Ep. 76: Radiation and Its Effects on Pregnancy

Dr. Emily Caffrey, a certified health physicist with the Health Physics Society, joins host Christ Stallman, CGC to talk about different types of radiation and their potential effects on a pregnancy.

Links Mentioned in This Episode:

Health Physics Society's Ask The Experts

https://HPS.org

Ep. 76 Transcript

You're listening to the MotherToBaby podcast, medications and more during pregnancy and breastfeeding. Ask the experts with your host, genetic counselor and mom of four, Chris Stallman.

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Welcome to another episode of the mother to baby podcast. My name is Chris Stallman, and I'm a genetic counselor, a mom of four, and a teratogen information specialist. So what that means is that I talk to people, so patients, family members, healthcare providers, the general public, about exposures that can happen before pregnancy, during pregnancy, while breastfeeding, and in cases of adoption.

Thank you And an exposure can be anything. So it could be a medication you take. It could be a vaccine. It could be a hair treatment. And in some cases it could be in the place where you work. Today we're going to talk about a very specific exposure, radiation. And we have a very special guest to talk with us today.

Dr. Emily Caffrey is the program director and an assistant professor for the master's in health physics program at the University of Alabama at Birmingham. She is also a certified health physicist that specializes in calculating radiation doses from environmental sources of radiation. Dr. Caffrey, welcome to the show.

Thanks for having me. Excited to be here. Great. So let's get started today. We're going to talk about radiation. Can you tell us a little bit about what radiation is and how people are exposed to it? Yeah, absolutely. Um, you know, radiation is just a form of energy. So there's two types of radiation. There's non ionizing radiation and ionizing radiation.

So non ionizing radiation are lights, microwaves, your cell phone emits non ionizing radiation, things like that. There's also ionizing radiation, and that type of radiation is a little bit higher energy, um, that makes charged particles. Um, and that's the kind of radiation you get when you're talking about a CT scan or an x ray, something like that.

Um, that's ionizing radiation. Uh, and I, and I just want to point out that radiation is all around us. It was present when life first evolved on Earth. It was present when dinosaurs lived. It's still present today. Uh, we live in a radioactive world, and I think a lot of people don't know that. So I'd like to start with, radiation's all around you, and it has been your whole life.

Um, natural radiation comes from space, and it comes from living things that are in the Earth. The Earth's crust is radioactive. You may, if you live in a place that has high radon, um, you may have heard of radon coming from Earth up into your basement. That's a really common source of exposure. Um, and our human bodies and cells have adapted over time to respond to and repair the small amounts of damage you might get from these low levels of ionizing radiation.

So some of the more common forms of radiation, like you described, light, microwaves, CTs, would that also include mammograms and would that increase risks to a pregnancy? Yeah, that doesn't include mammograms. The mammogram is again a low energy type of x ray that's used to image the breast tissue to look for cancer usually.

Um, and You know, just like all other types of, of diagnostic imaging procedures, and I think we'll talk a little bit more about this as we get into it, um, you really aren't at risk when you have a low, a low, a diagnostic imaging procedure, those are very low doses, your, your pregnancy is not at risk, the unborn child, not at risk from those types of exposures.

And I'm really glad that we can talk about that and hear about that again, because it is the kind of thing, you know, if. certainly if you need it in pregnancy, it's a good idea to get your cancer screenings. Absolutely. Dr. Caffrey, can you tell us a little bit about the Health Physics Society? Yeah. And I like to tell people like health physics is a profession you've never heard of, but the health physics society is the professional society for health, which are radiation protection professionals.

So we are the profession that is devoted to the safe use of radiation. Um, so anywhere radiation is used, whether that's a hospital, a nuclear power plant, um, the government and military installations, um, there's gonna be a health physicist, a radiation safety officer, someone there making sure that the people and the environment are safe from that ionizing radiation.

So you may not see us, but we are there making sure that we're following regulations and keeping people safe. When you mentioned earlier that radiation comes from space, I got to say, I love hearing that. I think that that's such a cool and exciting thing. So let's talk about cosmic ionizing radiation. So what is that specifically?

And does that increase risks to a pregnancy? Yeah, it's space is always fun, right? And we're talking about sending astronauts to Mars and things, right? Radiation. So, you know, one component of your natural radiation dose that you get just by living here on Earth is from outer space, and that's called cosmic radiation.

Um, so particles and electromagnetic magnetic waves from outer space, um, come and hit and impact Earth. So you may have heard of solar flares and things like that. And the sun flings off all these charged particles. So those come and hit Earth. Now, Earth is actually pretty well protected. We have this magnetic field that's around Earth that deflects a lot of those particles.

Think of it as like a shield around Earth. And then our atmosphere, like a literal atmosphere above us, also protects us from a lot of that radiation, but not all of it. So some of that radiation is going to come in and actually get into Earth, like where you and I are sitting here right now. Um, and, and, and, There's more at the north and south poles and as you go higher in elevation because at the north and south pole the magnetic field that protects us is weaker and at higher altitudes you're just physically closer to the radiation coming from space.

