

Radiology with Dr. Varshana Gurusamy

Ologies Podcast

April 16, 2018

Hiiii. It's your uncle's ex-wife who collects windchimes, Alie Ward.

You, fine listener, are a bag of chaos. Just organs and tubes. Fluids. Benign lumps. Squishy miracles. Let's get to know what's inside you. And me! And me. I've got all of that, too. But first:

Thank you. Thank you so much for listening to Ologies and thanks for telling your friends, and coworkers, and your tax preparators about the show. So many new people listening lately, and it's all thanks to you guys for yackin' about it. Thanks for supporting the show at Patreon.com/Ologies, too. This is a totally independent show that I just... make, and you guys help make it happen. Patrons are the ones who submit questions to the Ologists. You can get in on that action, you know. For a dollar a month! 25 cents an episode! Or more, if you want, but no pressure; it's your pocketbook.

Also, I just posted a 29-minute video on Patreon of me answering your questions about how the show is made, and secrets, and what's wrong with my hair. So, join. You can check that out if you want. You can also rep the show with shirts, et cetera, at OlogiesMerch.com, or you can support for a balance of zero dollars and zero cents just by tweeting or 'gramming. You can rate. You can review. You can subscribe on iTunes.

It's a well-known fact I am deeply creepy. I sit, I read all your reviews. I do. I'm like a tiny hairy vampire bat. I love them all. Like this one I just selected to read. I'm not gonna read the whole thing. Just some selections. KazalTX [phonetic] says:

I am a podcast aficionado. Because of a relaxed policy at work, I am able to listen to several hours of podcasts a week. And I listen to many.

That's a lot of podcasts. That's cool.

Amazing job, Alie. You put on an excellent product and should be very proud. The way you engage your guests is natural, funny and contagious. I've been listening to podcasts since 2007.

That's old school.

And I have a lot of podcasts I really enjoy. This is the first podcast I have ever written a review for.

The first one! KazalTX, thank you for writing the review. I appreciate it!

Okay. Radiation. It comes from 'radiare', which is Latin, meaning 'to emit light,' after the radiation involved in X-ray technology. But since X-rays were developed soooo long ago, we've got other

types of imaging, so radiology now essentially means (I'm gonna paraphrase): "medical technology that lets us gaze upon our disgusting wonderful guts and bones and stuff."

This Ologist, I'd met before through my very good pal Cara Santa Maria of the podcast *Talk Nerdy*. She's awesome. And I was over at Cara's house while this guest was in town, and I kind of pulled Cara aside and I was like, *[breathy, high-pitched and fan-girling]* "Do you think she would be on my podcast?!" And Cara was like, "Dude, she listens to *Ologies* already. She totally would." And it was like when you find out that your crush likes you back, except platonically, and instead of going to the prom she came over one evening and we sat on my couch to talk about lead smocks, and foreign objects being stuck in people's bodies, and me crying about brain imaging and DIY ultrasounds and very savage Ward Family pranks, and what kind of classic American hip-hop is best to listen to when you're 13 hours deep in images of brains and guts and just casually saving lives on a Wednesday.

She is a doctor doing a radiology residency. She's planning on a fellowship in Interventional Radiology. You'll find out what that is in a minute, and YOU WILL LOVE HER. Please lie back, stay still, or cuddle up under your heaviest blanket for radiologist Dr. Varshana Gurusamy.

Alie Ward: I ask you everything about your life and all of your secrets. That's not true. Okay. So now you live in Texas?

Dr. Varshana Gurusamy: Yes. I live in Houston.

Alie: Are you from Texas?

Dr. G: I grew up in Keller, which is a small town north of Fort Worth.

Aside: Dr. Varshana Gurusamy went to Baylor College of Medicine in Houston for her undergrad, and then she got a Master's in Texas. She went and did grad school and med school in Philadelphia, and then she headed to Texas, back to Baylor.

Alie: Were you excited to go back to Texas?

Dr. G: Yes, I really wanted to come back to Texas. My parents live here. I just wanted to come back. And I want to do Interventional Radiology and Baylor has a really strong reputation for that, so that's why I chose that program. But I'd always thought about coming back to Texas.

Alie: At what point did you know you wanted to do radiology?

Dr. G: So this is really interesting because I never wanted to do radiology. It sort of happened by accident. I went into medical school wanting to be a general surgeon and I was gung-ho general surgery. I did all the things for surgery.

I remember my very first clinical rotation as a third-year med student. I was on my pediatric rotation and we get to do a one-week subspecialty and I wanted to do it in surgery, in pediatric surgery. But the surgeon was out of town at this little hospital in Monmouth, in New Jersey, so they said, "Well, the surgeon's out of town, and you have to do it in radiology." And I was like, "Oh man, it's gonna be so boring. I don't want to watch people read these CT scans and X-rays. It's going to be terrible."

So I sat down at this workstation and there was a resident there, and he'd saved all these interesting cases. So, rather than have me watch him read scans, he let me work through these on my own, which was really interesting. And I should say, watching someone read or do radiology is kind of boring. It's like watching someone write a paper. They're going through the scan. You might not understand what they're doing, so it can be boring. But when you're doing it on your own, it's like figuring out a puzzle, like you're going through someone's body. It was awesome. So that kind of hooked me.

But I kept thinking about surgery and then I noticed on every clinical rotation I did, like, OB/GYN, and I really liked looking at the ultrasounds. When I was on surgery, I love that rotation. But we'd always go down to the radiology reading room and ask the radiologist about the scans in preparation for surgery. And I loved how the radiologists were such good teachers and they always took the time to go through everything. And I knew I wanted to teach; I really like that aspect of their medicine. But I knew I wanted to do something with my hands.

Sorry, this is a long explanation.

Alie: No, I love this!

Dr. G: So someone told me, maybe you should think about Interventional Radiology, where we use image guidance to do procedures, so that would marry the two things. I liked working, looking at images and I wanted to work with my hands. So then I did a rotation in Interventional Radiology and I totally fell in love with it.

Alie: Can you explain two things? What Is Radiology and what is Interventional Radiology? I know that you handed me a pamphlet with an old white dude on the front, but I'm going to have you explain it instead.

Aside: I was sitting in bed writing this episode. It's a Saturday. I'm not wearing pants. I haven't worn them all day. I wanted to describe the pamphlet that Dr. Gurusamy brought me, but it was in the other room, which was approximately fifteen feet away. So I spent upwards of five minutes looking for a .pdf of this same pamphlet online instead of just getting up. And finally I just got up and got it. So, it has an older white dude wearing scrubs on the front. There ya go. All of that, just to tell you that. Okay.

Dr. G: Radiology is the study of images, and making diagnoses based on images, and then using that to do procedures. There's sort of a misconception that radiologists just sit in a

reading room and look at their computers all day, and they don't ever see patients or other doctors. That's not true. They all do some kind of procedure. We look at four different types of imaging, mostly; ultrasound, X-rays, CT scans and MRIs. Those are the four main imaging modalities. There's many different subsets of radiology. So people specialize in neuroradiology where they may read brain CTs and brain MRIs. They specialized in that, or body imaging, which is everything from the neck down to the pelvis.

Alie: Is there a weird line in your neck where it stops being the head and it starts being the body?

Dr. G: No, there's definitely some overlap. Yeah, I know. It's a little like, "Oh, I can't do that. That's below the clavicle."

Alie: Right? Yeah. Like, what's the thyroid? The thyroid's like, "What am I?"

Aside: I guess your head is your skull and face and jaw. And your neck is part of your body. But then the whole thing is really part of your body. But if you think about your body, like, where does your body really end, given air and space and your microbiome? What is your body? Honestly? Y'know what? These thoughts are starting to spiral into things that a college sophomore staring at a blacklight poster would say, so let's just move on.

