Episode 10 – Vaccine Types & How They Work Part 1

With Dr. Paulette Grey Riveria

Diane (00:01):

Vax Matters returns for an all-new episode, this time to expand our knowledge of the various vaccines we receive and how they work. Hi everyone. We're glad you joined us today for part one of a two-part sequence of Vax Matters. This episode's discussion takes a broader turn surveying modern day types of vaccines and helping us understand how they work. I'm joined today by Clay Young, a longtime broadcast media friend who's originally from just down the road into the beautiful city of New Roads. Clay spent over 25 years in television and radio in Baton Rouge and became very involved in the community during that time. Now he's joining me on Vax Matters. Welcome Clay. How are you?

Clay (00:54):

(laughs) How are you? It's been a while.

Diane (00:56):

It has been.

Clay (00:56):

It's good to work with you again, right?

Diane (00:58):

Yes. Yeah.

Clay (00:58):

I'm excited to, to get together and have these great discussions about something that's so important and is really in the forefront of the minds of so many people around our city and around our state. And a- about that our vaccine expert for this episode and the next is Dr. Paulette Grey Riveria. Now she's, uh, the capital region medical director and administrator at the Louisiana Department of Health. She's a board-certified family physician. Dr. Riveria also recently served as a consultant to the Office of Public Health. Now, get this Diane, she conducted an assessment of healthcare worker attitudes-

Diane (01:33):

Mm.

Clay (01:33):

... and experiences related to the pandemic.

Diane (01:36):

Oh gosh. Yeah.

Clay (01:36):

Can't wait to hear more about that. Thanks doc for joining us on Vax Matters.

Dr. Riveria (01:40):

Thank you so much for having me. I'm so excited to be here.

Diane (01:43):

Well, thank you. We have a lot to cover today, so much so that we are going to have, as we said, part one part two. So as we're starting out this morning today, this is what we wanna ask you. We've been inundated about vaccines, especially since COVID and to the forefront. So people really wanna know about this in an easy to understand way, because it's so very complicated as you well know. So there are many vaccines for so many different diseases in today's world, and we will get into those, but why not start us off by explaining how our immune system works to fight off infections in the first place? Because our immune system is pretty brilliant.

Dr. Riveria (02:26):

Yes, I would agree there. And I also think it's a great place to start. I think the most basic way to understand the immune system is really to think about it as a defense system, a system that protects our body from anything foreign. And by foreign, I mean, anything that's not naturally produced in the body. So if you think about it that way, we have our immune system that develops in really one of two ways is either what you're born with or what you acquire over time. And that acquiring over time, for example, is what babies receive across the placenta-

Diane (03:04):

Mm.

Dr. Riveria (03:04):

... from their mothers, what they receive in breast milk, or as adults, or even children, actually, depending on the health condition, what you might receive in a blood transfusion. So if you think about it that way, is two different ways that we acquire protection. So the cells we're born with and what helps us fight, and then what's passed to us based on what we experience in life. So in general, that's the way we wanna think about it. And the immune system, it's, it is complicated, but if you continue to go back to that same thing, it's the defense system, it's a defense system. It helps us fight. Then you have to ask, well, what is it that is fighting? So we have these cells in our blood and, you know, in our blood, we have red blood cells. We have platelets. We also have white blood cells.

Clay (03:54):

Mm-hmm.

Dr. Riveria (03:55):

And those white blood cells are really the defense system and they're different types. So I'll stop there. But, um, that's-

Diane (04:03):

(laughs).

Clay (04:03):

No, I, I think it's amazing. And I know we're gonna get into-

Dr. Riveria (04:06):
Mm-hmm.

Clay (04:07):
... how vaccines play a role in this, but with the proliferation of conversation about vaccines and viruses, people don't often know where to go to get the best information. And it's always great to ask a doctor outside of talking to a family physician, where would you recommend people look to find out about what's happening with their bodies or to be- to get better understanding about it?

Dr. Riveria (04:29):
Well, that's a great question. Thank you. I think the CDC or the Centers for Disease Control and Prevention, they actually have really, really plain language information-

Clay (04:39):
Yeah.

Diane (04:40):
That's what we need.

Clay (04:40):
Mm-hmm.

Dr. Riveria (04:41):
... on many different topics. So I think that's a first start, a good first start. And then when you think about some of the premier institutions around our country, Johns Hopkins is definitely an anchor for very simple scientific information. Cleveland clinic is another one that I found that when laypersons go to it, it's easy to understand. Also of course our own department of health-

Clay (05:02):
Yeah.

Diane (05:02):
Correct. Yeah.

Dr. Riveria (05:02):
... you know, we produce lots of content and the website is so robust, but there's lots of information there. What I would caution people against is websites that appear to be produced by fringe individuals.