So if you're, um, your background radiation dose, if you're at the North Pole or if you're standing on top of a 14 year in Colorado is going to be higher than me sitting here in my office in Huntsville, Alabama, which is basically at sea level, right? So it's just a small difference, but it does change a little bit.

Um, but you know, cosmic radiation contributes Um, about 5 percent of our average total background dose. So that's a very low, low number. You and I just living on Earth, which is radioactive, get about 3 millisieverts per year. And a millisievert is just a unit of radiation, uh, dose that we, that we use to count, you know, when we're talking about radiation doses, that's just a number we, a unit that we use.

Um, so you and I get about 3 millisieverts per year, and about 5 percent of that 3 millisieverts is from cosmic space radiation. Um, and I, and I want to add to that background radiation doses are too low to increase your risk of pregnancy or cause any harm to your unborn child. We are not worried about background radiation doses or doses that are lower, um, in, in than, especially not background, but lower than three is definitely not a concern.

And we'll talk a little bit more about what levels you might want to start thinking about, about, you know, where, at what levels you might want to be concerned, but definitely not at background levels. Great. Okay. So thinking about space occupation, what's out there? What about radiation exposure for someone who's working as a flight attendant?

I got to tell you, I got this question for the very first time, maybe six or seven years ago. And until then, it never even occurred to me. I was like, yeah, of course, there's radiation in the atmosphere. So I'm going to stop talking and let you give us this answer. Yeah, and I'm really glad you asked that question because we hear this concern a lot, both from flight attendants, pregnant women that travel for work a lot, uh, pilots, right?

We hear this question a lot. And I think people, uh, I certainly didn't before I got into this field, didn't think about flight attendants being, uh, people that are exposed to COVID. More than average, right? Um, but when you fly up high, especially people that fly transcontinental flights that go over those poles where you have a higher radiation dose, they get a higher radiation dose in the background.

They actually, in some cases, get higher radiation doses than workers at nuclear power plants, but higher does not mean there's a problem. So let's back up for just a second. Um, so the amount of exposure that you get from flying is significantly lower than, um, The exposure needed to cause any harmful effects to your, to your unborn child or to you, the pregnant, pregnant person, rightly, that we're not concerned.

Um, and just to give you some context, right, we talked about 3 millisieverts as our background radiation dose. Um, the radiation dose needed to cause harmful effects is roughly, and again, there's a lot of research on this that's ongoing all the time as we improve our models, but we're talking roughly 100 millisieverts.

Um, and again, millisieverts just being a unit of radiation dose, so 3. Is your background radiation dose, and 100 is what we're talking about for harmful effects. Um, and then to talk a little bit more specifically about flight, so how much radiation do you get in a flight? Well, your radiation exposure during a commercial flight is about 0.

01 millisieverts per hour of flying time. So to get to 100 then right? That means you need if you do some quick division. That means you need about 10, 000 hours during your pregnancy to reach the amount of radiation that might be harmful. I don't think anyone is even flight attendants, right? You're not flying in 10, 000 hours.

You really aren't quite safe from as a as a flight attendant or a pilot or even just someone that travels a lot while you're pregnant. That's it's not of concern. Excellent. And I'm so glad that you mentioned, you know, it could be higher than 100. wherever we start out. But that alone doesn't necessarily mean that there is a problem.

We have to have more information. We have to have all the pieces and that's so important for all exposures. But again, certainly for one like this, where you may not have known or you may not have remembered, it's like, oh, there's radiation all around us. Oh, wait, it also depends on how much we're being exposed to.

Now, for my favorite thing to ask all of the guests on the show, when I get the opportunity, what is the most interesting question about radiation and pregnancy that you or the Health Physics Society has received? Yeah. And I'm, and again, this is a great question. We get hundreds of questions from pregnant women and thousands of questions from the general public.

Yeah. Um, and you know, it's kind of, I didn't pick something like when I was thinking about this, I didn't pick something light hearted because this, this particular question that I'm going to throw is one that has stuck with me and it's the one I that just reminds me of why talking to people and using my knowledge to explain why things are okay or not okay or what you need to be concerned about and what you shouldn't be concerned about is so important.

Um, and so about, about a year ago, we had a woman right in, um, an Italian woman and she had had a diagnostic x ray of her pelvis before she knew she was pregnant. And her, her gynecologist told her the pregnancy was probably more risky because of the x ray. And she specifically asked us if she should terminate her pregnancy.

And under Italian law, you know, that was very time sensitive because she only had a week to make such a like, insanely impactful life decision. Um, and so I was so glad that she found us because I just want to be really clear here. The answer to that question is absolutely not. A diagnostic x ray, even to the pelvis, um, is not going to cause any harm to your unborn child.

And just the relief that we were able to provide, um, that, that soon to be first time mom was just like overwhelming. She wrote back to us, um, several times over the course of, you over the course of her pregnancy just to check in and she told us she sent us an email saying that her son was born happy and healthy and she was just so grateful and so relieved because she didn't know right and and so being able to offer that service and being able to help people understand and make massive decisions is just really amazing.

