TPWKY – Episode 184 - Gallbladder

Maria: It started on a Sunday afternoon. I was sitting on the couch working on my laptop when I suddenly got an upset stomach. I had cramps, then nausea, but it quickly escalated. Within a few minutes, I was crouched in my bathroom floor with a sharp pain just below my ribcage. It felt like I was being repeatedly stabbed in my right side.

Maria: The pain was so intense that my diaphragm wasn't contracting. It felt like it was stuck in place. I crawled into the next room where my husband was napping, and I tried to gently call to him so as not to alarm him, but I was having trouble breathing, so I just managed to stammer, "I don't feel well." He startled awake and was instantly worried.

Maria: He said my lips were white. He was calling 911. "No," I croaked. "I just need water. Bring me a glass of water." He hesitated but acquiesced and went to the kitchen, while I lay on the floor trying to reason through what was happening. My symptoms didn't match appendicitis or a heart attack, and since I was out of ideas, I figured it must not be anything serious.

Maria: Silence from the kitchen. Now, my husband is not a wimp, but he has been known to faint while having his blood drawn. And once when an acquaintance went into diabetic shock, he stepped outside to call 911 and then promptly passed out on the phone with a dispatcher such that when the EMTs arrived, they attended to my husband, crumpled on the sidewalk and not the man inside having a seizure.

Maria: So the silence worried me. I called to him. "Yes?" He said quietly.

Maria: "Are you passing out right now?" I asked.

Maria: "Trying not to," he said meekly. I made a mental note not to allow him in the delivery room if I ever went into labor and tried to remind him of the task at hand.

Maria: "I could really use that water." I heard the faucet turn on, and then a few moments later, he shuffled over and set a glass down next to me, then plopped down on the floor with his head in his hands to fight the lightheadedness.

Maria: I was flat out on my back. "I can't drink this," I told him. "I need a straw." He looked at me as if I'd asked him to climb Everest, but he stood up

and shuffled back into the kitchen. It was at this point that I realized I need to snap out of it, 'cause I would need my wits about me when he inevitably fainted and hit his head on the countertop and I had to call 911 for him. I propped myself up to sitting against the wall, and he shuffled back with a travel mug of water.

Maria: I took a sip and in a few minutes I started to feel better. I returned to my place on the couch. "That was weird," I said. Now, let it be known that my husband wanted me to go to the hospital anyway, but I told him I didn't have time to sit in the ER all night. And sure, that was pretty strange, but I felt fine now. My husband flew to South Dakota the next day, and the rest of the week went as usual until Saturday afternoon when I took our dog for a walk. I made it one block to our forest trailhead, and the stabbing pain returned. I couldn't stay upright. I had to lay down on the forest floor. It was tick season, and I live in a place with a very high incidence of Lyme disease, so this didn't seem prudent.

Maria: "You're gonna feel like an idiot if you get Lyme disease because of a stomachache," I thought and forced myself up. The walk was excruciating, but I managed to stumble home without vomiting in my neighbors' yards. When I got in my door, I laid down on the entryway bench. There, I writhed and literally moaned in agony for over an hour until I eventually made it to the couch where I continued to writhe and moan some more.

Maria: There was no position that was comfortable. After several bouts of dry heaving, I started to cough up blood. "Maybe it's an ulcer?" I thought. So I texted my close friend who had an ulcer and told her my symptoms.

Maria: "No," she said, "I've never experienced any of that. You should go to the hospital."

Maria: "I can't drive right now," I told her. "I can't even sit up!"

Maria: "Then call a friend!" She texted back.

Maria: "You know I don't have any of those," I replied. I had moved to a new state recently, and making friends is hard.

Maria: "Well, then call an ambulance," she said.

Maria: "That seems like overkill," I told her. "Plus the dog would lose his mind, and I'm in no state to control him right now." And so I lay there, alone, hoping the pain would subside as it had before. But it did not. My husband

arrived home around 11:00 PM, having had to rent a car from the airport since I had texted to say I would not be there to pick him up as planned. He also wanted to take me to the hospital, but since I still couldn't sit up, I dreaded a 30-minute car ride and a long wait in the ER waiting room.

Maria: I promised him I'd go in the morning when I planned to be feeling better. I spent the night on the couch without sleep, though the pain did start to lessen. In the morning, he reminded me of my promise, but I still wasn't feeling up to the trip. I renegotiated the terms such that I would go to urgent care when I was capable of sitting upright, which happened around noon.

Maria: At this point, I was actually feeling almost normal, so I insisted on taking myself. When I told the check-in staff my symptoms, I was told they could not see me at urgent care. I'd have to go to the ER. I called my husband from the parking lot and debated whether to wait until Monday morning to see a doctor rather than going to the ER where I'd surely waste time.

Maria: But he was sufficiently worried that I relented and [00:05:00] drove over to the ER. To my surprise, if you tell the check-in nurse that you are experiencing sharp, stabbing pain just under your ribs, there is basically no wait. I was called back to a little curtained room almost immediately, and blood and urine tests were taken as well as an X-ray.

Maria: The doctor came to tell me my results a couple hours later. My liver function tests were off the charts. He suspected my gallbladder had to come out. They kept me in the hospital overnight. I had an MRI to confirm cholecystitis the next morning and then laparoscopic surgery the next, and I went home that same day.

Maria: After three days of recovery, I felt great and I promised everyone in my life that the next time my gallbladder goes, I'll go straight to the hospital.

[00:00:00]

EW: Oh my gosh. Maria. Maria.

EAU: Maria.

EW: Um, I mean, disclosure. I have heard this story a couple times now, and every time I'm just like, I, I, I am enthralled and scared at the, at the right parts and relieved at the right parts, and laugh at the right parts. It's just, yeah.

EAU: It's a great story.

EW: It was a great story and I'm glad. I'm glad you're okay.

EAU: Set of circumstances.

EW: Yeah. Uh, thank you, Maria.

EAU: Yeah. Thank you for reliving that yet again for us and everyone who's listening,

EW: Yeah. Hi, I'm Erin Welsh

EAU: I am Erin Allmann Updyke.

EW: And this is, This Podcast Will Kill You.

EAU: Today we're talking about the gallbladder.

EW: Just the gallbladder,

EAU: gallbladder.

EW: The gallbladder. I know.

EAU: I almost texted him multiple times to be like, it's just gallbladder. Right? We're not doing like a specific part. It just, it's gallbladder.

EW: A specific part of the gallbladder

EAU: we're not just doing like gallstones or

EW: or like gallbladder cancer or

EAU: cholecystitis.

EW: C

EW: Yeah.

EAU: We're doing gallbladder.

EW: Yeah.

EAU: I can't

EW: I I mean, I, and, and the, the reason that if you had texted me that my answer would've been like, I don't know. I don't know what these things are, so whatever we could do anything you want to do with our podcast.

EAU: We've promised this for a while now.

EW: We have,

EAU: Um, I'm really excited to finally be doing it.

EW: I mean, of all of the organs to start with.

EAU: Is this the first like organ episode?

EW: Yeah.

EAU: It is, isn't it? Yeah.

EW: Yeah.

EAU: That. Right. I feel like we've talked about doing, like the heart, we've talked about doing other organs, I guess.

EW: Can you think of other organs?

EAU: I mean, the uterus is the first one I think of, and we've done a lot of

EAU: like uterus

EW: Right, but it's

EAU: but we've not just like done a whole episode on the uterus

EW: yet. Well, gallbladder, here we are. Here we are. Let's celebrate the gallbladder and also chastise it for the things that it does poorly.

EAU: I can't wait. I'm really, really excited. Um, I have no idea what you have in store for me, Erin, but I It's gonna be fun. I know that I,

EW: We'll see. Before we get into all of that though,

EAU: it's quarantini

EW: quarantini

EW: time. What are we drinking this

EW: week?

EAU: Drinking on the stones, like on the rocks,

EW: I thought we were gonna do gall of

EW: stone.

EAU: Oh, I.

EW: Oh, no, you're right. We did do On the Stones.

EW: Okay.

EAU: We had a lot of ideas.