Dr. G: I mean basically we use images, a real time X-ray, ultrasound or CT to guide whatever procedure we're doing. So there's lots of different procedures.

Alie: Like, gallbladder removal and tumors and stuff?

Dr. G: We don't do gallbladder removals because that would be surgery, but we do put drains in gallbladders and patients that aren't healthy enough to go through a surgery. So we might divert their gallbladder and have that drain outside. But we do...

Alie: Where does it go? I'm so sorry.

Dr. G: Into a bag.

Alie: Does it really?

Dr. G: Yeah. If they're obstructed, and they need to like, you know... they can't have their gallbladder removed. Maybe they have gallstones, but maybe it's like a really sick 85-year-old and she can't get surgery or something. We might put a cholecystostomy tube in.

Alie: Or is it like tapping a Capri Sun?

Dr. G: Kinda! I should think about it that way. Because it would make it more satisfying.
[laughing]

Alie: *[laughing]* Just a bile flavored Capri Sun.

Dr. G: Mmmm. Delicious. *[Still laughing]*

Alie: Tap it! Drain it! Movin' on.

Aside: Let's backtrack and take a closer look at those four main imaging modalities—or the dark wizardry that radiologists use to stare into solid objects including your brain and butt.

Alie: Can I make you tell me a run through: The four different modalities? Ultrasound, MRI, CT scan and X-ray. I know that those are like just like breathing for you, but I only found out the difference between a CT scan and an MRI, like, a year ago.

Dr. G: That's like most radiologists probably when they started training!

Alie: Like I didn't know. I was like, which one uses X-rays? I thought radiology was only to do with X-rays, but MRIs and ultrasounds don't use actual X-rays. Right? So what is, like, what's the difference? Oh! And also, CT scans used to be called CAT scans, right?

Dr. G: Yeah. People still call them CAT scans.

Alie: What's the difference?

Dr. G: Nothing. Just like, an easy way of saying CT scan.

Aside: Side note: 'CT' stands for 'computed tomography,' and 'CAT' stands for 'computed axial tomography.' The 'axial'? It just refers to the way that the machine spins around you taking a bunch of X-rays as it goes. So, 'CT scan,' it's the up-to-date way of saying 'CAT scan.' It's a new easier phrase, with more syllables! CT! CAT! One's got two syllables! Anyway. Pay attention because this is radiology in a nutshell. This is how it works:

Dr. G: I guess within all the different specialties we probably use some variation, maybe, use more CT or MRI in certain specialties. I can go through how we generate those images.

Alie: Yeah!

Dr. G: So ultrasound basically is sending a sound wave and measuring the echoes back. And different tissues will send those sound waves back at different speeds and then we use that to construct an image. So that's like, briefly, ultrasound.

And then X-ray... X-rays are just like one part of the electromagnetic spectrum. We send X-rays from a source through the tissue. And then tissue, depending on how dense it is,

will attenuate or stop the beams. Bone is very dense. It tends to stop a lot of the X-ray beam, where something that's air-filled, like the lung, would let a lot of X-rays pass through it. Then all those X-rays are sent to a detector and then an image is generated from that.

And CT scan is like an X-ray, but it's like a moving X-ray, and it's two dimensional. So that's how they reconstruct that image.

Alie: A CT scan kind of revolves around you? So it's like an X-ray that does loop-de-loops in a spiral around you.

Dr. G: Exactly.

Alie: And then it creates kind of, like, a 3D image of your inside guts?

Dr. G: A 2D image that we can scroll through, or step through. Like, looking through your feet up through your body.

Alie: *[Gasp]*. And then MRIs are magnetic?

Dr. G: Yeah. Most tissue in our body is made up of water, and water has a lot of hydrogen atoms. So an MRI generates a magnetic field and we measure how the hydrogen atoms spin and what's their angle relative to this field. And we use that to generate an image. So that's different from CT and X-ray in that it's not ionizing radiation. It's not, you know, causing radiation. It's just a magnet that's sending a pulse.

Alie: Which is crazy to me. I had to learn what an MRI—the difference between a CT scan and MRI—for a shoot. I was in the hotel room the night before. I remember being like, “Wait, wait, wait. All of your hydrogen atoms in your body line up?!”

Dr. G: Yeah. We send a pulse to line them up, but then we see how they, like, fall down or the speed or angles at which they fall down.

Alie: How come you can be in the MRI tube, all of your hydrogen atoms are lining up like soldiers, and it just is like *[sing-song]* doopty-doop-doop?

Dr. G: And you don't die? Yeah. I don't really understand the physics of that yet. That is something that I'm still learning in my training.

Aside: So, essentially, your body has tons of hydrogen atoms like, water, fat, lots of hydrogen. So, we're made of maybe 60% hydrogen, and hydrogen has an unpaired proton which also has a magnetic spin. So when you have a strong magnetic field around you, like an MRI machine, these hydrogen atoms respond by lining up.

The machine throws out radio frequency pulses too, which causes the protons to spin again in the other direction, and that energy change can be detected by imaging

equipment to figure out how dense, and what kind of tissue you've got going on. This whole process makes a sound like a foghorn and a car alarm had a lovechild that had a lot of opinions. *[noisy whirl of MRI machine]*

That is very, very, super, super nutshell and not textbook. Don't @ me. That's just the basic, "what the hell is happening" of it in case you're ever in the clangy tube getting peeped by magnets.

Alie: Have you ever had to get medical imaging done for yourself?

Dr. G: Yeah, I have. I tore both of my ACLs, so that's probably why I used that as an example earlier.

Alie: What?! What happened?

Dr. G: Yeah, doing dumb stuff.

Alie: What kind of dumb stuff?

Dr. G: I played intramural basketball in college and I tore my right ACL then. And then I played flag football in med school for, like, five minutes and tore an ACL.

Alie: I thought people in college who played flag football were only in Zima commercials. Like, they were only in like beer commercials of, like, a happy, amazing group of college people just having fun out on the field.

Dr. G: Yeah. Had to hang up the cleats after that. I've had those MRIs done and the magnet's noisy! And even for someone who was... I wasn't in radiology residency at the time; I was in medical school, but even someone who is medically literate, it was kind of scary.

And it's weird; it's noisy. You don't know what's going on. You're in there for 45 minutes. But it gave me some perspective on what it's like to be a patient in that magnet and maybe getting a brain MRI, how much scarier that would be when something's around your brain.

Alie: What kind of tools do you have to have in your pocket psychologically to help patients? Because I mean, TMI, but I had to get a brain MRI last year, and my mom has MS so I'm familiar with brain imaging, and it's kinda scary. But I had to go in because they thought maybe I had a brain tumor, like a pituitary tumor. They were like, "Let's check it out." So I was like, "Ok, well I'm just going to go by myself. It's fine." And I got to the hospital and as soon as I checked in I started sobbing. I... Totally, totally unexpected. I was just like, "Hey, wha—" *[cartoonish sobbing]* And then the radiologist was like hugging me...

Dr. G: Oh, good!

Alie: ...like, wiped mascara off my face. She's like, "You're gonna be fine, you're gonna be fine..." Because it's just like, you're right in the threshold of knowledge you might not be prepared to take.

Dr. G: Yeah, definitely.

Alie: Like how do you... Do you ever see patients just fucking lose it?

Dr. G: All the time. And I'm so glad to hear that a radiologist was able to comfort you before getting the scan done and everything.

We can... for people who are really anxious, we can sedate them. We can give people valium and help them relax. But I think just talking to someone and explaining what's going to happen and how we're doing the MRI is really helpful.

