, 'cause also a scientist—

Justin: He had two microscopes?! Wow!

Sydnee: Also a scientist, also he could find it. It's interesting because, you know, and we've talked about a lot of different scientific discoveries where a lot of people are finding sort of the same thing at the same time, and there's always an inherent competition between all of these people. Usually dudes. Not always dudes, but a lot of dudes. There's usually an inherent competition because if you're the one that finds it... you get your name on it!

Justin: Yeah.

Sydnee: Epstein. And so it—it—to go to someone else's lab and be like, "I am on the verge of a monumental discovery [through laughter] and I need your lab equipment 'cause I don't have any," is a big deal, you know? Um, it shouldn't be, right? All of science should be collaborative. But it's not, and part of that is because you can make money off stuff, but that's not really in this case. Part of it is just 'cause people want to—they want a legacy. They want to be famous. They want to be known for... the virus they saw. [laughs quietly]

Justin: Yeah.

Sydnee: So they, uh—they characterize this new—it was in the herpes virus category. And they find this new virus, the Epstein-Barr virus at this point. So they know, by the way—and that's another thing about this. This is really focused on mono, the illness. But Epstein-Barr virus can also cause this lymphoma, this specific kind of cancer. So it is a virus that can do different things.

Um, now what's really interesting is that there was a, uh, technologist who was working in Henley's laboratory. So this was kind of like serendipity, right? Like, Epstein couldn't find anybody to confirm these findings in England. He had to send them all the way to Philadelphia to a guy whose lab was dismantled, who had to then take it to another guy's lab and ask, "Can you help me?"

And there's a tech working in that lab who regularly—they started doing these experiments with Epstein-Barr virus, and who didn't have any antibodies. They looked in a lot of people's blood to see, do they have antibodies against this new virus we found? And as I said, a lot of people had 'em, right? 'Cause they were adults, and a lot of adults had been exposed.

Well, this tech was unique in that they did not have any antibodies against Epstein-Barr virus, right? So they could donate some lymphocytes to do experiments with. Which is something we don't really do much in labs today. Like, ask our lab techs, "Also, can we take blood from you and use your

blood cells in the experiments that we're doing and that you're helping us with?"

We don't do that as often these days. But back then, that would've been more—I guess more standard. But it was interesting 'cause—so, one she could donate. She didn't have these antibodies, they knew. And two, the cells would only grow for so long in culture. And then they would die. They didn't continue to grow forever, which is not strange.

However, in August of 1967, she missed work because she was sick, so she ended up missing five days of work. Initially her doctor thought she had rubella, which is sometimes called German measles, nowhere very done a show on that before.

Justin: Yeah, yeah, yeah.

Sydnee: Um, but he also considered, you know, there's this thing called mono.

Justin: Whoa.

Sydnee: And you might have this thing called mono. So they checked her for rubella antibodies, and she didn't have 'em.

Justin: Okay, good.

Sydnee: And so then they checked her for a different kind of antibody. There's a specific antibody called a heterophile antibody, which the important thing to know about it is that it's closely related to infection with mono. It's the thing that they were looking for, like if you had a mono test. They're looking for this specific kind of antibody to see, is it possible you've had mono?

And the laboratory that she was helping work in is what established this as the test. So, anyway.

Justin: Wow.

Sydnee: So they do the test, and it's positive. She has the antibody now.

Justin: Great. No one kiss—don't kiss her.

Sydnee: And also, when they took some of her lymphocytes and tried to grow 'em in culture, they just kept growing continuously, which was interesting. And they were positive for Epstein-Barr virus antigens. So here now we have somebody who has the syndrome of mono, who we know for a fact didn't have this antibody before, because she was donating cells, and now moving forward does have this antibody.

Justin: Wow.

Sydnee: It's just a very lucky coincidental thing that sort of proved, like, mono is caused by this virus that we have this antibody against, and there's the antibody that you can test for, and there's the antigens that prove the virus is there, and there's the syndrome of the fever and the sore throat and all the stuff, you know?

Justin: Yeah.

Sydnee: So this was a huge—

Justin: [simultaneously] What a lucky break.

Sydnee: Yeah, it's a huge lucky break that shows that Epstein-Barr virus was responsible for this, you know, very common infection called mononucleosis. They did other—obviously they wanted to replicate that as well.

Justin: Can you help me understand something very quickly? The distinction between a virus and an infection. So, like, how does Epstein-Barr virus cause mononucle—like, what's the difference?

Sydnee: Well, so you've got to think about the fact that you see an get exposed to a virus—so, like, the virus gets into your system, right? However,

through saliva or blood or whatever it is. And your body mounts a response, right? Like we've talked about how the immune system works. Something's gonna detect an invader and take it and try to check it out and see what it is and see, like, do we already have attack—do we have antibodies against this already? Do we have a way to attack this? Whatever.

And your body is gonna mount an immune response to remove that invader. Sometimes that happens so quickly that you get exposed to something, you create these antibodies against it right? But you never actually get sick. Versus it establishing an infection where you get symptoms, you become ill, you're probably contagious. And then the symptoms usually have a name, like the viral syndrome, the disease, the illness that is caused by the virus. Think about right now, COVID-19 is the disease, the illness, the sickness that is caused by a novel coronavirus. The virus itself is different from the disease COVID-19.

Justin: Okay, that makes sense. Yes.