EW: Yeah, we did. Well, we had two at least. So, um, and in On The Stones we're actually doing a classic

EW: cocktail, which I've always heard of, but never knew what was in, it's a Harvey Wallbanger.

EAU: Not to be confused with Wal. Wait, wait, wait. Harvey Wahlberg isn't a person, is it?

EW: Um, there's Mark Wahlberg.

EW: Right. And then there's Donnie Wahlberg, and I assume other

EW: Wahlbergs

EAU: I don't know why. That was the first thing I thought of when you said Harvey Wallbanger.

EW: You did, you were like, what's in the, what's in the, the Harvey Wahlberg? I'm like, excuse me.

EW: What? Yeah.

EAU: What is in Erin?

EW: Okay. In the Harvey Walang or, or on the stones is orange juice, uh, vodka a, like a yellow kind of vanilla liqueur called Galliano, or. Guyano Guyano, I'm not sure how you pronounce it. And, um, a Marino cherry.

EAU: Delish

EW: Yeah, it's delicious. The reason we, we chose this too, is because I, when I was like thinking of the, the quarantine, I was like, okay, well it's gotta be yellow because that's what bile is. And then I told you and you were like, yeah, but bile is not yellow, but we're going with it anyway.

EAU: it's yellow. It, it can be yellow. It ranges from like yellow to green. Black is not a good color for bile, but sometimes, so it's, it's a spectrum. Um, I think we think of it in our minds as more bright. Ye like more on the light yellow spectrum than it, it's closer usually to the darker side of the spectrum. But you know what?

EW: Already learning things, already learning things. We will post the full recipe for on the stones on our website. This podcast will kill you.com as well as on all of our social media channels. So check it out.

EAU: Check it out. Also, check out on our website, um, our merch, our bookshop.org affiliate account and our Goodreads list, um, our Music by Blood Mobile, who's also on Instagram. Um, our Patreon page transcripts, sources from all of our episodes and so much more.

EW: much more. Uh, we're on youTube.

EAU: We are on [00:05:00] YouTube, uh, follow the exactly right

EW: Subscribe to it all.

EAU: Uh, we are on, uh, uh, what do you call it? iHeart podcast now, and Apple Podcasts and all of the other ones. Thanks for listening. The end,

EW: And now over to

EAU: beginning. I'm gonna talk us through, what the heck is the gallbladder right after this break?

EAU: You know, those like old timey water skins, like, I think they're probably made out of like animal organs. But you see them in like old movies, like old westerns. Like you put it on a saddlebag and then you drink your water out of this. Yeah. Okay. So your gallbladder,

EW: Uh oh. We're off to an unusual start.

EAU: it's kind of like a little water skin kind of.

EW: Okay.

EAU: It's like, uh, it shaped a little bit like that. Like what I, what I think of as, as those little water skins. It's like this seven to 10 centimeter, so it's quite a bit smaller than those water skins. So two and a half to four inches long little pouch, and it sits just on the underside of your liver, and your liver hangs out in the right upper quadrant of your abdomen. It just like abuts against your diaphragm, which is what separates your abdomen from your thorax or your chest.

EW: The, the liver is always so much higher than I think of, like for some reason I just think of the chest cavity as empty, and all my organs are somehow crowded at the very bottom.

EW: Is

EAU: chest cavity is empty, not like your lungs and heart.

EW: It. Lungs and heart, and then

EAU: Well, that's right

EW: else until like my

EAU: until the bottom.

EW: Yeah. It

EAU: No, your livers way the heck up

EW: It's way up there.

EAU: Um, and this little pouch sits just, there's like a little, uh, uh, a little groove, a little divot that it basically sits in, and it is part of what's called our biliary system, which is basically a series of tubes, like a, I think of it as like the branching plumbing system that the Super Mario Brothers travel through.

EW: Mm-hmm.

EAU: Some of these tubes come from the liver. They're called the hepatic ducts. And then they join together with the tube from the gallbladder, which is called the cystic duct. And those all join together into what's com called the common bile duct. And then another branch comes over from the pancreas. I don't know why it went this way, 'cause it's coming from your left side.

EAU: And these all together empty out into our duodenum, which is the first part of our small intestine. So you have this series of duct work that connects our liver, our pancreas, and then there's this one branch that ends in a blind pouch. And that blind pouch is the gallbladder.

EAU: To better illustrate

EAU: this,

EW: do we have props?

EAU: we have props

EW: Yay.

EAU: I made a biliary tree

EW: Oh my gosh.

EAU: Out of some pipe cleaners and a balloon. So

EW: It's adorable.

EAU: Imagine. Thank you. I tried to get my kids to help and they were like, nah, I'm good.

EW: There's Minecraft to watch.

EAU: exactly, so I made this, um, imagine if you're just listening, I'm, I'm gonna talk you through it. Basically, we've got two pipe cleaners that come together in like a y shape. These are our two hepatic, like left and right hepatic ducts. These are what are bringing the bile, which is made in the liver down into the common hepatic duct. This pouch, which is a balloon, a squeezy balloon, is the gallbladder. It's connected to this whole system by the cystic duct here. Then we have the common bile duct. This branch coming out towards the left, which is really quite skinny, connects really close to the bottom of the common bile duct, and that is what connects the pancreas. That's the pancreatic

EW: Okay. The blue is the pancreas. Got it.

EAU: Mm-hmm. And then it lets out in a sphincter. So there's a muscular sphincter here called the sphincter of odi. And it is what allows flow out into the duodenum or small intestine.

EW: Hold on. Where's the liver again?

EAU: The liver is up here.

EW: is up there. Okay,

EAU: So the liver is what's covering the top part of this. And then your gallbladder sits just underneath the liver, just kind of poking out depending on the day.

EW: Okay.

EAU: And so the gallbladder, it's essentially a storage unit or really like a storage and handling unit. Our liver is producing bile and it produces something like a liter a day, which is more than I realized. But it produces this bile. I know, right? It produces this bile at different rates, depending on whether we are eating or whether we're fasting, right? In response to hormone signals that it gets when we're eating. And then. This bile is traveling ultimately to the duodenum, right? It has to get into our intestine because it's going to help us

digest [00:10:00] our foods. But because there is this muscular sphincter at the bottom, it's regulating the flow of bile. So the bile is not just free flowing, gushing all the time into our duodenum. So depending on the timing, pre meal, after a meal, if you're snacking and the pressure of this sphincter, bile will either flow outwards into the small intestine or it gets diverted into the gallbladder.

EW: Okay. So if you're like, we don't need to digest right now, just hold onto this until for, for a little bit

EAU: Then B boop, the pressure like that sphincter is closed. So the pressure builds up here and then bloop that fluid gets diverted into our gallbladder. Something like 90% of the bile that's produced during times that we're not actively eating or digesting our food ends up going into the gallbladder for storage. But while it's there, it's not just sitting there. Our gallbladder is doing a job and that job is concentrating this bile. You can think of it kind of like a barrel that's aging your fine wine. Right?

EW: yeah,

EAU: Some of, i'm really going hard on the, on the analogies here

EW: I like it. I like it

EAU: So if, if you have wine in a barrel, like some of that wine soaks into the barrel, right? So the wine that comes out after a certain amount of time is a little bit different than what went in. It's the same thing here. So the bile that exists in the gallbladder is more concentrated because there's all these crypts. It's not like a smooth wall on the inside of the gallbladder. It's got like folds and layers and these crypts. So you actually even end up having like layers within the gallbladder of this fluid, this bile where the most concentrated stuff is deep down in the crypts, this inner lining. And then there's less concentrated stuff on top. So after a meal, and depending on how big that meal was, how much fat was in that meal, like a lot of different components, how much hormones are being secreted out, how well your gallbladder squeezes to begin with. Our gallbladder will get to work squeezing and pushing that concentrated bile out the cystic duct, which will mix with stuff coming from the liver that's free flowing still, and then will eventually travel while mixing also with enzymes from the pancreatic duct out. Threw that sphincter into our duodenum so that we can digest our fat burger.

EW: Two questions.

EAU: it to me.

EW: How is it concentrating like, and number two, what is bile?