And a lot of times people will give you headphones to listen to. They probably didn't do that because you were getting a brain MRI. With my knee, I remember they did. So it helps drown out the sound of the magnet. In pediatrics, sometimes they give kids these little glasses where they can watch a movie to help distract them. So we have those kinds of tools to help patients go through these scans.

Alie: If you have some shit going on that's not good, particularly with like neuroimaging, do you ever have to have a poker face where you're like, *[overly formal]* "Okay, see you later, Mrs. Wilson." And then you're like, "Ooooh wow, she's screwed."? Because I think that's always what's so scary when you're getting diagnostics done as a patient is how long 'til I find out.

Dr. G: Right.

Alie: And if it's something's wrong, will I find out now or will I just go about my business for two days? You know what I mean?

Dr. G: Typically when we're reading the scans we're in a reading room that's dark with these huge monitors and we're far away from the patient. So we don't always get to... I mean, we usually don't get to tell the patient like, "Oh, I saw this and I can tell you immediately." We read it, and we dictate a report, and it's sent to the electronic medical record. And then your primary physician may tell you. But when we're in the ER, when we're reading emergent scans in the ER, if we see something emergent, we'll call the physician immediately and they'll tell the patient. But when we're in that diagnostic reading room we don't get to communicate that to the patient.

Alie: Right. Cause there's sooo many protocols steps that I'm sure It has to go through.

Dr. G: Yeah. And there's just so many studies, like we're just crushing studies.

Alie: Oh my god. You can't pop up like a gopher and be like, "Hey, whoa! Go to Disneyland tomorrow, man."

Dr. G: Seriously.

Alie: "Live it up."

Do you have friends that text you pictures of the inside of their guts and be like, 'hey, have a look at this'?

Dr. G: All of the time.

Alie: Really?

Dr. G: All the time! And not just like the inside of their guts but, like, rashes and stuff. And I'm like, "Man, I'm not a dermatologist!" or just: "My family member has this, like, weird... she's getting nauseated every time she eats chips." I'm like, "I dunno!" Like, "That's not my job!"

Alie: Do you ever see someone out and about like, in line at the grocery store or on a plane or something, and you're like, oh, I could definitely tell that they have like a certain condition that they may or may not know about?

Dr. G: Yes. Yeah. Sometimes we'll see people that are, like, really short of breath, and they have really edematous legs.

Aside: PS: 'Edematous' means, casually: 'kinda squishy because of retained water.' So next time you feel bloated, just say, "My, my myyy! I am an edematous *fox* today!"

Also, this is not really a joking matter, because, please take care of yourself for real.

Dr. G: I'm like, they probably have congestive heart failure or something. You know. just like stuff that we saw a lot of in medicine.

Alie: Would you ever tell someone?

Dr. G: No. No, I don't think I could.

Alie: Yeah, that's not really legal, huh?

Dr. G: Yeah. That's probably crossing some line.

Alie: Someone's like, "I'm just here to watch the boat show. Like, what are you doing?"

Dr. G: "Just let me live my life."

Aside: So what else does Dr. Gurusamy, working as an interventional radiologist, do?

Dr. G: So, I'm so excited about, like, the neurointerventional radiology that we do. It's AWESOME. We do a lot of spine injections, like I was talking about, but we do endovascular work, which means we work in the blood vessels. Which is a lot of what interventional radiology is. I can just give you an example of a really interesting case. We had a lady that came in, she was about 60-something. Came in with acute left-sided arm and leg weakness and left-sided facial droop, so she's probably having a stroke.

Alie: A stroke. Yeah.

Dr. G: So she comes in to the ER. She gets a head CT, that's what we would do right off the bat.

Aside: So they ordered a CT scan where they injected contrast to look at the blood vessels to see if there's a clot causing her stroke. And one of the diagnostic radiologists saw something that looked a liiiiittle *funky*.

Dr. G: I was on call that night, and I called my attending, the neurointerventional radiology attending. And we brought this patient into the IR, interventional radiology, suite. We went in through an incision in her groin, which is what we do for a lot of interventional procedures.

So, back in the day when you did surgery, you would open the patient totally up, but interventional radiology is going through vessels, making a small incision, and using X-ray guidance to know where you're going.

So we go on through her right femoral artery, we're going up to her aorta, up to her internal carotids. I'm looking at the vessels in her brain by injecting contrast and taking real time X-ray, like I was talking about before. Contrast is going into a certain location and then it's just not going past that, so we're thinking that's the area of the thrombus, that's what's causing her left-sided weakness. The blocker's on the right side and it's causing the left-sided weakness. So we put another catheter up through the vessel, all the way up there, and it's kind of attached to a little vacuum...

Alie: Whoa.

Dr. G: And we sucked the clot out.

Alie: *[cheering]* Wooh!

Dr. G: And right after the procedure we asked her to move her left arm and leg and she could. It was SO cool. That was one of those moments where I was like, "This is why I'm a doctor." It was so bad-ass.

Alie: That's, like, the most heroic version of unclogging a drain ever. You know what I mean? You're like, "Boop! Got it!"

Now, where are you while all this is going on, are you six feet away? Are you across the room? Are you operating a robot? Like, how are you imaging while operating?

Dr. G: We're right there. We're standing right by her groin. We're using that access to manipulate wires and catheters up to her brain, and there's an X-ray, and that's like over her head or neck.

Alie: So it does seem like surgery as well as radiology, like, how is it not... in terms of the nomenclature, how is it not "radiological surgery" as well, you know what I mean?

Dr. G: Yeah. I think it's not surgery because we aren't cutting the patients open and we're just making a small incision. I like to think of it as image-guided minimally invasive procedures. Because when this woman came out of her procedure, she just had a little Band-Aid on her groin, like a one-centimeter incision and we were like, we were just up in your brains sucking a clot out.

Alie: *[gasps]* That's NUTS. I just feel like if the guy that trims your gums is an oral surgeon, like what you do is surgery, you know what I mean? Like up in there through the brain, just like, boop-a-doop!

When you were a kid, were you ever a fascinated with X-ray glasses or invisibility cloaks or anything sci-fi like that?

Dr. G: No, I don't think I was! That's so interesting. I was really into blocks and building. And my mom said that they never brought me Barbies because I was never interested. And people would come to visit and I got like one or two as a child growing up and I took their heads and legs off and she was like, "Alright, Jeffrey Dahmer. No more Barbies for you." *[laughs]*

Alie: If it makes you feel any better, we had Barbies and once my sister and I read about Joan of Arc, and we were so inspired that we cut off our Barbie's hair and burned her at the stake in the yard. And I remember my mom came out to be like, "Rice-A-Roni's read—WHAT ARE YOU DOING?!" We're like, "She's Barbie of Arc!" *[laughs]*

Dr. G: That's awesome! *[laughs]*

Alie: We took a Ken head and put it on a snake's body once, put it in the freezer. The '80s were a weird time. *[laughs]*

Dr. G: They were a weird time.

Alie: But do you feel a little bit like a detective? Like do you like puzzles and mysteries?

Dr. G: Yes. That was what really attracted me to radiology is I loved the puzzle. Every scan, every X-ray, is a puzzle, and you just do that all day. I thought it was so fun. It's also mentally exhausting.

Alie: Really?

Dr. G: Yeah, like I leave every day feeling like I just took the boards or an exam, because it's so tiring, but it's sooo fun. It's just never boring.

Alie: Do you do a lot of it real-time while the patient is kind of in the bay getting the scan or do you get it and then spend two hours looking at everything slice by slice?