Diane (05:18):
Hmm.

Dr. Riveria (05:18):

And by that, I mean, uh, individuals who are just giving opinions, but not necessarily scientifically sanctioned by an institution that's recognizable or an agency that's recognizable. As you know, anyone can put up a YouTube video or launch a website, but you really want to fact check-

Diane (05:35):
Yeah.

Dr. Riveria (05:35):
... what you're seeing on the internet. And of course, there's the old school library system (laughs).

Clay (05:40):
That's right.

Dr. Riveria (05:41):
So the library has great tools-

Diane (05:43):
Yeah.

Dr. Riveria (05:43):
... and also great guides to guide you to those tools. So those are the sources that I would say outside of your personal medical provider.

Diane (05:50):
A- and you know Clay, we've said it before, too, that Dr. Google does not have a medical degree, you know.

Clay (05:55):
(laughs).

Dr. Riveria (05:55):
Right.

Diane (05:56):
I mean, people, they Google all this and they run down that rabbit trail.

Clay (05:59):
That's right.

Diane (05:59):
It's like, holy cow.

Clay (06:01):
Yeah.

Diane (06:01):
And it's, they, they, it's scary.

Clay (06:04):
Right. Right.

Diane (06:04):
And because like you said, you don't know what they're reading, what the source is. So we've got to be very careful.

Dr. Riveria (06:09):
Right. And not only that, but those first hits. So often people stop at whatever comes up first-

Clay (06:15):
Mm-hmm.

Dr. Riveria (06:15):
.. and they don't dig deeper.

Clay (06:17):
Mm-hmm.

Dr. Riveria (06:17):
So you really have to pay attention because often that first hit is Wikipedia-

Clay (06:20):
Yeah.

Dr. Riveria (06:20):
... which is-

Diane (06:21):
Oh gosh. Yeah.

Dr. Riveria (06:21):
... can be edited by anyone. I-

Clay (06:23):
By anyone. Yeah.

Dr. Riveria (06:24):
I could ... regular Joe Smith off the street-

Clay (06:26):

Yeah.

Dr. Riveria (06:26):

... can go in and edit a Wikipedia article. So you just wanna pay attention to not only what's the most high volume source, but what that actual source says.

Clay (06:35):

Because the absence of accurate information is what has created so much panic around the public. People are comparing what they've read, and I just believe you have to put out there where the best sources are and they are based in science. So let's talk a little bit about ... let's go back to the, the, the type, the type of blood cells you talked about, and then-

Dr. Riveria (06:55):

Sure.

Clay (06:55):

... explain for people in a way that they can get it.

Dr. Riveria (06:58):

Okay. Well, if you think about just white blood cells as the defender, let's, let's call it the army. So within the army, you know, there are different segments of specialties. And within our bodies, we have stem cells that can really become anything. So the stem cells that will become white blood cells, they're either gonna become that first line defender. So those are the cells that sit right under our skin, in our nasal passages. And those cells, you can think of them like the flag waivers. If a foreigner comes on the territory, so a virus, a bacteria, they will wave the flag in the immune system and they will start to pump out chemicals that recruit other cells to the forefront.

Dr. Riveria (07:39):

And then also those first defenders, macrophages are part of them. They will try to what we call engulf the cell right away. Often, that defense is effective, but sometimes not. So again, that recruitment of more specific cells that can fight a little bit harder and that have more specialty in the fight are recruited. So if you have your first line defenders, your macrophage is also danger sites are, are part of those defense systems, then you have T cells, B cells, and you have also monocytes. So the way I think about T cells and B cells, really, they are the cells that will specifically attack a particle, create a memory of that encounter for the next time around.

Diane (08:32):

So the T cell is the memory cell. Is that what you said?

Dr. Riveria (08:35):

Actually, good question. Both types of cells actually create memory.

Diane (08:38):

Oh, okay.

Clay (08:39):

Yeah.

Dr. Riveria (08:39):

So let me explain it this way. The B cell will develop an antibody. So those antibodies are basically proteins. They will attach to that foreign cell, and they'll try to kill it in that attachment. They'll send a signal that will overcome the viral or the bacterial particle. And then that cell, once that activity is done, it actually convert itself to a memory cell. So it's a pretty powerful system.

Clay (09:04):

So it studies the invader, figures a way to stop or at least hold up the invader and then replicates itself.

Dr. Riveria (09:13):

Yes. Actually co- actually converts, converts, converts-

Diane (09:15):

Wow.

Clay (09:15):

That's pretty good (laughs).

Diane (09:16):

Yeah. That was impressive, Clay. Wow.

Clay (09:18):

Don't ask me to say it again.