EAU: I knew you were gonna ask that question. So my literal next part is, what the heck is bile? So glad, when we work together well, um, the way that it's concentrating is basically there's like, um, you know, a bunch of transporters like ion transporters and different things in the wall of the gallbladder itself, like in that intestinal lumen, or not intestinal, but in that bile lumen. Um, and so it's going to be like soaking up, like basically taking back some of that water and, and maybe other parts of what's in the bile, um, and leaving a more concentrated bile behind, if that makes

EW: it. Yeah.

EAU: So bile, great question. So glad you asked. Is, uh, this yellowish greenish liquid that's made in our liver and it's made up of a bunch of different things. It's a combination of bile acids, which is the most kind of active part, and probably one of the more important parts of bile and bile acids are, we've talked about them, uh, in one of our pregnancy episodes when we talked about cholestasis of pregnancy.

EW: Oh,

EAU: But these are made from cholesterol, so our liver is making cholesterol, and then through a process of a whole bunch of enzymes, converting that cholesterol into bile acids and then. What it also does like on top of that, there's another thing called bile salts, and that's just a fancy name for the liver, will take these bile acids, combine them with other amino acids to make them more hydrophilic so that they're more soluble in water because cholesterol is fat and fats don't mix well with water. So our liver makes these cholesterol products called bile acids then makes them into something that's more hydrophilic that we call a bile salt. And that's a big, huge component of our bile.

EW: Mm-hmm.

EAU: It also contains bilirubin, which is a byproduct of like red cell breakdown. It also has other phospholipids. There's probably just some like plain unprocessed cholesterol in there. There's water and then there's other salts and minerals. What bile does, especially these bile acids or bile salts, are help in the digestion of lipids or fats in our GI tract. They are helping to emulsify and

facilitate the [00:15:00] absorption of our fats and things like fat soluble vitamins.

EW: Okay.

EAU: They also are going to grab onto and help eliminate cholesterol from our body, uh, by like grabbing onto it and then essentially like we'll poop it out so they'll like block some absorption of cholesterol. Mm-hmm.

EW: Huh?

EAU: And because these are made in the liver. And then traveling via this biliary system, maybe pit stopping in the gallbladder, and then being re-seed after they're in our digestive tract and they're, they're doing their jobs, they actually get reabsorbed through our intestinal wall later on in our small intestine. Then re-enter what's called our entero hepatic circulation. Go back into our liver where they can be reprocessed, re-seed, and used again.

EW: Okay, so we, we recirculate bile?

EAU: Yeah. Most of our bile is recirculated. Our liver is always making more, but we need way more bile than it's making in a day, if that makes sense. So we recirculate it and then we poop out the

EW: That's, that's really fascinating. And this is, like you said, a liter a day.

EAU: Mm-hmm. At least, yeah.

EW: That's such a huge amount.

EAU: I know. yeah.

EW: When you're, we talked about this a little bit, but just again, to go over it, when you're barfing and you get to the point where you're just barfing up, like a little kind of gummy, sticky, snotty liquid, that's bright yellow, is that ever bile or is it just stomach acid?

EAU: could or it could not be bile. Uh, really ous vomiting is like considered pretty bad. So like that would mean like something is pretty wrong most of the

EW: it would have to be like from your small intestine back through your stomach. So like that should not, that's a one way path.

EAU: it should be a one way path. And so that tells us that there's something going on that's causing that much of a backup. So we think of that with maybe something like a small bowel obstruction, um, or something like that. That doesn't mean that it's impossible to bar up bile. We definitely like people bar up bile, you know? For sure. Um, but most of the time when you're doing that like dry heaving and then you get out just a little bit, it's probably mostly just your stomach contents or, and like the, the stomach acid that's left in there. That's what leaves that really terrible taste in your mouth and things.

EW: Okay. Uh, I feel like I have a lot more questions, but they're all related to the things that can go wrong and I have a feeling that's what you're gonna talk

EAU: That is, how can things go wrong? Oh, go. so I mentioned already that a big part of what your gallbladder is doing is concentrating this bile. Anytime that you have a liquid that's not just like say pure H2O water, but you have a solution that gets more concentrated. The solutes in that solution are at risk of precipitating out, and that is essentially what happens when you get gallstones. We're down.

EW: This stuff precipitates out.

EAU: Yeah, it's not like perfectly as simple as that, but that's the simplest way to think about it because gallstones, there's a few different types of gallstones, um, but something like 80 to 90% of gallstones are cholesterol stones. So they're basically a solid mass of cholesterol from these bile acids that essentially crystallizes as well as calcium, other proteins, and then these things called mucins, which are produced by our gallbladder and can kind of act as, um, if you've ever made like rock candy, have you ever made rock candy?

EW: I've eaten rock candy.

EAU: you're gonna make rock candy, you make a super saturated, uh, solution of sugar water and then you have to take your stick or your string or whatever and roll it in sugar crystals and dunk it in there. And those sugar

EW: that kind of domino crystallization attached to me. Yeah.

EAU: and so these mucins are something produced in the gallbladder that can act as one of those crystal formations. They kind of are like that cad, not a

catalyst, but they are that first thing where your cholesterol crystals can start to precipitate out and then eventually, uh, form a gallstone. There are other types of gallstones, so pigment stones are mostly made up of bilirubin, and so those can happen if you have an overabundance of bilirubin in the bile, which we might see in something like a hemolytic disease or some other kinds of medical disorders, but those are much less common. Most gallstones are cholesterol gallstones. You can also have mixed gallstones.

EW: And that's just where the cholesterol is falling outta solution and kind of like,

EAU: Making little chunkies

EW: okay,

EAU: or big chunkies.

EW: How common are gallstones? And then how common are gallstones that cause a major problem?

EAU: Great question. Gallstones are quite common. It's estimated that like 10 to 15% of adults in the US and in Europe where we have the best data. But I also saw some studies out of China that were like around 12%. [00:20:00] So like 10 to 15% of adults have gallstones. 80% of people with gallstones totally asymptomatic, never even know that they have them unless they happen to get a right upper quadrant ultrasound and we see them ah.

EW: Huh. Okay.

EAU: Not so bad until they go really wrong. And there are a lot of risk factors for gallstone formation and we really, in all honesty, just don't really understand them. Like maybe poor gallbladder motility might have a role to play. 'cause we see that in conditions like pregnancy, which we talked about, where everything slows down, things aren't contracting as much, and so then you can get stasis and if you have stasis, you have increased concentration of this solution and then you have more

EW: Ah, okay.

EAU: We can also see that in diabetes, because diabetes can cause a slowdown of the GI tract. Side note, GLP one medications. Our friends like ozempic slow

down the GI tract and have been associated with an increased risk of gallstone formation.

EW: Very interesting.

EAU: There's also probably genetic predisposition to things like excess mucin production. Or just slow gut transport in general, or differences in the way that bile salts are metabolized and reabsorbed because you can end up with like more or less hydrophobic versions. So some that might just be more likely to precipitate to begin with, if that makes sense. They're just not as good at dissolving in water.

EAU: There's probably microbiome considerations. Estrogen might play a role. There's a lot and we don't fully understand it, but most of the time, gallstones just hang out there in your gallbladder and don't really cause any problems, but if they're going to cause problems, most of the time the first presentation if someone is symptomatic is what's called biliary colic.

EW: Mm-hmm.

EAU: And that is this kind of, uh, I mean, good example that Maria gave us in her firsthand account. Unfortunately, um, it's this postprandial. So after eating about an hour or so after eating this episode of really severe, usually right upper quadrant, 'cause that's where your liver and gallbladder are pain, that can be very severe, very intense, lasts for maybe an hour, maybe a few hours, and then eventually resolves on its own. That is the like classic description of billary colic.

EAU: We think that usually this biliary colic is caused by a stone. What's sometimes called sludge. 'cause sometimes you don't get like a full on stone formation, but you just get slugginess where it's like really thick concentrated stuff, um, that gets lodged somewhere in this biliary system. Right. Whether it's in the cystic duct or somewhere else in this biliary system. Um, and then it causes irritation and inflammation and pain because it's activating our like visceral sensory nerves. More than 90% of people who have one attack will have a recurrent attack of biliary colic within 10 years. A lot of them will have a repeat episode within two years.