Dr. G: It depends. If it's something not urgent, like an outpatient, you know, shoulder or hip MRI, we may do that later. It may take a couple of hours. For things that are emergent... Like, someone comes in, a motorcycle crash, and they get a head-to-toe CT. We're reading that very quickly within minutes. So the patient will come in, and they'll get scanned in the ER scanner, and the trauma team will walk in as the CT is being done. And so they'll expect you to go through it real time with them very quickly. And that's kind of where you grow up in radiology. I remember doing that rotation as a first-year resident and I was like, "Oh no! I don't want to look stupid in front of the whole trauma team."

Alie: For real. It's, like, time's a-tickin'.

Dr. G: Yeah, exactly. Time is tickin' and what you say is important for their operative plan. So we'll go through the scan quickly and just point out the big stuff: liver lacerations, broken bones, things like that, where we think bleeding may be coming from.

Alie: Have you, based on your work in imaging, decided that you're never going to ride a motorcycle?

Dr. G: Yeah! I'm NEVER riding a motorcycle. Like, that's crazy! These people come in with the worst pelvic fractures. We're always like, why do people keep doing this?!

Alie: It's like, I would not sit on the top of a car.

Dr. G: Yeah.

Alie: Why would I just, why... It's like driving a car, but without the car. I get it. It's quick. It's... the fuel economy's top-of-the-line. But I just had a boyfriend that rode a motorcycle and I was like, every time I'd be like, "Well, if you die, goodbye now." Like, it's sooo dangerous.

Dr. G: They get just gnarly pelvic fractures. We had one guy who we were doing an embolization on for his pelvic bleeding and he also had a very severe degloving injury of his thigh.

Alie: *[cartoonish vomit noises]*

Dr. G: Which, if you don't know what degloving is, it's like kind of what it sounds like, but it's like your skin and your muscles being like just peeled off.

Alie: That's going to be no for me.

So do you have a strong stomach? Because if you are willing to go into surgery... Like, I can barely salt raw chicken without breaking down and crying. Like, how do you... what kind of stomach, or what kind of resolve do you have to have in order to put someone who might be hamburger meat on a slab?

Dr. G: I think a lot of us have really strong stomachs. I think a lot of surgeons do. There's only one thing that grosses me out and it's the sound of spit in your mouth. When someone's intubated and they make the spit noise, I'm like *[gags]*.

Alie: That's the only thing?!

Dr. G: That's the only thing. *[laughs]*

Alie: You Capri Sun a gallbladder, but, like, saliva grosses you out?

Dr. G: Saliva grosses me out. Like, I can deal with poop and pee and blood—just like blood everywhere—and I can't handle spit.

[gagging noises]

Alie: Varshana's like, "Bye-bye. I'm out." Oh my god!

Oh, I had another question. I'm going to have to cut this out because I can't re—. Oh yeah. So, I had a boyfriend, he was telling me this story. Before I met him he got into a car accident. Rear ended, and he had to go in... He was messed up, like he lost a tooth, his neck and back were all messed up, right? So, he went and he had to get an MRI—I think it was an MRI, not a CAT scan, whatever—and he was in bad shape.

But he found out how much it was gonna cost without insurance and he went outside and threw up, just from stress. I think it was like \$13,000 or something. Why is imaging so, so, so expensive?

Dr. G: The machines are very expensive. They cost, like, millions of dollars, and the time that we use the machines is very valuable. So that's why. I don't know why an MRI costs, like, \$5,000 or \$10,000. I don't know how it gets assigned that number.

Alie: I think it seems worth it just to purchase your own MRI just in case you need it.

Let's talk about ultrasound goop.

Dr. G: Okay.

Alie: What the hell is that stuff?

Dr. G: The gel?

Alie: Yes!

Dr. G: The gel helps create an interface between the ultrasound transducer and your body, because air doesn't let sound travel very well through it. So we use the gel to help the sound waves go to the body and come back.

Alie: What is the gel?

Dr. G: I don't know what's it's made out of. *[laughs]* I should look that up. It's just ultrasound gel.

Alie: It's made out of elf tears. You always see that in TV shows where, like... this, like big...

Dr. G: This blue goo...

Alie: Yeah. This big farty goop of like *[fart noise]* on a pregnant belly.

Dr. G: Oh yeah. And it's always cold.

Alie: Always freezing. I've gotten an ultrasound on my thyroid before and they're like, "Goop it up!"

Aside: What is the goop?! What is the goop? She emailed me later to say: "I asked, like, four radiologists what this was made of and no one knew. So I felt better about myself."

So then I went, I did a little more digging. Your buddy. Your pops, AW here. I found out that ultrasound gel is polyacrylamide and it's made up of glycerin and propylene glycol, a bunch of stuff. But I stumbled on this one forum where someone was asking what to use if you run out of it. And folks were chiming in that aloe vera gel or lotion works for their home doppler machines.

And then I was like, "What?! Some people have ultrasound machines at home?! I don't even have a dishwasher!" Anyway, I guess to check in with fetuses and get a jump on parenting?

Tom Cruise apparently was doing ultrasounds on Katie Holmes and baby Suri Cruise. The American College of Radiology DID NOT like it. One Yale doctor threw the following shade: "If Mr. Cruise and Ms. Holmes want their child to be a film star, they should wait until it is born."

I hope that Yale doctor also does skin grafts because that was *[high-pitched]* a sick burn.

Alie: Oh, I have a question. You know those airport X-ray machines?

Dr. G: Oh. Yeah.

Alie: They're always like, "Don't worry, it doesn't do anything to you." And I'm like, "You're looking inside of my body to see if I'm smuggling any, like, drugs or weaponry."

How much radiation do those airport scanning machines have?

Dr. G: That is such a good question. I love this question about radiation dose. The background radiation that you're exposed to just by living and doing your daily activities is about 3 millisieverts. And a sievert is like an SI unit that we use to say, like, if one sievert is equal to a 5.5% chance of getting cancer.

Alie: Okay.

Dr. G: So now we're talking about *millisieverts*. So 3 millisieverts is just your background exposure to radiation. Just, like, walking around doing what you do.

Aside: Quick aside: What exactly is radiation, and where does it come from? So, it's defined as the emission of energy as electromagnetic waves or as high-energy particles that cause ionization.

What is ionization? I looked this up, and am reading it verbatim. It's when an atom or a molecule acquires a negative or positive charge by gaining or losing electrons to form ions. So, do what you will with that information. It's none of my business.

So there is background radiation we experience every day just from space, and the sun, and uranium in the soil, etc. But in the case of the airport scanners, it's said that they're about 0.02 microsieveverts per scan. That's what they thought. But then it turns out that technicians were just measuring them wrong. [*Homer Simpson's D'oh!*]

The good news is it might only be a tenth of what they thought it was. They took ten measurements and a lot of them forgot to divide by ten. Okay, guys.

But I also went and looked at scans to see what the people at the airport are looking at and they can TOTALLY see your junk and boobs and stuff. See all of it. Anyway. Speaking of boobs:

Dr. G: And something like a mammogram would be like 0.4, millisieverts. So, the equivalent to like six or seven weeks of daily radiation, which is nothing. I know people always worry about getting exposed to radiation when they get a chest X-ray or a CT scan. But when you think about what you're exposed to daily, it's not that much, and we're talking about millisieverts and 1 sievert would be a 5.5% chance of getting cancer.

Alie: What if I travel a bunch and I'm going through those things all the time on airplanes all the time?

Dr. G: A cross-country flight in an airplane is like 0.03 millisieverts or something like that. That's the background radiation that you'd get. So all this radiation... You have to get exposed to a certain amount of radiation before you would maybe get something...