Dr. Riveria (09:20):

Yes. And actually converts itself.

Diane (09:21):

Yeah.

Dr. Riveria (09:22):

And then you have the T cells and what they do, they're gene- sometimes they're called killer cells, but you actually have different types of T cells. You have T cells that help. So helper T cells, those are the ones that, again, they produce chemicals to recruit more, recruit more soldiers, if you will-

Clay (09:38):

Yeah.

Dr. Riveria (09:38):

... to the site. And then you have also the cells that, uh, regulate meaning they control who's coming. And then you have the cells that are the killer or the cytokine cells. So those cells actually produce chemicals that will kill a cell directly.

Clay (09:54):

Is there anything a person can do to create more of the kind of cells you need within the body to help defend against viruses?

Dr. Riveria (10:02):

Yes. Actually, the way I'd like to think about it is this. So all of these cells, they're produced in the bone marrow, right? But they actually live in different parts of the body just waiting. And so a main part of the body is of course the blood vessel we talked about. So if you think about it, there are only certain things that should be in a blood vessel. But unfortunately, depending on our habits, we have other things clouding our blood vessels. So I'll give an example. Let's say cholesterol, that can form plaques, make the blood vessels narrower.

Dr. Riveria (10:33):

So in terms of habits, one main basic thing to do is to eat healthy because the better nutrition you have, the less clogged your blood vessels are, the more easily those cells are to travel, get to where they need to go, and defend you more readily. So that's one thing. The other thing is also nutritionally rela- related. So based on what we eat, we, we have antioxidants, uh, from certain food and those antioxidants, again, help keep the blood vessels open, help keep the blood flowing very nicely and also help keep the organs healthy to produce and house these cells. I hope that makes sense (laughs).

Diane (11:11):

Mm-hmm.

Clay (11:11):

It does. No, you're, you're, you're getting it done.

Diane (11:13):

Well, you know, the immune system, it just, again, it is, it works wonderfully when it works, but sometimes a different people, do they have different immune system, some stronger than others or how does that impact their health?

Dr. Riveria (11:29):

Yeah. So if you think about it, all of these signals are very specific-

Diane (11:34):

Mm-hmm.

Dr. Riveria (11:35):

... and it requires perfection really in order for the signal to get where it needs to go and for it to be effective for the cells, our defensive cells to be produced in enough volume. So in some people, they just miss fire in terms of the signals. Some people don't produce enough defense cells that they need, and some people actually produce cells that are dysfunctional in themselves, or they over produce. And that, as we know, for an abnormal, overly produced cell can become cancer.

Diane (12:04):

Mm-hmm.

Dr. Riveria (12:04):

So there are many ways the immune system can suffer from a poor production line, um, and then of course, there's the optimal way.

Clay (12:13):

How, how do vaccines now fit into the immune system and, and effort to stay healthy?

Dr. Riveria (12:19):

Well, the way you can think about it is, a vaccine is basically a disease imitator. So it will imitate a bacteria, or it will imitate a virus or another pathogen germ, if you will. And in that imitation the immune system, all it sees is what it looks like. So the way vaccines work is they will prime the immune system. They will help get it ready, but not cause the severity of the outcome, the disease.

Clay (12:48):

That's interesting. And without getting into all of the, the myths and the, the, the things that are out there about vaccines, in the last, I would say 18 to 24 months, the public has become more aware of the topic of vaccines and getting vaccinated. And there is an aspect of this that is healthy because people are having the discussion. Of course, the bad part is when the wrong information is out there. So for a person listening right now, who is strictly anti-vaccination, for whatever reason, and they sat with you, what would you tell them?

Dr. Riveria (13:19):

Well, first I would ask them, I would ask them why. I would want to listen to what their concerns are, because sometimes in that discourse, you might have, uh, a point of intervention, if you will, to ameliorate a point of confusion or to, to actually answer questions that are valid, that maybe have not been answered before. So if a, if it's a point of a scientific misunderstanding, I think that could easily be remedied. If it's a question of vaccine safety, then I think that's also an individual discussion about why do you not feel that this is safe? Is it something about your particular body or your particular immune status that you're concerned about, or is it more of a philosophical concern? And usually with that latter basket of philosophical concerns, then we can take the conversation to, well, have you ever been vaccinated? Have your children been vaccinated? Because often that answer is yes, and then the concern is really about a particular vaccine.

Diane (14:19):

Mm-hmm.

Dr. Riveria (14:19):

And we can discuss the science of that particular vaccine. So for example, with the flu vaccine, that's a common one. Every, every year, family docs and docs all around the country-

Diane (14:31):

(laughs) Yeah.