EW: Okay.

EAU: But these type of attacks, this kind of biliary colic, is usually considered self limiting, right? It's not necessarily causing an emergency. It doesn't need

intervention necessarily. But these gallstone blockages can also cause a number of more severe complications, which all have various itis names because they're associated with a lot of inflammation. We can get acute cholecystitis, we can get bacterial cholangitis, we can get pancreatitis. Gallstones are also a very well known risk factor for gallbladder cancer down the line. So I wanna kind of talk through how each of these processes happen because they're kind of all actually the exact same process. It all just depends on where in this billary system a stone is getting lodged. Basically anytime that you have a tube in your body, but especially when you have a blind tube, right, like this pocket where there's no exit on it, when that tube gets blocked, you're going to increase pressure behind that blockage.

EW: Yeah.

EAU: So in your gallbladder especially, this increase in pressure is going to cause swelling, which especially along with this super saturated bile that's already present in your gallbladder will cause further inflammation and inflammation in our body comes with edema or swelling, which will further increase this pressure.

EAU: So acute cholecystitis is when you have a gallstone that has blocked the cystic duct and then causes this increase in pressure and inflammation and swelling in the gallbladder itself. Eventually, this can lead to the wall of the gallbladder not being able to [00:25:00] get enough blood supply. So then parts of the tissue, 'cause of just there's so much like edema and swelling, so then the blood can't flow there well, and so then the tissue will start to die.

EAU: So we can see necrosis with necrosis, you can see hemorrhage, right? Because you're gonna have bleeding from where this tissue is dying. That can eventually lead to perforation of the wall and the gallbladder, which would cause it to spill out its contents into the peritoneal cavity.

EAU: And that's super concentrated bile acids that are supposed to digest stuff, so that can be really severe. But even if it doesn't perforate, as you continue to have all of this edema and cell death and necrosis, you eventually can get a purulent phase where you get a lot of white blood cells, inflammation.

EAU: Bacteria can get into this system, whether they're coming from the GI tract, whether they're kind of there already, but not causing problems until they proliferate. They make their way in there one way or another, and then cause a bacterial infection on top of this. So that can happen in any part if it happens near the pancreatic duct.

EW: Yeah.

EAU: And blocks here, you can get inflammation in the pancreas, and that's called acute pancreatitis. 50% of cases of that are caused by gallstones.

EW: Okay.

EAU: You can get a stone that lodges somewhere in the, the common bile duct itself, right? So below the gallbladder, but before the pancreatic duct. And that can cause, uh, what's called cholangitis. It's usually bacterial cholangitis. And that's really severe because this is a relatively small tube. So, a small increase in pressure, you could potentially have a perforation, so that could be a lot more severe. So we see people really, really sick when that happens.

EW: And so, but like no matter where the stone or the obstruction is happening, the gallbladder will continue to be backed up and swell, or is it only when that stone is at the opening of the gallbladder.

EAU: Yeah, it kind of just depends. So you can definitely get pancreatitis without having any gallbladder swelling, like without having cholecystitis on top of it. Cholecystitis, acute cholecystitis is specifically when it's blocked at the neck of the gallbladder somewhere, so it's the gallbladder that is most affected.

EW: Like the hotel California of gallbladder issues. You can check. You can go in, but you can never come out. This is like the worst. That's all I could think of is like you can, you can, yeah. You can't leave.

EAU: you can't leave. Exactly. Nothing can leave. The same is true though. Like if you get, if you get a stone blocking somewhere else, it just depends on how long it's there, how severe it gets, whether it's ever able to pass. You could certainly get inflammation, like you can end up with an infection in the gallbladder or inflammation in the gallbladder when you also have cholangitis, uh, in other places. And at the heart of it, the problem ultimately is the gallbladder itself in any case. Right. Um, and so for a lot of these cases though, I will say not all of them, like, especially not when we're talking about pancreatitis, the treatment for that is potentially different, but especially when we're talking about acute cholecystitis. When it's this inflammation of the gallbladder itself, um, treatment is usually take out that gallbladder, cut it the heck out, cholecystectomy.

EW: So what are the consequences of this? What is the deciding factor? So obviously if like, if it's severe enough, yeah. What do we, do We ever just remove the gallstone?

EAU: Mm, mm-hmm. You absolutely can. Yeah. There's, there's a number of procedures that you can do to just remove the gallstone. There's also medication that you can use. Um, we use it definitely like in, in pregnancy when it's the. That co cholestasis of pregnancy, which is different. That's like, it's a different process. See, our pregnancy episode, we talked about it. Um, but so there is a medicine that we can use that helps to kind of break up these, uh, gallstones themselves. Um, but it's not necessarily like all that effective, long, long-term and prevention of complications. But, but that is one option. Um, we used to do a lot more of like what we do for kidney stones, which is like go in and like ultrasound, wave them somehow and break them up. That's not really done anymore. Um, so another option if someone is really, really sick, uh, with acute cholecystitis, so this infection, inflammation in the gallbladder and they cannot have a surgery because ultimately surgery to remove that gallbladder is the treatment, especially for acute cholecystitis.

EW: Okay.

EAU: Um, if someone cannot have that surgery because they are too sick, uh, or they cannot have that surgery, then sometimes we'll put a drain in it. So that would come from the outside, and that's called a percutaneous chole cystostomy tube. And so that's just gonna drain all of the infected fluid, all of the pus, everything, all of the bile. Um, but it's sort of just a [00:30:00] temporizing measure. Eventually you're gonna have to do something more permanent.

EW: Mm-hmm.

EAU: Um, so yeah, I mean, it, it really does depend though on what the presentation is. So if somebody just has that biliary colic that we talked about, they may or may not decide to get their gallbladder removed. If they do, a surgeon is probably gonna want it to be at a time when there's not any issues going on, because then everything is calm and cool and it's easier to remove because you don't have irritation and inflammation.

EW: I have a question about diagnosis though. So, like you said, this is a, these attacks are fairly characteristic. It's like right upper quadrant debilitating pain. Like I've heard some people that I know I've had it describe it as like, they're like, yes, I've had children and this is worse than unmedicated childbirth, which is wild to think about. Um, and, and, but it, like you said, it's, it's self-limiting.

It's, it does go away eventually unless there's like a more severe, unless it doesn't. And so if that goes away and then you go to your doctor a week or two later, and let's say there's no gallstone that they can find, so then what, what do you do?

EAU: It's a great question. It kind of depends. It depends on if it comes back, um, most of the time, like most of the time you see something, whether that's sludge, right? So you might not see a stone. If you had a small stone and it passed, you know, during that episode, then we might only see sludge. But even just sludge itself can cause biliary colic, right? If that sludge get pressed up against and then ends up causing irritation. Um, but yeah, I mean it all just is gonna depend on, on that specific presentation, on how often it's happening there. There are other things, of course, that can mimic this. Um, so I don't have any an easy answer for that.

EW: Okay. All right. So, but what are, if you get your gallbladder out,

EAU: Mm-hmm.

EW: Obviously this happens? A lot. Yeah. What happens?

EAU: It depends. Some people, um, they don't even miss it and they have no issues whatsoever. And then they live their life without gallstones. Uh, and isn't that great news, but a lot of people can have post cholecystectomy complications and that can really, really range estimates. I saw most of them were around 40% on the high end. Um, some were a lot lower and I'm not sure that I believe that just based on all of the other papers that said anywhere from like five to 40%. So I think there's a pretty huge range of, of looking at different studies, but the symptoms can also range. Um, and I'm not talking about like acutely, there are of course complications from surgery that can happen, right? You could have injury to the bile duct, you could have leakage, things like that. Um, but outside of that, like just post-op period, some people can have acid reflux. That they can get after a procedure like this. We don't fully understand. Some people get persistent, right upper quadrant pain, so like they still end up having pain in that area where they were having pain from their gallbladder. Um, some people very commonly end up with diarrhea and that has a lot to do probably though we don't fully understand it, with the changes in how you now are getting bile acids into your GI tract, right? You're no longer having these concentrated bile acids, but you are having more of a constant free flow. Of less concentrated bile acids into your GI tract. And it's thought that this likely changes the gut microbiome, which will then shift how these bile acids are like conjugated or unconjugated or what they're conjugated with when they go

through processing and, and all of that kind of stuff. So there's a lot of potential changes that happen, um, after a cholecystectomy. And yet you can function and your GI tract can function just fine without your gallbladder. You just,

EW: Snippet. Snip. Snip.