Alie: Start to cook your own body.

Dr. G: Right.

Alie: What happens when you're exposed to radiation, like, what's the risk here? Is it changing your gene expression? What's going on?

Dr. G: Ionizing radiation, or UV radiation, causes breaks in the DNA. And your body has ways... Your cells have ways of repairing that DNA, but sometimes it doesn't. The DNA just gets wonky and it's replicated in this, like, wonky state, and that's how you get cancer. So that's how radiation would cause cancer, but you'd have to get exposed to a significant amount for that to happen.

Alie: Okay. Good to know. That puts me at ease a little bit. And the other thing is about the airport scans is you can always opt out and then you get like a free...

Dr. G: Or you get the full...

Alie: You get the massage.

Dr. G: Yeah.

Alie: And if you've been traveling and you're a little lonely and then someone just comes and caresses your back looking for weapons.

Dr. G: I've had that. I didn't refuse the scanner. They just were like, "You're getting the pat down." And I was like, "All right. Whatever."

Alie: I saw a guy get a pat down the other day and he just willingly dropped his pants and they were like, "Sir, sir, you can keep them on." He was so indignant that he was getting patted down and he was like, "Have a look! Look at everything!" And they're like, "Sir, please."

Dr. G: I like how they do the back of the hand. Like it's less invasive, like when they're rubbing your vagina. I'm like, *[resigned]* "Okay."

Alie: They're like, "I can sense less. But just enough."

Dr. G: I feel slightly less violated, I *guess*.

Aside: If you listened to the gynecology episode, right now you're thinking about vulva taxonomy and I'm proud of you for that, kiddo.

Alie: On a first or second date. I only let someone touch me with the back of their hands.

Dr. G: Don't be giving me that front hand. *[laughs]*

Alie: No front hands 'til marriage. *[laughs]*

Okay. I have questions from listeners. Okay, are you ready for rapid fire?

Dr. G: Oh my goodness.

Alie: You can take as long as you want to answer these. I call it rapid fire, but I never hold anyone...

Dr. G: Okay, good.

Alie: Gary Jungling [ph.] wants to know: Are radiologists always afraid of becoming sterile or getting cancer? That is like right to [the point]...

Dr. G: That is a good question!

Alie: Good question.

Dr. G: So, being exposed to radiation is an occupational risk, especially in a field like interventional radiology where you are exposed to more radiation than a diagnostic radiologist.

Alie: Why is that?

Dr. G: Because you're using real time X-ray, like what I was saying. So you're standing next to the machine that's producing the X-rays. So we wear lead suits, we wear a lead thyroid collar.

Alie: Woah.

Dr. G: A lead vest and a lead skirt, and that helps reduce some of the radiation. We were leaded glasses.

Alie: Wow.

Dr. G: So we all leaded up.

Alie: What about lead poisoning?

Aside: I wasn't sure if I was being paranoid, so I looked into it. And last year the American College of Radiology published a paper that minced no words. This was the title: *Lead Aprons Are a Lead Exposure Hazard*. Dang. Okay.

So they collected 172 lead garments worn by radiologists and they took down the age and the appearance (of the aprons, not the radiologists.) Anyway, 63% had detectable lead dust on the surface. And the shittier the apron looked, the more lead dust was typically found. Interestingly, garments kept on hangers had *fewer* positive lead tests. So, maybe you need new lead garments.

I found a site that has a whole catalog and it was very fetching; different patterns, different colors, skirts, thyroid collars. And even things called 'gonad shields' which resemble large eye patches. So keep your radiation garments lookin' fresh and un-hazardous.

You can replace old ones or hang them up in a fashion that would make even Mommie Dearest proud. [*Faye Dunaway as Joan Crawford in Mommie Dearest: "I buy you beautiful dresses, and you treat them like they're some dishrag!"*]

But no matter how you hang 'em, those lead blankets? They're heckin' comfy, right?

Alie: Whenever they put the lead blanket on me at the dentist, I'm like, "This rules. Never take this off."

Dr. G: Oh, it's so like heavy and comforting.

Alie: Like they sell those anxiety blankets when you're like, "I could just go to the dentist and hang out there all day."

Dr. G: I find the lead very comforting, too. Because it's just like, you know, it's just fitted to you. But when you're in these procedures for really long and you're wearing a sterile gown and mask and gloves and everything over it, you can sweat a lot.

Alie: So you might get stinky but not sterile?

Dr. G: Yeah.

Alie: So do radiologists worry about that? Or do you feel pretty well protected?

Dr. G: I feel pretty well protected, but we wear radiation badges that measure how much radiation we're exposed to. So you'll get a warning if you've been exposed to too much radiation, and we can reduce the amount of radiation we're exposed to not just by wearing the lead but by also imaging smaller parts of the body.

Alie: So you take a lot of precautions.

Dr. G: We do.

Alie: Okay. Good. Meghan C. Great question, Meghan. Weirdest thing they have seen inside someone?

Dr. G: Man, this is such a good question. We actually... people like to talk about the things that patients put in their butts. I think the weirdest thing... I've not seen anything super weird. Someone had a rolled... One of those, like, old-school rolling deodorant things.

Alie: A roll-on?

Dr. G: Yeah.

Alie: Like a wet... like a Ban roll-on?

Dr. G: Yeah! They use 'em for butt stuff now.

Alie: Woah... That's butt stuff!

Dr. G: Yeah. But I mean people... I heard about someone who put a beer bottle in there, like a Corona.

Alie: Man, you can Amazon Prime anything you need these days pretty anonymously.

Aside: After this interview, the Doc and I exchanged a series of text messages from radiology textbooks and I honestly... I don't know where to start. I will say: PSA; if you would like to experiment with pleasures involving forbidden orifices, hit up Amazon Prime. Free shipping. Get yourself something rubber.

I was treated to photographs that looked like a gauzy human body was being haunted by the ghosts of a beer bottle. Or, as one text message from another radiologist said: "Beer bottles are child's play. This is a 1979 Left Bank Bordeaux." Which is a wine... bottle. Y'know what I mean.

The most common "improvised rectal foreign body," as medicine politely demurs, seem to be containers that once held alcohol. What are the chances? Gatorade bottles, 2-liters of Mr. Pibb, they just don't seem to incite insertion experiments quite in the same fashion. But still, one X-ray image entry on a radiology site (and yes. I googled some. One was called Radiopaedia) reported that aerosol cans are a relatively common improvised rectal foreign body.

And in this one—just stunning—illustration of X-ray vs. CT scan imagery. Oh my god. I was sent a photo from one super-famous case that involved a synthetic human fist—this is a forearm up to the elbow—that had just simply gotten away from someone. Just, slipped out of reach up there.

In the X-ray, it's blurry and faint. It takes a minute to see it and get your bearings. Kind of like a faded superimposition. By comparison, on the CT scan, it's like watching a 3D I-MAX documentary about fisting. I'll put it on the Patreon page for the truly curious.

No matter what, the lesson here is just don't opt for the items that shatter, okay?

Alie: Corona long necks are like, "Don't look at me man. That's not what I'm here for."

Dr. G: Exactly.

Alie: "I am to deliver beer to your mouth." Have you ever seen anyone swallow anything weird? Like car keys, or...

Dr. G: Yeah. We did x-rays on a patient that swallowed razor blades. She swallowed parts of a spoon.

Alie: So first intervention is getting those things out, right?

Dr. G: Yeah. Especially like something like a razor that's gonna, you know, be cutting things on its way down.

Alie: Do you have to go in and do, like, laparoscopic surgery? Where does that go? How do you escalate a case?