Uh, it gives me the warmth, like, that is amazing. I am not only so glad that the society exists and that folks like yourself are out there giving this information. I'm so glad they found you. I'm so glad that, you know, it seemed like a good outcome for them. That's wonderful and so important. And it is one of those things where, you know, you don't know what you don't know.

The good news is in a lot of cases, there are people, um, again, like you and the health physics society that are out there assisting with some of this information that isn't as commonly available. So thank you so much. What a great story. So Emily, if someone has a question specific for the health physics society, so radiation.

Or even, you know, concerns in the pre pregnancy or after pregnancy planning stage. How did they get to your organization to find this information? Yeah, thanks for asking that. Um, so you can find us at hps. org, hps. org. That's the website of the Health Physics Society. And you'll see a little Ask the Experts button.

And you just click that button and you'll see our webpage. Um, there's a webpage specifically for pregnancy and radiation. And on that web page are a couple of videos that the Health Society has produced. There are fact sheets about radiation and pregnancy. There are Q& A's from, uh, not only some, some basic Q& A's that we have written, but also, um, some stories that other people have, other questions that people have written in with.

We, we anonymize them, of course, and we post some of those to our website. And we cover everything from, um, background radiation, to pregnancy and flying, to what if I need a medical procedure, to I'm a lactating mom that's breastfeeding, you know, and I have to have this nuclear medicine procedure, you know, if, am I okay, what should I do?

Um, I think the medical industry does a good job of providing information, but I think people sometimes still want, you're still overwhelmed, right? When you, you have a child and you are doing something in the medical realm, like those are two very overwhelming things. In and of themselves. And so when you have another question that didn't get answered, please reach out to us and we're always happy to help.

That's awesome. And we are going to put information for the Health Physics Society in the show notes. Something else, um, that I was just thinking of, I, you know, talk to people all day. That's my job. But if I forget to ask my doctor or healthcare provider something, or if I'm traveling or busy, I might not always have the opportunity to connect with them, and I will say that sometimes I turn to Google.

So it's great to know where they can find this information. Providers are wonderful. They give good information. Sometimes I do not have it in me to wait 30 minutes on the phone. You know, life is busy. So it's great to know that we can find this information online as well. Dr. Caffrey, before I let you go for this episode, um, cause I would love to have you come back and talk more about radiation.

Is there a final thought that you would like to leave our audience with? Yeah, I think, you know, I think the thing I want to emphasize is that radiation can be scary. You can't see it. You can't feel it. You don't know it's there. Like anything you can't see and you don't know is there. Can be scary, but I just I want to emphasize that our bodies evolved in this radioactive world.

They have repair mechanisms for low doses. And we know from population studies from epidemiological studies. That the amount of radiation used in these diagnostic procedures, so x ray scans, mammograms. Um, even to the pelvis area are just not are way too small to cause harm to your unborn child. So you don't need to worry about those types of procedures.

You know, and if you are concerned or you had a specific procedure or you had a nuclear medicine procedure, you know, those are things that experts can talk to you about and counsel you through, um, to make sure that you're getting up to date information. And it's so important to remember to ask those questions because diagnostic procedures can prevent a lot of issues that are harmful to your baby, right?

And, or could be harmful to your, to your unborn child and, or yourself, right? As the pregnant woman, like, um, There are actual harms that can be done by not having a CT scan when it's clinically indicated, and the radiation dose should, should be something that you think about, um, and, and be aware of and educated about, but it should not stop you from getting a diagnostic procedure that could potentially save your life or your unborn child's life.

So radiation's scary, but we, um, myself, the Health Physics Society, and all of my topic editors and experts are here to help. Hps. org or through the mother's baby website, there are links, um, and you can find us online and we are, please reach out. We are happy to help. Absolutely. And thank you. Thank you for the reminder that, you know, these procedures, MRIs, CTs, and so forth are not done lightly.

They are done because someone needs it, especially during pregnancy and you, you probably do need it. So please feel free to contact. The health physics society or mother to baby with any questions that you have. Dr. Caffrey, it was my pleasure to speak with you today. Thank you so much for being on the show, giving us all this great information, and we hope to have you back in the future.

Thank you so much for having me. It's been a pleasure. And that's going to do it for this episode of the mother to baby podcast. Be sure to hit that subscribe button. So that way you never miss a new episode and you can go back and listen or relisten to some of those older episodes as well. You can find us on iTunes, Spotify, Audible, or however you like to listen to podcasts.

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Host Chris Stallman, CGC, welcomes back Maternal-Fetal Medicine Specialist and social media health educator, Dr. Shannon Clark of @babiesafter35. Dr. Clark joins the podcast for a special Folic Acid Awareness Week episode and debunks potentially dangerous folic acid myths being spread on social media. Hear the evidence-based facts in this important episode!

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