Sydnee: And so the reason that that's really important, especially looking back from a historical perspective, we had to have pretty regimented ways of saying conclusively, "Okay, well, I examined you and did studies on you, and can diagnose you with this disease process. But what is causing it?" It was harder, right? Because we couldn't look at viruses. Once we had the ability to find viruses, then I needed a really regimented way to say, "Okay. You have this. Let's figure out what it's caused by by looking in your blood, seeing what we can find, and comparing it to other people who have the same syndrome, and what's in their blood, and then we can conclusively say that constellation of symptoms, that collection of illness, is caused by this."

Justin: Okay, that makes sense.

Sydnee: Does that make sense?

Justin: Yeah.

Sydnee: Okay. So, that's what they had to do next, right? 'Cause they found it in this one lab tech, but that doesn't mean it's conclusive, you know?

It could be a coincidence. We've talked about the guy who thought syphilis and gonorrhea were the same thing.

Justin: Right, 'cause people caught 'em at the same time a lot.

Sydnee: Yes, and because he accidentally infected himself with both.

Justin: [snorts]

Sydnee: And set medical science back, like, 100 years. Anyway... [laughs quietly]

Justin: [laughs quietly]

Sydnee: Um, so they had a bunch of serum from six students already at this lab, so they had a lot of pre and post illness samples. Um, and so they started looking for the virus, for the antibodies, putting it together with descriptions of the symptoms that the students had, and at the end they were like, "We figured it out!"

Justin: Done!

Sydnee: Epstein-Barr virus causes infectious mononucleosis, and you can do a heterophile antibody test, look for this antibody, and that tells us that you have it.

Justin: Boom!

Sydnee: And that is how we pieced it all together back in the 60's. Um, there still are—we still use antibody testing, specific cytology, to look for patterns to tell you. It's not as simple as one test, per se. If you get a—if you ever get a test for mono, they're gonna usually do this Epstein-Barr virus panel of antibodies. Um, and it's several things we're looking at to see, do you have it now? Or did you have it in the past?

Justin: Okay.

Sydnee: And that pattern of antibodies helps us know, like, is this—because so many people have been exposed to it that just testing you to see, do you have the antibody? Well, I mean, I do.

Justin: Doesn't tell you very much, right?

Sydnee: Yeah. You probably do. So we need a certain pattern to tell us, are you acutely ill with it, or did you just have it and you got something else now? Um, the treatment for it is pretty much supportive. It's a viral syndrome, it'll go away on its own.

Justin: Just gotta get you through it. Stay away from kissing.

Sydnee: Yeah. You are contagious, so yes, stay away from kissing, or anything that would share saliva. So, like, you know, I don't know, food and drink, depending on what you're doing, I guess. [laughs quietly]

Justin: What do you mean, what you're doing?

Sydnee: It's, like, full of backwash.

Justin: Ew! Gross! That's the worst phrase.

Sydnee: I don't know. Well, we've talked about, like, deep kissing, and intimate oral contact, so.

Justin: Yeah, there's a lot of unpleasant sounds in this episode. Are we almost done? [wheezes]

Sydnee: It's a virus that'll run its course. Fluids, rest, avoid anything that's gonna rupture your spleen. [laughs quietly]

Justin: Again. Good rule for life.

Sydnee: And then of course treatment for the sore throat, 'cause the sore throat can be—I will say, having had it when I was younger, it was... it was really bad. I mean, I could still swallow, but it hurt. I could only hold down

liquids. It's rough. So treatment for that. Um, one interesting thing is that because the sore throat is such a big feature, it is often misdiagnosed as...

Justin: Strep.

Sydnee: Strep, yes.

Justin: Ahh, yes.

Sydnee: And if people don't, which we often won't, do a test for strep, we'll just look at you and based on a set of clinical criteria say "Yeah, we think you have strep throat. Here's some amoxicillin."

If you do that, there's a characteristic rash that you get if you accidentally mistreat mono with amoxicillin.

Justin: Your delight at that fact is adorable.

Sydnee: Well, I think—[laughs] it's... if you are in medical school, you will probably get asked this question at some point. You will have a patient that you think has strep throat in the question. In the question they will say you treated them with amoxicillin, and then they came back a few days later and they're covered in a red, spotty rash, and they said "I think I'm allergic to the amoxicillin."

And what you're supposed to know...

Justin: It was mono.

Sydnee: It was probably mono all along. Or maybe you're allergic to amoxicillin.

Justin: [simultaneously] "I screwed up."

Sydnee: But...

Justin: "I'm a doofus. I'm a bad doctor. I missed it. Ugh!"

Sydnee: Well... no. It's just a... [crosstalk]

Justin: I was so careful, Sydnee! How could this happen?

Sydnee: [laughs quietly] Um, so anyway, that's the—that's mono. I don't know. You're supposed to—so, most people only ever get it once in their life, but the virus—I mean, it can life with you forever in your B-lymphocytes. And so it is possible for it to reactivate. It is possible to come in contact and get, like, some mild symptoms again. All these things are possible. It's not the most common, so I don't know. I do wonder. I still have a sore throat. [laughs quietly]

Justin: Who knows?

Sydnee: It's been over a month. Um, and then just for completeness, there are a lot of other things associated with Epstein-Barr viruses I mentioned, including things like chronic fatigue syndrome, which you kind of get into when you start talking about, um, mono reactivating and stuff like that. But that's a whole other issue, and that's much—it would take us a whole other episode to cover all that.

Justin: And we don't have a whole other episode, 'cause this is the end of this one. Thanks so much for listening. Thanks to The Taxpayers for the use of their song, "Medicines," as the intro and outro of our program. Thanks to Max Fun for having us as part of their extended podcasting family. And thanks to you, for listening. We really appreciate it. That's gonna do it for us for this week. 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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