Dr. G: So, I mean for us, we would read the X-ray and we'd be able to tell the surgeons where it was, or maybe the GI physician who would go down and scope it and try to fish it out.

Alie: *[gasps]* That seems— What do you do? Put a magnet on a string?

Dr. G: I don't know.

Alie: Yeah, so don't swallow the stuff guys. Jordan asks this really dumb question: Why do certain types of ultrasounds feel so uncomfortable, particularly abdominal and pelvic ones?

Dr. G: Because sometimes we have to push down really hard to get a better picture. So you might feel a lot of pressure when someone's pushing on your stomach or on your kidneys.

Alie: The other thing is if you're ultrasounding something, chances are there's something funky going on down there.

Dr. G: There's something that brought you there. Also, ultrasounding your bladder's uncomfortable because it makes you feel like you have to pee.

Alie: That's true. So has anyone ever peed on a table?

Dr. G: Not with me, but I wouldn't be surprised. We also ask, when we do pelvic ultrasounds, we ask patients to have a full bladder. And we may give them fluids or have them drink a lot of water because air is not a really good medium for allowing sound waves to pass. So, fluid in the bladder gives us a good window. That's like another trick or whatever.

But it's really uncomfortable when we're looking at your uterus and we're pressing on this full bladder. I've had a lot of patients who are like, "I really need to pee, I need to pee, I need to pee, I need to pee." And I'm like, "Just hold on! Please!"

Alie: You're like, *[creepy witch voice]* "That's the point. It's working out just as I want it to."

Jennifer Buz asks: Do you ever harness the radiation in your work place for your own purposes? For example, leaving your pet tarantula next to it and then coaxing it to bite you, making rocks glow, et cetera? Also, do you ever wear the lead shield just for fun or for exercise?

Dr. G: Man, I should wear that lead shield for exercise, like go out for a little run with it.

Alie: Up and down the stairs in the hospital.

Dr. G: Yeah, that would be nice. No, I've never done that. And I mean I don't think we use enough radiation to do anything really exciting.

Alie: To become a superhero or anything? No?

Dr. G: No.

Alie: I guess it's kind of illegal.

Dr. G: Probably.

Alie: Harrumph. Well, Jennifer Buz, if she does do that, then she didn't get the idea from you. Bob wants to know: What kind of fun, cool things have you scanned after hours?

Dr. G: Oooh... I don't do that. We're not allowed to.

Alie: Would they know? Would they'd be like, "Wait a second. This MRI has been used 12 times today. Not 11."?

Dr. G: Oh yeah, they would definitely know. To do that, we'd have to put it under a patient and that would be medical fraud.

Alie: So, it's not like using the microwave.

Dr. G: Yeah. So I haven't done that. Sorry. That's not interesting.

Alie: You've also never been to jail.

Dr. G: That is true! *[laughs]*

Alie: Jack Keller wants to know: Why are we still using such old technology? Isn't there something more modern that's less dangerous?

That is a little bit of shade thrown an X-rays.

Dr. G: Daaang.

Alie: I know. Just debating here.

Dr. G: Yeah, I like it. I mean they've been around forever. That's true. X-rays have. But they're still good. It's a little bit of radiation. Just getting a chest X-ray gives us a lot of information about a patient, and we can use that as a screening tool to get more advanced imaging, like a CT, or an MRI, or decide if the patient needs a procedure. Yeah, these things have been around forever, but they work, and they're safe.

Alie: What do you think about the history of X-rays, where... Didn't Edison try one on an intern and ended up killing him? He tried it a million times. Have you heard that story?

Dr. G: No, I haven't. I probably should've, but I know about like Roentgen who invented the X-ray and the first X-rays of his wife's hand and you can see her ring.

Alie: Oh! That's cute.

Aside: Was it cute? Well, William Roentgen, the German man whose name I probably just mispronounced, in 1895 discovered and named X-rays (after 'X,' because it was an unknown ray for radiation) made the first medical X-rays of his wife's hand. And it looks kind of like a fuzzy X-ray. You can see she's wearing a ring in it. And upon seeing it, she said, "I have seen my death." But I don't know... Germans are so goth.

As for Edison's history with radiology: Clarence Madison Dally was an employee of Thomas Edison, and after many, many, many, many experiments with X-rays he developed carcinoma on his hands, then arms, and despite amputations, died. Thomas Edison was quoted in 1905 saying, "Don't talk to me about X-rays, I am afraid of them." So, he was like, "I don't fuck with X-rays."

Of course, this was early on, while we were still riding donkeys to work and indoor plumbing wasn't really a thing, and we didn't know a bunch of stuff. Anyway. Moving on!

Alie: April wants to know: Is being big-boned really a thing?

Dr. G: Oh. Hmmm. Yeah, I guess some people have bigger or more dense bones. I mean you can find this out if you've got a DEXA or bone scan. But whereas, you're just big boned, you're not fat, I don't know about that, like, this subcutaneous tissue doesn't lie. Like, if there's a lot of tissue there, it's not yo' bones.

Alie: I guess, could you say, “I’m just ample with subcutaneous tissue.”

Dr. G: Yes. I have an abundance of subcutaneous tissue.

Alie: And *that’s* why my bathing suit doesn’t fit.

Dr. G: You’re welcome.

Alie: Which, I’m in that. I mean, both of us...

Dr. G: That’s why my pants split this week. Hashtag ‘diet starts on Monday.’

Alie: Both of us, I feel like, are speaking from a place of ripped pants, so we are not throwing shade. We get it.

Aside: For the sake of transparency, I’m just going to come out with it. The week that we recorded this, both myself and Dr. Gurusamy—separately, totally randomly—had wardrobe malfunctions involving trouser ripping. She, as she got into an Uber in nice slacks, and myself, as I foolishly tried on jeans that I had not worn in some time. *[Crowd cheering, Alie as referee over stadium loudspeaker: “Trousers: 0 points. Subcutaneous tissue in the lead with 2 points.”]*

Alie: Greg wants to know: Where are we with 3D printing and AI integration as tools for radiology today? Like, how much improvement in medical imaging technology can we expect within the next couple years?

Dr. G: I’m so glad he asked this because we were talking about AI, artificial intelligence, at this conference. We use some computer-aided detection or some form of artificial intelligence now. Especially in mammography, we use something called CAD, computer aided detection, to help us find lesions in breasts, like masses that we may not see, just like little tiny things. That’s just a tool that the radiologist has to make sure they’re being very thorough and looking at everything.

And that’s probably what we started with and now we’re expanding that to looking at things in chest X-rays and CTs. But this talk that I went to today was from... what these radiologists in Stanford were talking about, was that they won’t replace radiologists necessarily. It may notice that something’s wrong, but you have to use the context. You have to know the medicine and understand what the meaning of that finding is. So these are all just tools, but they are definitely changing the way that we read scans.

Alie: Is it kind of like you can be a writer and spell check helps, but that doesn’t make you a writer? It’s a tool, but not.. you can’t rely on it.

Dr. G: Yeah, something like that. And I think those algorithms for recognizing... you know, findings in imaging are just getting better and better.

Alie: Do you have to consent to have your images put in that database?

Dr. G: I think so. I think they must. Yeah.

Alie: I think that's nice though. I mean, you know, if it can help someone else.

Dr. G: Your contribution.

Alie: Yeah, y'know. Put your guts in the library. In the "gut-brary."

Carolyn Steele wants to know: I had a hip arthrogram last year and found out afterwards about Chuck Norris's wife, and the gadolinium toxicity thing. Is this madness or should I be concerned? I want you to know, by the way, I, Alie Ward, don't know what most of those words meant.

Dr. G: That's fine.