EAU: Yeah, that's the end.

EW: Oh, okay.

EAU: Erin,

EW: Oh, wow.

EAU: about the history of all of this, would ya?

EW: Maybe we'll see, we'll see what, what I come up

EAU: Okay.

EW: Have you ever heard someone described as like having the gall to do something? Like what gall, he has to suggest

EAU: Don't tell me that that has to do with gallstones.

EW: Course it does.

EAU: I don't know why I thought it was.

EW: Well, the gallbladder, yeah.

EAU: I know, but I, this is so embarrassing. I'm not gonna say it out loud. I thought it was gulls. No, like the, birds.

EW: oh, gull.

EAU: I thought it had something. I mean, I knew it was gall, but I don't know why. I just assumed that it had something to do with birds.

EW: I mean the, I, I would say gulls do have a lot of gall because it's like, usually it's like, you know someone who's bold and maybe rude

EAU: out of your hand.

EW: Exactly. the [00:35:00] gall the gall on that gull. The audacity basically is like, is what it is. Yeah. Um, I love it. It's, it's such a great word. It's like a little pearl clutching word. I don't think we use it enough

EAU: Okay. Let's use it

EW: the gall. Um, and it comes, yeah, it comes from the gallbladder. So like why, what does the gallbladder have to do with personality or temperament or daring? So today we may not think that often of our gallbladder except for the subset of us who have been at the mercy of our organ because of gallstones or chole cystectomy or some other reason. Like how many of you out there listening knew what the gallbladder did or could locate it on a diagram before this episode? I could not at all. Yeah.

EAU: Fair? Yeah. Yeah. Yeah. We don't think about it very often.

EW: we don't, we don't. But this sort of backseat overlooked role that the gallbladder now plays is actually a relatively recent one. For centuries, the gallbladder, or maybe more precisely the substance that it stores was a star. It was famous among the organs or among the substances produced by organs crucial for how it affected not only your health and wellbeing, but also your outlook on life.

EAU: What?

EW: And that is the story that I wanna tell today. I've touched on it in other episodes of the podcast, but it's not one that I've ever really told or thought about in full. And so what better time to discuss the Humoral Theory of disease

EAU: Yes. All the different

EW: like eight years into this? Yeah. So you might be thinking, okay, well what do we care about? An outdated and disproven model for understanding human health and disease. Fair

EAU: I care.

EW: I mean, yeah, I, but I, I asked myself, what is this really the right thing to do? It doesn't give us a ton of accurate info about our body's inner workings, but it does give us insight into how the world was, was perceived in past centuries,

and how that perception actually lingers today in a surprising way long after the Humoral theory of disease was supposedly discarded in favor of germ theory and other concepts of modern

EAU: Okay.

EW: But before we get too deep into the humors, I figured I should at least share some fun gallbladder facts that I collected.

EAU: Give it you mean?

EW: The

EW: largest gallstone removed laparoscopically was 12.8 centimeters long and 7 centimeters wide. that's 5.1 inches, 2.8 5.1 by 2.8

EW: inches.

EAU: Yeah, that's hefty.

EW: It's hefty. It's like a smallish avocado is what I would say like a, a very, like a quite a small avocado.

EAU: Sitting in your gut. Okay.

EW: That was the laparoscopic removal. the largest removed in a traditional surgery, at least like documented in recent times was 16.8 centimeters long and 7.8 centimeters wide. So it's like 6 point 6.5 by 3 inches. It's like a large avocado, like a good sized avocado. Avocado. And also they kind of are, were avocado

EAU: Yeah. 'Cause the gallbladder's a little like,

EW: It's avocado.

EAU: Yeah. Pear shaped. Avocado shaped.

EW: That one weighed 278 grams or 0.6 pounds.

EAU: Wow.

EW: It's a large avocado.

EAU: a little,

EW: I've got citations for those, but this next one comes from a more questionable source, so I Googled like largest gallstone and then found the ones that are like in, you know, medical journals. But then the Guinness Book of World Records, of course, has an entry.

EAU: stop it.

EW: Quote, the largest gallstone reported in medical literature was one of 6.29 kilograms, or 13 pounds, 14 ounces removed from an 80-year-old woman by Dr. Humphrey Arthur at Charing Cross Hospital london.

EAU: Okay.

EW: Yeah. Okay. No citation provided for this, so I hunted it down. I read the original paper titled A Large Abdominal Calculus by Humphrey Arthur couldn't find anything in that paper that was like, this is a gallstone. I made you read it, and I was like, do you see anywhere that they tie this to as a gallstone? They identify as a gallstone.

EAU: And it doesn't Sound like a gallstone

EW: Doesn't sound like a

EAU: it a bladder stone

EW: Yep.

EAU: in the, in the paper.

EW: It's not a gallstone. So someone has gotta notify Guinness to say, you know that. Sorry, that ain't a gallstone.

EAU: Guinness, are you hearing this? Can someone at them right now,

EW: I right now, right this minute.

EAU: You have your largest gallstone Wrong.

EW: Wrong. I mean, the largest one I could find in the literature was 0.6 pounds. Not

EAU: vast difference than 13 pounds. Okay.[00:40:00]

EW: Anyway,

EAU: will say, don't you remember at the Surgical Science Museum in Chicago, they had some hefty gallstones

EW: did I This there had so many gallstones Highly recommend a visit.

EAU: Such a great museum.

EW: Let's go back.

EAU: Okay.

EW: Okay.

EW: Gallstones have been found in ancient Egyptian mummies. There is a bronze model of a sheep liver and gallbladder from the second century, BCE, that was found in a field in italy. And, um, the first gallstone, removals began in the late 19th century led by German surgeon, Carl Langen book, who reasoned that some mammals don't have a gallbladder, so that probably means that humans can survive with that

EAU: I love

EW: It's just like kind of a leap, but like, they were like, eh, it's probably

EAU: that's probably fine.

EW: Uh, previously surgeons would treat gallstones or like any gallbladder complaint primarily by like creating kind of an opening, like you described, like a fistula is what they described to access And remove stones.

EAU: stones. Okay.

EW: Yeah. Um, okay. What else? I. We can add acute cholecystitis to the list of things that allegedly killed Alexander The Great. Um, I think we've covered like

poisons on this before, or, um, some infection, whether it was typhus or typhoid. I, who

EAU: I mean, you can have poisons, so you can get cholecystitis from, not gallstones, like 10% of cases are called a calculus, so maybe in fact, it was both a poison and acute cholecystitis.

EW: Could be, could be. Um, the famous American surgeon, William stewart Halstead performed surgery on his mom to remove gallstones in 1881. That prolonged her life, uh, by a couple of

EAU: Wow.

EW: And in September, 1965, president Lyndon b Johnson had his gallbladder removed.

EAU: Okay.

EW: You know, uh, laparoscopic helped cut down complications and speed up healing time. And the first laparoscopic cholecystectomy was performed in 1985, and now we've got robotic assisted cholecystectomies. Pretty, pretty cool. Revolutionary healing time is, yeah, it's, it's neat. It's neat stuff. Um, that's the end of my gallbladder facts. Let me know if, if you out there have more for me. That's really all that I could find, um, for this. So onto humeral

EAU: Okay.

EW: Okay. In the fifth century, BCE, our old friend, friend of the pod hypocrisies, along with his buds, put together the revolutionary medical texts that would come to rule Western medicine over the next 2000 years. In it, they described a person's health, their psychology, character, behavior, preferences, and appearance, and how all of this could be traced back to the balance or imbalance of four substances in the body. The

EAU: The humorous.

EW: quoting from Galen, who is a few centuries later, quote, to begin at the beginning, the elements from which the world is made are air, fire, water, and earth. The seasons from which the year is composed are spring, summer, winter, and autumn. The humors from which animals and humans are composed are yellow bile, blood phlegm, and black bile. End quote.

EAU: I love it. He's like, listen, it's 4, 4, 4, okay.

EW: Four. Four. There's a symmetry that is beautiful,

EAU: undeniable.

EW: undeniable. The humors were related to the elements of the world, like air and blood, water and phlegm, uh, fire and yellow, bile earth and black

EAU: Interesting.

EW: and also to temperature and moisture. So blood was hot and moist. Phlegm was cold and moist. Yellow bile was hot and dry. Me and melancholy or black bile was cold and dry.

EAU: Interesting

EW: Too much of one humor could be deadly. Your death could be caused by excess phlegm, like that would be on your, you know, death certificate. Let's say you maybe ate too much of something or drank too much of something that gave you that excess phlegm. That was what led to it. And treatments were advised based on the precise imbalance. If it was an excess of blood bleeding was your best course of action. If it was yellow or black bile that you had too much of, you should probably take some laxatives or mimetics, something to make you throw up. And if it was phlegm that was bothering you, like it clearly is bothering me, nothing better. Nothing is better than something that caused you to sweat or expectorate.

EAU: A quick question. Is phlegm back then the same thing as phlegm today?

EW: I think so. But it's kind of, this is where it gets a little bit weird because [00:45:00] what the heck is black bile?

EAU: that's what that was gonna be. My next question.

EW: Yeah, it's. We'll, we'll get a little bit more, no, we'll get a little bit more into it, but like, I think that we have to suspend our our perception of, we have to see what these substances are and where they're coming from, because a lot of it was not in how they're coming out of your body, but just this like concept.

EAU: In your body. Okay. Okay. I feel like I always thought of phlegm as like lymph, and I know that they didn't really know that that was a thing, but like in my brain, I'm like, that's what it is.

EW: Yeah. Right, and, and maybe it is, you know, sometimes these did come out, like you could see maybe phlegm is, you know, snot or whatever. Blood obviously is more visible, but like there's blood wasn't necessarily blood, if that makes sense.

EAU: It doesn't, but I'm gonna go with it.

EW: You know, like, well there was like the blood that you bleed and then there was the blood that was like a part of your core

EAU: that that was different.

EW: Mm-hmm. Yeah, it's really, I mean, we gotta just try to think in their, in their minds. Um, and so what you, what you wanted to do with treatment was basically treat with opposites. So like allopathy as opposed to homeopathy guided, which is like, like with like. And so guided by these general principles, people suffering from whatever ailment didn't necessarily have to seek the help of a physician only in extreme cases, but they could concoct their own remedy or buy a home remedy. Tices enemas, syrups, potions, powders, pills, ointments, antidotes, fermentations, inhalations infusions, lots of

EAU: Endless possibilities.

EW: Yep. And the quality of the treatment was determined, and not by its efficacy necessarily, but generally how rare or expensive the ingredients were or how complicated it was to put together. But even for the healthy person, there were general guidelines for how to live your life under the humeral theory of disease. Eat less in the summer and more in the winter. Beer nourishes provokes urine has a laxative effect, causes gas, truth, vinegar induces, melancholy.

EAU: Hmm.

EW: I'm not sure about that one for me. Um, bloodletting is best in springtime and only for those older than 17 baths are not recommended during the summer months, which is also a time to eat cold food and avoid love making,

EAU: Oh dear.

EW: Which might be related to the baths.

EAU: Okay.

EW: Guidelines, I'm not sure. But alongside temporary imbalances rocking the boat, people tended to have a certain humoral imbalance, which determined their personality. Those with more yellow bile or color Kohler were choleric, achievement oriented, driven, bold, decisive, independent, argumentative. These, this yellow bile was associated with, or people of this temperament. It was associated with summer and adolescents or youth. If you had an excess of black bile, you were of the melancholic personality, sensitive in direct detail oriented, loyal, associated with maturity and autumn, and a tendency to delirium or depression.

EAU: hmm.

EW: A phlegmatic person or phlegmatic person had more, you guessed it, phlegm. And they tended to be calm, steady, introverted, agreeable, indirect, slow to action associated with winter and old age. And then finally, more blood led to a sanguine personality. Optimistic, social serene, fun-loving, extroverted, active, associated with springtime and childhood. And there's like diagrams that you can see that have like these different colors. So like red is, uh, sanguine, obviously black. Bile is black. I'm pretty sure yellow. Bile is yellow. And then phlegm, I think is orange, or not orange blue.

EAU: Interesting.

EW: Yeah.

EAU: It's like, an

EW: it has like, it's like an Enneagram. Yeah. I, I don't know if they're like wings and whatever. And I was like thinking in my head like, oh yeah, the, you know, yellow bile, the choleric personality really sounds kind of like an eight or a three. And then like, yeah. But then I was like, I can't, these are not one-to-one

EAU: no, obviously.

EW: Um, but yeah, so the Humoral theory of disease provided a framework to understand not only a person's health or disease, but also their emotions and personality linking the two. And it drew connections between the environment, diet, and just inborn temperament to not only explain a disease, but also to

provide a prognosis how the disease [00:50:00] was expected to play out, guided by adjustments to humoral balance. More than this. The Humoral theory of disease represents a revolution in how people understood the world to work rather than divine intervention or superstition, there was a physical basis for every phenomenon of the human body and a corresponding explanation. All you had to do was closely observe your patient, maybe take a case history, which led you to a diagnosis, then prognosis, then treatment.

EAU: Hmm.

EW: This approach to medicine was really the first to resemble the scientific one that we use today to some, to some extent in, because instead of there being one answer to every question of why, which would be because God decreed it. Yeah, there could be a multitude of answers.

EAU: Hmm.

EW: This framework of humeral theory had its own logic, even if that logic is not based on our current understanding of anatomy and physiology. And it allowed physicians to, you know, do all of these things in order to care for their patient.

EAU: Hmm.

EW: And the humeral theory of disease persisted for centuries, despite the, you know, the lack in, in our eyes we're like, you kidding me? What, what even is black bile? It's like, what is that? Um, what is it based? Not based on fact or on, on what we, we know It still persisted because it gave meaning to the world. It answered these unanswerable questions, and I think it provided some form of certainty. And we know how much people hate uncertainty.

EAU: my gosh. Yeah.

EW: Yeah. And so in this way, the humoral theory of disease was deterministic. Like everything including behavior and mood could be explained as it related to humorous. Oh, well of course you have this, you know, like, and I imagine that would be both satisfying and also like very irritating. Like, no, I'm not upset because I ate hot soup and my bile is up. I'm upset because you borrowed my toga and you stained it, but you're gonna have a sanguine temperament, so of course you wouldn't understand. Uh, but at the same time, people couldn't use their humoral imbalance as an excuse for bad behavior. Like if an imbalance

represented a diseased, unnatural state of being, they should try to act against it to use their rational mind to make decisions and take

EAU: Like you're supposed to overcome this

EW: Yeah, yeah, yeah. And to not overcome it, to be beholden to your inborn temperament was kind of like viewed as a weakness. Like you, you know, better. Yeah. It's fascinating. Um, and so the order and explanatory power that the humoral system provided is really what helped it survive for so many centuries, because it could be folded into any religion. Like this is how whatever deity you believed in created humanity. It could explain any illness or any state of mind, and it was adaptable. Like if you needed to add a little bit more color to your diagnosis, you could just say, well, you know, it wasn't just an excess of blood, but it was the type of blood, how viscous it was, where it came from. Which organ or like part of the body was it concentrated

EAU: You could get really, really nitty gritty

EW: you could,

EAU: your various humors

EW: So, like smallpox, for instance, was believed by one ancient physician to be the result of retained menstrual blood by the fetus. So like you got smallpox as a 15-year-old because as a fetus there was retained menstrual blood in your mom's womb.

EAU: Oh, like not, okay. Oh, okay. Like, okay.

EW: Exactly. So like it, there's, there's no limit to the mental gymnastics that you could do.

EAU: Wow. Okay.

EW: Mm-hmm.

EAU: Just come up with an idea and then you could, say, you could, you could humor it.