Alie: Gadolonium [sic] toxicity and a hip arthrogram...? I do know what Chuck Norris is, but address that.

Dr. G: So gadolinium is the type of contrast that we use in an MRI, so we didn't talk about this earlier when we talked about imaging, but we use contrast to help opacify, or make the blood vessels more dense, or the tissues that are being fed by blood vessels may look brighter on a scan. There are people that may not respond well to gadolinium. It's processed by your kidneys and eliminated by the body through your kidneys. So if you have kidneys that aren't functioning well, that puts you at a greater risk. And some people can get toxicity from gadolinium even though they didn't have problems with their kidneys. So, this is just a very rare risk.

Aside: Chuck Norris and his wife Gena are suing—get this; I just looked it up—for 10 million dollars! Also, then I went down a rabbit hole about Chuck Norris trivia. Brazilian jiu-jitsu black belts, which he has; tooth veneers, which he also has. Mustache memes. But then I hit some stuff about political affiliations and it stopped being fun.

Anyway. As long as we're on a down beat, this episode was recorded a few weeks ago [*sighs*] and this next question comes from a Patron, and an Ologite, and internet friend of many years who I just found out passed away suddenly today. I'm so sad to hear it, I know he loved when I read his name and his questions. He loved the show. He was an awesome friend to the pod, so please raise a glass and send some good cosmic vibes to his wife, Chris.

Alie: Brian Edge wants to know: Are people too worried about the side effects from imaging?

Dr. G: No, they're not too worried. I think that people just don't know. And I didn't really understand... I couldn't really quantify how much radiation I was being exposed to from an X-ray versus how much I was being exposed to just by living my life. So, I think that's

a really valid question and I like when patients ask that and we can explain it to them, and I feel like we can dispel some of the fear and myths behind getting imaging done. So it's a valid question.

Alie: It's a valid question. Hillary Mazer [ph.] wants to know: How do radiologists learn to read images that just look like fuzzy blobs to the uninitiated?

Dr. G: Man, it's really hard. [*laughs*]

Alie: Yeah. You're like, "That's why I'm a doctor!"

Dr. G: You kind of have some idea in medical school because you get exposed to some imaging, you look at a little bit of ultrasound, and CT, and MRI through medical school. So you have some framework, and you know where the organs are relative to each other, so you have a little bit of an approach.

People tend to develop a search pattern. Maybe they start looking at the lungs, and the heart, and then the bones or whatever on a CT scan. We try to approach things methodically and systematically, and ask for help, look at resources.

But it takes a long time. There's a lot of anatomy. We're doing all the anatomy in the entire body, and in weird, three-dimensional, like, rotated ways, so it's complicated.

Alie: I imagine it must be like if you don't know a language well it would be really hard to discern regional dialects. But if you have spoken it for years you would be able to say like, "Oh, are you from Philadelphia?" You know what I mean? Little things, the more familiar you are or something, it must get easier to pick out abnormalities.

Dr. G: I'm so glad you use that analogy, language, because this is what I felt like it was when I was a first-year radiology resident. I was like, "I don't know the language. I don't know what you guys are talking about, Millisieverts? What's that?" And the physics of radiology is very complicated. I feel like now I speak the language and I can understand what people are talking about.

Alie: Paulo Hanley [ph.] wants to know: If you're behind the scenes when a patient is getting a scan, do you have any stories of like good news where you saw something where you're like, "Whoosh! All clear!" Like, are there any of those [*singsongy*] feel good moments?

Dr. G: All the time. We get scans for people where they have vague abdominal pain and you're like, "Oh no. What's this going to be?" It could be anything, and we're just happy when it's not something terrible.

Aside: I would like to take a moment to impart a family story. So, my older sister Janelle used to get migraines. One day, I went to visit her in Detroit. And I asked her how

her head was feeling. She got really serious and she told me she's glad I asked. She'd just been to the doctor and they discovered a growth.

And she waited until I had tears on my actual face (Also? It was my birthday.) to clarify that this was her way of announcing that I'd be getting a niece or nephew. The growth was a *baby*. Her head was *fine*. She just is a rascal and I'm still shaken. I was a great prank and a great joke. But it was my birthday. I was CRYING. But my nephew's super cool, so all is forgiven. Now what if you are growing shards of a skeleton that's not a baby?

Dr. G: It is exciting when you see something unique that's, like, a learning opportunity, but usually something that's fun and interesting for a radiologist is probably not good for the patient. So we try to, like, you know, understand, or remind ourselves of that.

Alie: You're like, "You have a teratoma!" They're like, "Fuck you!"

Dr. G: *[laughs]* Exactly.

Alie: Have you ever seen a teratoma?

Dr. G: Yes, I have! They're so cool. They have like teeth and hair inside of them. They're awesome.

Alie: What do they look like? I mean, I've seen pictures. If you really want to, say, cut down on your snacking, all you have to do is google image search teratomas and you will not be hungry.

Dr. G: Or play the sound of someone's secretions.

Alie: But what was the first time you saw a teratoma, like...

Aside: Just to catch you up: A teratoma is a random ball of bones or teeth or hair, or tissue—it's like a ball of hair that just grows inside some people for decades. For no reason. They aren't even tax deductions. And no one gives you their seat on the bus if you're growing one.

Dr. G: So it was an ultrasound of a... It was a pelvic ultrasound.

Alie: So it was on the ovary?

Dr. G: Yeah, it was.

Alie: What are those called? A den— A... some kind of cyst.

Dr. G: A dermoid. Yeah. So we saw a little bit of calcium and we saw this, kind of like, wavy pattern that was like the keratin or hair. And we're like, "Oh! We're going to get an MRI of *this*." And then, yeah... It was pretty neat.

Alie: Do those people get to keep the teratomas if they want?

Dr. G: No. Oh you mean, when they're removed?

Alie: Yeah.

Dr. G: No, we send them to pathology because the pathologists have to slice up the tissue and make sure there was no underlying cancer or anything. So you never get to... I know. People ask to keep weird things. They ask to keep everything.

Alie: I mean, if I grew teeth in my butt I'd be like, "Let me keep it, dude! I worked 17 years on that! I get an extra set." *[laughs]*

Dr. G: "It was my twin!" *[laughs]*

Alie: Seriously! They're so gross. They come from the word for monster.

Dr. G: Oh, they do?!

Alie: Yeah. Teratoma.

Dr. G: It does sound really terrible.

Alie: Yeah, it comes from... Well, if you're like, "I grew a monster in my body." Anyway.
Mike Melchior wants to know: Is it true that X-rays are actually visible to the naked eye?

Dr. G: Uh, no.

Alie: Okay. Good to know.
Jennifer Overbye wants to know: Are dental x-rays worse because radiation is shooting directly to your head? My mom told me this at some point. Now every time I go to the dentist I'm sure that it's taking years off my life. *[laughs]*

Dr. G: Oh, no! *[laughs]* They're really low dose.

Alie: Christa Avampato wants to know: I know there are so many mixed opinions about mammograms and ultrasounds for women. What's the right age to start them? And if someone has a risk factor, like family history, should they start them earlier? So, are there any new innovations in the works that might replace mammograms?
And Christa, I'm going to guess that you had an uncomfortable mammogram. I've never had one myself. Have you ever had a mammogram?

Dr. G: I haven't. No.

Alie: No? They just squish your... Squish your boob.

Dr. G: I mean, I've seen them. They look really uncomfortable. We typically start them at age 40 unless they've had some risk factor. If they have first-degree relatives that have breast cancer we may start them 10 years before. But people with... like, women who are 35 or younger and have very dense breasts, may not. They usually don't get mammograms. They'll get breast ultrasounds because your breast tissue is so dense.