EW: there you go. Uh, infectious and heritable diseases also fit nicely into this since miasma explained how could it could be transmitted from person to

person, uh, like humors and humoral temperament could be transferred from parent to

EAU: Mm, naturally.

EW: Mm-hmm. Treatments were also less about curing someone than they were about guiding someone through their natural course of disease and doing their best to, to get the best outcome. And with things like diet, and then later on herbal remedies. So this left more wiggle room for physicians who weren't expected to cure their patients. So it wasn't like, you don't know what you're talking about because this person's not getting better. It was just like, this is the destiny and I'm trying to do my best to fix things, but [00:55:00] I'm, you know, I can only do so

EAU: I'm limited

EW: Unlimited. Yeah. And the basic principles of humoral theory were also fairly easy to grasp. Like if you could remember each of the humors and what season or moisture they were associated with, and then various foods and their, you know, moisture or heat levels, yeah, you could make a good guess as to what your disease was and how, and how to manage it even if you had no formal training or education.

EAU: Okay.

EW: The other thing that let Humoral theory reign was that autopsies were not permitted for a good chunk of this time. That excess of black bile was based on external observations of just like someone's symptoms, and as we'll later see fact checking would undermine the credibility of

EAU: Once they tried to find out what the heck is black bile, then they were like, there is no such thing. Whoops.

EW: Ain't no such thing. Whoops. Yep. And this isn't to say that humoral theory remained unchanged until the 17th and 18th centuries. You know, there were, uh, scholars like the famous Persian physician, Avicenna, who added his flair to it. And overall interpretations became more complex, as did the mental gymnastics that were required to come up with these explanations. So, for instance, a combination of heat in the liver, weakness of the spleen, external cold, and a long disease history could lead to a heightened amount of black bile in the organism.

EAU: Okay. How do they know what is a liver and what is a spleen? If they're not

EW: yeah. Animals.

EAU: Okay animals. Okay. Then they

EW: they would do,

EAU: okay.

EW: They would do, um, auto, autopsy or not autopsies, dissections on animals, and then like, make assumptions like that must be what the human correlate is. Yeah. Yeah.

EAU: do we even know if yellow bile is what we call bile today?

EW: I think it was because I believe that Hippocrates thought it was produced by the liver, or not, not the liver, but a, a, he thought it was produced actually by the gallbladder, by an organ attached to the liver. So I do think that it was related to the bile

EAU: So we have at least those correlates and phlegm might be really phlegm and then black bile is the real question mark here.

EW: Yeah. I I had a little bit about black bile, but now I have forgotten what it was. it was. just sort of like, we don't really know. Is it a certain type of blood? Is it? I don't know.

EAU: Interesting. So interesting. Erin.

EW: Yeah. Um, and humoral theory, it's not like it remained super popular during this entire time, so it fell out of favor occasionally, like in the Middle Ages when Christianity was on the rise and treatment was thought to like corrupt the soul and go against like God's wishes.

EAU: okay.

EW: Or when an epidemic exhausted the explanatory power of humoral theory. Like when the black death struck Western Eurasia in the mid 14th century, you

can't explain away a third to a half of the population dying because they all took a bath in the summer. Like, that's you

EAU: a hard pill to swallow.

EW: Yeah. So that was a crack in the certainty that humor wisdom had provided and that crack just widened over the next centuries as people tried out alternative frameworks to understand the world. You know, magic, religion, alchemy, homeopathy, anatomy. By the 17th century, humanism was under threat. With the taboo against dissection slowly breaking down. You had anatomists like VAs publishing intricate drawings of the human body and artists like Michelangelo celebrating the naked form. People were gaining a clearer insight into structure and

EAU: Mm-hmm.

EW: and then you have microscopes allowing a view of the world as it had never before been seen. What these new perspectives revealed was that Humoral theory simply did not hold up under scrutiny. The vena cava was not connected to the liver as Galen had claimed, nor were the lungs simply there to cool the heart. I mean, there were entire humeral structures missing. Yeah. Mm-hmm. I mean, yeah, we, we've talked about breath before and how it was not understood why breath

EAU: What breath was?

EW: Yeah. Cause we didn't know about oxygen and Yeah. Anatomical dissections, ironically, were permitted because they were supposed to support humoral theory and like provide more detail, not dethroned it. And so Visa's findings were quite an unwelcome shock to the medical establishment of the mid 16th century, which had, you know, still was adhering to Galen's teachings, but you couldn't unrack that egg. And this marked the beginning of the end for, for humoral [01:00:00] observable evidence obtained through experimentation became the gold standard for establishing new laws of nature and guidelines for practicing medicine. Just empiricism basically. But there was no concept of health and disease that could immediately replace Humoral theory, and so it was a slow decline. It didn't help that Humoral was literally embedded in language, not just for physicians or scientists, but for everyone. Like it was how you understood yourself. It was how you understood the way you moved about the world. Blood wasn't just blood. It could be invigorating or excessive, pure or corrupt, but that connection grew thin as scientists discovered that blood well was just blood. And the human body actually bore a closer resemblance to the

machines that engineers were inventing. Rather than the mystical being imagined by the ancients,

EAU: Hmm

EW: the feeling was that everything would eventually be figured out in short order. And for many things that was true. The 19th century saw germ theory, oust myas, asthma. The circulatory system was fully mapped. The beginnings of hormones and vitamins were, you know, starting to be understood, and there were effective treatments developed for a myriad of illnesses. Bit by bit body, part by body part medicine was laying claim to distinct areas of human health. The one realm that seemed stubbornly opaque was the brain and nervous system.

EAU: Still true.

EW: Still true. Neurology as it was born in the late 18 hundreds wasn't explicitly modeled after humanism, but it certainly paralleled it. Hysteria was associated with excess fluidity and was thought to be impacted by diet, exercise. Too much of this, too little of that. Some of which might have a trace of truth to it,

EAU: I think that's what's so interesting about, I mean, like, you know, not, not to the extreme of like, don't do this in summer, don't do this in winter, but like, so, so much of it is like still like, we should move our bodies. Makes sense. We like,

EW: It's just common sense. A lot of it is just common sense advice.

EAU: Yeah.

EW: Um, but then there were, yeah, things like neuro athenia also had associations that were very, like humoral in nature. Uh, melancholy remained pretty much unchanged in its conception. It was like, oh, black bile cooled the brain. It makes you depressed.

EAU: Interesting.

EW: The psychiatrist of decades past, just like those today, have sought to bridge the gap between the brain and the mind. And part of that bridge has really been constructed with the concept of temperaments. Like why do we respond the way we do to certain events? Do certain individuals tend to be

affected by this disease or that disorder? Whether these are mental health illnesses or whether these are like physical illnesses. People who are high strung, they are thought to have, you know, higher blood pressure and all these things. Why? The reason is because humors have not left the building, the traces of humoral theory can be found in the language that we use, like sanguine, like melancholy, good humored, bilious, gall. Um, in Greek, the word choly means bile. Melon means black. So melancholy, black bile like that is directly what it comes from. Isn't that fascinating?

EAU: Wow. I didn't know that.

EW: Yeah.

EAU: Huh?

EW: But the humoral theory has also lingered beyond linguistics. Like we still seek balance in our lives, whether it's our work life balance, getting, uh, the right, the balance, diet, uh, enough exercise and relaxation. We feel like we should eat certain foods in certain times of year, right? Like warm and hearty soups. In the winter, we take ginger for nausea in humoralism. Ginger is warming and so that was supposed to help to up combat, um, uh, whatever it is. Phlegm or something. Yeah, yeah. Eucalyptus for stuff. Sinuses, like also straight from humoral theory. We're only now recognizing the role that diet might play in a myriad of things that we just kind of had discarded previously, like mental health, maybe via our microbiome. This would not have surprised humorists at all, which I find really fun and interesting.

EAU: we get It's all a circle.

EW: It's all a circle. Yeah. Today scientists and medical practitioners operate under a framework that's been refined by decades of observation and experimentation, and we rely on these general rules to make sense of the world. But when we discarded humoralism in favor of empirical science, we also left behind perhaps what I think is like [01:05:00] the most important lesson of humoral theory, and that is that each patient is a unique person and you have to first understand that individual and where they come from and who they are in order to help them. So like that's, I don't know. That was something that I was thinking about in terms of like just. How the temperaments, yes, it is putting people in boxes, but it is also acknowledging them as individual people at the same time. So I just thought that was an, an interesting little foray. Um, that's the lesson that I could draw from humanism. I mean, I, to be honest, just full disclosure, I wrote most of this when I was sick, and so I like reading it over. I

was like, wow, this feels like a fever dream. Um, you can hear it in my voice still. Of

EAU: maybe the humoral theory all is, is it is a fever dream erin.,

EAU: it's, it

EW: all a fever dream. Yeah. Um, I, I had no idea what I was gonna do for gallbladders. I did not expect to come down this path of humeral theory of disease, but I thought it was fun. Then I was like thinking like, what, what humeral, tempera temperament? Am I,

EAU: What are you

EW: I don't know. I asked my sister actually, and she said I was choleric, which is like the argumentative one.

EAU: I would agree. I would agree with that, but I, would say I, I was gonna guess myself as the same, so.

EW: Yeah, I, I I think we might be, yeah, we might. Be a mix of, of choleric and sanguine is what I would,

EAU: so too. We're right on the borderline there.

EW: Look yellow and red. Perfect.

EAU: Be optimistic also, right?

EW: Yeah. Uh, but that's all I've got for gallbladder, which is really the humoral theory of disease,

EAU: I did not expect that journey and I really quite enjoyed it.

EW: I'm glad, I'm glad. What's, what's going on with gallbladder stuff today? Let's, let's wrap this up by getting back to where we started.

EAU: Let me tell you about it.

EAU: I kind of already told you about it, Erin, honestly,

EW: Okay.

EAU: um, 10 to 15% of adults in the US and in Europe. Uh, and we don't have data on like across the whole globe, but it's estimated on average, 10 to 15% of adults end up with gallstones. But luckily most people, 80% or so of people with gallstones are asymptomatic. The other 20% may end up with complications at some point. 10 to 15% of those complications will be acute cholecystitis. So that is. By and large, the most common complication of gallstones. There are pretty big differences in like prevalence of gallstones, especially if you're looking at different like racial or ethnic groups like within the US for example. But it is not necessarily thought that this is genetic, like we haven't found genetic markers that clearly explain this. And so the thought is maybe it's more related to, say, dietary factors in different like populations or different areas, which might underscore that race is just a social construct after all.

EW: I did think though, that like there tended to be gallbladder, like family history of gallbladder might or gallbladder removal makes you more likely to have gallbladder

EAU: There. Yeah. So there, there are some like familial clustering, but we still haven't found any like genetic markers. So is it microbiome where, you know, you have similar microbiomes when you live in the same households and things? I dunno. We don't know. Does it Could also be genetic and we just dunno it yet.

EW: Sure.

EAU: Um, people assigned female at birth are more likely to have complications from gallstones, although that's also less true in older populations. Like it kind of evens out the older that you get. So that's why it's maybe thought, is it the estrogen that we have higher levels of, especially, you know, in our younger years prior to menopause. We don't, we don't know. But those are some of the risk factors. There's also other things, sometimes higher BMI is associated with a higher risk of gallstones, but also so is weight loss associated with gallstones and complications? Um, I mentioned diabetes and some of our diabetes medications. Um. We know too that it's not just acute cholecystitis. The incidence of acute pancreatitis, um, is about 40 per 100,000 each year in the us.

EW: Okay.

EAU: Um, I should have erin mathed that, but I didn't. Uh hmm. But about 50% of those are from gallstones, and gallstones are kind of the major risk factor for gallbladder cancer, of which there are an estimated 115,000 or so cases each year across the whole globe. Um, so that's my stats. Okay. According to most sources in the US there are about half a million cholecystectomies performed every single year. So that means Half a million [01:10:00] gallbladders get the bucket kicked.

EW: Whoa,

EAU: I know it's a lot. Right.

EW: Oh, I have a question. I don't know. Okay. Um, if you have a liver transplant, is the gallbladder ever come with?

EAU: I don't think so. No,

EW: Okay. I don't know why. Just curious.

EAU: An interesting question. I don't think so. No.

EW: Okay.

EAU: Great question. Do they take the gallbladder out? I don't. Oh, I feel like I ought to know more about this. So,

EW: Because they're like buds. They're like,

EAU: Yeah, they're buds. They're pals. There's a little pouch for it.

EW: Yeah.

EAU: Um, no. I don't know. Great question.

EW: I love that you abbreviated question. Great. Que

EAU: Listen, what are we doing in terms of research with the gallbladder? Great question. I don't know.

EW: Oh, okay. Okay.

EAU: Um, but I did find a really interesting paper. It was like real long and like deep in detail. So if someone wants to get deep into this, I got some sources for you. I underestimated just how important bile acids are. Um. How much of a role they serve outside of just digesting our fats. They're important in like intestinal homeostasis. They're important in like absorption, but if there's too much of them that makes it to the colon, they can end up causing diarrhea.

EAU: If there's not enough, you can end up with chronic constipation. So there's been like bile acid dysfunction implicated in IBS. They're affecting our microbiome. That might even affect the increases in risk in colon cancer, and we've seen a lot about colon cancer lately and increased risk, especially in young folks. That might have something to do with bile acids. We don't know, still up for debate. And there's just increasing evidence of bile acid's role in a myriad of other disease processes. And so there's research ongoing into using drugs that target bile acid receptors, either blocking them or activating them as potential treatments for a number of different diseases. We also do use bile acid sequestering, so that's like um, things that grab onto bile acids and help us to just poop them out rather than reabsorbing them. Um, mostly to treat elevated cholesterol, but we don't use them really often 'cause they have quite a lot of side effects, especially diarrhea and like bloating and things like that. Um, so yeah, none of that is very gallbladder specific, but it's

EW: I mean, but bile like,

EAU: and bile acids. So, So, interesting. so if you wanna read more, let us tell you about all of our sources.

EW: Yes. Um, if you wanna read more, about definitely something that is not gallbladder specific in any way, shape or form. There is a book called Passions and Tempers, and it's about the Humoral Theory of Disease by Noga Arika. And then there's a paper, um, which just has a few fun tidbits. Uh, it's a book chapter actually called History of Medical and Surgical Management of Acute Cholecystitis by Barry and Frank from 2015. And I've got a few more sources, especially on those, um, big gallstones and uh, you know, so Guinness Booker World Records get on this.

EAU: Yeah. Um, I also had a number of sources. I used primarily also a textbook chapter. It was from the textbook, comprehensive Physiology, and the chapter was called Functions of the Gallbladder. Surprise Surprise, um, uh, I also used a bunch of other specific papers to look at. For example, there was one from The Lancet in 2006 called Cholesterol Gallstone Disease. There was a JAMA review from 2022 called Acute Cholecystitis, A Review. I've got one on

gallbladder cancer, one on pancreatitis, a few others on bile acids, both the synthesis and their use in these other, like the other functions that they serve. You can find all of that on our website. This podcast will kill you.com under the episodes tab.

EW: I certainly can. Maria, thank you so much again for sharing your story. Yes,

EAU: seriously, thank you so much, so much for telling us that story and sharing it with all of our listeners.

EW: Uh,

EAU: really appreciate it.

EW: thank you. to Blood Mobile for providing the music for this episode and all of our episodes.

EAU: Thank you. to Tom and Lianna and Brent, pete and Jessica and everyone at Exactly right. For everything that you do to make this podcast possible. And

EW: Thank you. Uh, and thank you to you, listeners and watchers, fans of this podcast will kill you. Uh, we really appreciate the time that you take to, you know, just support the show by watching it's and listening. It's really, it means the world to us. We do this for you, period. [01:15:00] So let us know what you think of the gallbladder. What, what temperament are you, what, what, you know, hippocratic temperament or whatever are you. Let us know.

EAU: And a special shout out as always to our patrons. Thank you so much for your support over on Patreon. We, we really appreciate it. It means so much to us,

EW: We do well. Until next time. Wash your

EAU: you filthy animals.