Alie: Do you think they're going to have different modalities for imaging that doesn't involve making a fruit roll-up out of your boob? It does feel like they squish it into, like, fruit leather. *[laughs]*

Dr. G: The reason that they do that so they can spread out all the tissue and it's less dense. So, it helps us scan through it and see things better.

Aside: Dr. Gurusamy says that in higher-risk patients, like those who may have the BRCA gene mutation, a contrast-enhanced breast MRI can detect breast cancer. It has a sensitivity of up to 90% with the MRI, versus 38% for mammography or ultrasounds, so 90% versus 38%. Pretty good. Way to go, contrast-enhanced breast MRI. Tuck those stats in your breast pocket like a kerchief.

Alie: In all of this though, with any of the discomforts, you're like, it's better to be uncomfortable for 15 minutes than to be not alive.

Dr. G: Yeah, that's... I use that kind of message a lot.

Alie: The shit I've been through for one to two months of having a hair-free face, you know what I mean?

What's one thing about your job that suuuucks? Or about radiology that frustrates you?

Dr. G: Um... let me think. I mean, it's tiring. So we sit a lot. When I'm not doing interventional radiology stuff, when I'm not doing procedures and I'm doing the diagnostic part, I'm sitting a lot. And I'm just, like, tired of sitting for 14 hours. And it's so busy, and I think sometimes people think... there's a misconception that we just sit in that room all day and we don't talk to patients or we don't do procedures, and that's not true. But I think because we're sitting in the room that's dark and we can listen to music, that we're not working hard, but it's hard.

Alie: And what kind of jams do you pump?

Dr. G: All kinds of jams. Like on nights we were like old-school Bone Thugs.

Alie: *[laughs]* Really? While you're diagnosing all sorts of crazy stuff?

Dr. G: Yeah.

Alie: That's fantastic. Actually Bone Thugs is, like, kind of appropriate considering that you are...

Dr. G: It's kind of quiet and like... Oh yeah. *Bone Thugs*. I get it.

Alie: Like, you're looking at bones.

Dr. G: This is true. I never thought about that.

Aside: Little fun fact: Until radiology was developed, scientists had no idea that the Bizzy Bone was connected to the Wish Bone, and the Wish Bone was connected to the Layzie Bone. The Layzie Bone was connected to the Krayzie Bone; the Krayzie Bone was connected to the Flesh-n-Bone. So, this aside will only matter to you if you're familiar with the Bone Thugs-n-Harmony roster. [*Bone Thugs-n-Harmony* Body Rott: *Body rott, body rott, body rott*]

Alie: What is your favorite thing about what you do, or the most rewarding aspect, or something that's just super, really piques your curiosity?

Dr. G: I love that radiology's so technological and it's always changing, like, with the artificial intelligence, and with interventional radiology we're always coming up with new techniques to get in the brain or get to where we're going. I just love that it's always changing. And I like the puzzle of reading the scan and I love working with my hands. It's just for me, it hits everything.

Aside: After the interview, Dr. Gurusamy, a.k.a. Varshana emailed me some links, and at the very end, she said:

We talked about my least favorite part of my job, which was people thinking I was just 'chillaxing,' listening to Bone Thugs rather than mainlining CTs, MRIs, et cetera. But I think what goes hand in hand with that is that radiologists really have an image problem."

She goes on to say:

I realize the irony in saying this given we are imagers. Reading someone's scan allows you to know/see them in a way they may never be able to see themselves. It's weird, and beautiful and so damn interesting to see your innards the way we do.

Alie: Have you ever gotten anything back from patients where they were really, kind of, surprisingly grateful for what you do? Does anyone ever bring you donuts or anything?

Dr. G: No, but one of my co-residents got a bunch of socks.

Alie: What?!

Dr. G: They were, like, compression socks, which would have actually been really helpful because we were standing, but they were just like nice wool socks. And it was really sweet because it is cold in the angio suite where we do our procedures.

Alie: That's really sweet. So, thank your radiologist. Honestly, some radiologists are the first line between you and a box of Kleenex. I will never forget going in for that MRI and just crying and having someone be like, "It's okay. It's going to be okay."

Dr. G: That's nice. That's so good to hear.

Alie: It's almost like dealing with shelter dogs or something where you're like, 'they're going to be shivering and kind of scared.'

Dr. G: And breast radiologists deal with this a lot because, you know, like for women I think sometimes we feel like our breasts are just ticking time bombs, and you know you have to go in and get that mammogram, like you have to go get your colonoscopy or whatever. And when you may need another study or an ultrasound, the radiologist is right there with you and they're explaining things to you. And I think that part of radiology, that real direct patient care, is really helpful and meaningful.

Alie: It's crazy that you are a conduit to so much knowledge about someone's body. Like it's kind of cool. You're like an interpreter between me and my body. You're like, "Okay, let me let you know what's going on." That's pretty cool!

Dr. G: All of your insides.

Alie: I know! Look at my guts! Thank you for letting me ask you so many questions.

Dr. G: You're welcome! I hope I was helpful.

Alie: Next time I get any kind of body scan, I'm just going to send it to you for sure!

Dr. G: You should. Don't send me your rash.

So save the rashes for your dermatology friends, people. Now, for links from this week's episode, head to AlieWard.com/Ologies, or for super sensitive pictures, you can become a Patron for as little as a dollar a month at Patreon.com/Ologies, that means you get to ask the Ologists questions and also see photos—in this case—that are too delicate for Instagram.

Dr. Vershana Gurusamy is on Instagram and Twitter but, much like the things you have wedged in your rectum, her accounts are private. I myself am very publicly [@alieward](https://twitter.com/alieward) on [Twitter](https://twitter.com/alieward) and [Insta](https://www.instagram.com/alieward), and Ologies is [@Ologies](https://www.instagram.com/alieward) on both!

Now, to rep the podcast, to start conversations about it, and also cover your nude body, you can head to OlogiesMerch.com for shirts and sweatshirts and pins and dad hats. The proceeds help

support the show. They let me pay my amazing merch folks, Shannon Feltus and Boni Dutch, as well as Editor Prince in the Kingdom of Podcasts, Steven Ray Morris. Thank you Erin Talbert and Hannah Lipow for being admins in the online science party that is the [Ologies Facebook group](#).

The music for Ologies was composed by Nick Thorburn. And please don't forget to ask smart people dumb questions. Just do it. They're so fun. And learning stuff and making connections is why we're all here on this planet. And while you're at it, while you're asking smart people dumb questions, tell someone today that they are great and you're glad that you know them.

Okay. Now for my *[sings]* secret at the end of the show. I went to pluck a hair off of my body and I just didn't grasp it right, and then instead, I curled it. And it was really upsetting. I just curled it like gift wrap ribbon, and I was like, come on. Sometimes it happens.

Okay. Berbye.

[Outro Music]

Transcribed by B. Stewart Caswell, Belfast, ME

Some links you might find useful:

[Not the pamphlet I was looking for](#)

[CT is *harder* to say than CAT, tho](#)

[How MRIs work](#)

[MRIs are not quiet](#)

[MRI sound effects to fall asleep to](#)

[Everyday radiation all around you](#)

[Airport scanners: how awful are they?](#)

[Backscatter airport x-ray machines](#)

[People have DIY ultrasound machines?](#)

[What's in ultrasound goop](#)

[Tom Cruise is not a doctor](#)

[Get yourself some gonad shields](#)

[Edison's employee who perished from early x-rays](#)

[How were x-rays discovered?](#)

[Here are some images of things up people's butts](#)

For comments and enquiries on this or other transcripts, please contact OlogiteEmily@gmail.com