Dr. Riveria (14:31):

... cringe in terms of, okay, how, how are we gonna get our patients vaccinated? The common questions are well, won't this give me the disease itself? And we sit, and we talk about that. That answer is primarily no (laughing). So we, we talk about why people believe vaccines will give them the disease. And if we go back to what we were saying before, which is that vaccines imitate the infection itself, when the body recognizes this foreigner, as you can imagine, all these defense systems generate energy, generates a certain, you know, your temperature may rise, your muscles may ache. Think of the whole body working overtime to defend. That can feel uncomfortable physically. Also, again, this vaccine is mimicking the disease. So that recruitment of that defense system, it can sometimes cause physical symptoms that are similar to the infection itself.

Diane (15:31):

You know, sometimes I think that whenever we have this, a reaction, it kind of makes me feel better to know that, you know, my little system is working, you know, it's, it's doing what it needs to do. My immune system is kicking in there and that is, you, you know, that makes me feel like things are going in the right direction. And I would imagine in your practice, you said you also, uh, have young children, that it's so good for you to have these conversations. I would think it would make you feel good as a doctor for parents or for young adults to actually be able to feel comfortable to sit down and talk to you instead of just going willy-nilly and asking their friends or their uncle's brothers, sister-in-law what they did and what happened. They're coming to the source and they're wanting to know.

Dr. Riveria (16:17):

Yes, I, I agree there. And I also think, you know, one other point of conversation that at least in my practice tends to be effective, it's to talk about the consequence of not being vaccinated. So of course there's a personal potential consequence, but there's also a community consequence. These pathogens that we face can be very smart. And for every host or every person whose system doesn't defeat it, that virus, or that bacteria has a chance to learn itself-

Clay (16:46):

Mm-hmm.

Dr. Riveria (16:46):

... 'cause we talked about the immune system learning, but the viruses and the other pathogens also have an opportunity to, to learn, to recombine, to get stronger and then reinfect the next person, which mu- with much more armory and [inaudible 00:16:59].

Diane (16:59):

They're wiley. They're very wiley (laughs).

Dr. Riveria (17:01):

Exactly. And so if you imagine this wiley-

Diane (17:04):

Mm-hmm.

Dr. Riveria (17:04):

... uncontrolled smart-

Diane (17:06):

Mm-hmm.

Dr. Riveria (17:07):

... foe that is not only attacking one person in your family, but then will mutate, if you will, or recombine, strengthen and attack the next person and the next person, you do not know the severity of disease that will be caused at each turn. And not only within our households, but within our community. You know, we interact with people who are vulnerable immune wise and we don't know it. So if we ourselves are protected, we're less likely to pass an infection to the next person. Whereas in me, I might experience mild symptoms. I don't know if my elderly neighbor will experience a fatality from the same infection. So it's really important I think particularly for us here in the south we're community minded to think about it from a community lens as well.

Diane (17:51):

And we're huggers down here.

Dr. Riveria (17:52):

(laughs) Yes.

Diane (17:53):

Everybody wants to hug.

Clay (17:54):

(laughs) That's right. Yeah.

Diane (17:54):

That was the hardest thing about the, about COVID. You couldn't touch, you couldn't hug and you, again, you're respectful of yourself, of your family, of your community, your, your neighbors. That's what it boils down to.

Dr. Riveria (18:07):

Yes. And we know that vaccines are highly effective at preventing not only disease in some regards, but severity of disease and death. And so if, like I said before, if for one person, you may not get severely ill, you may not die. Again, we're talking about your community, your neighborhood, your state, your country, and in, in the pandemic sense, the world. So if, if we could employ vaccines more readily, we can stop the spread of these infections that have really an unpredictable outcome.

Clay (18:40):

So, you know, one of the things that ... you just said something that I find interesting that vaccines can help prevent, uh, some, some sicknesses or prevent death. I'd like you to talk about why and how. Like why for people who don't believe it, explain why vaccines can help you stay alive or prevent you from getting sick.

Dr. Riveria (19:01):

Okay. Well, thank you for that. So let's just think about it at a cellular level. So when a virus or a bacteria comes into the body, it's looking for a production source to reproduce, to spread, not only

throughout your own body, but to others. So when you encounter a virus or a bacteria, you are left with your own defense system. And as I said in the beginning, that's either what you were born with or what you acquired that may or may not be as strong as it can be.

Dr. Riveria (19:40):

Vaccines on the other hand, what they do is instead of allowing your body to wait to see the infection, to wave the flag, to recruit, they teach you before you even see the disease, how to mount a defense. So it gives you a state of readiness that you don't otherwise have. And that readiness can sometimes be the difference between life and death, depending on the severity of the infection that you may actually encounter. So remember when I was saying that there's some cells that are just waiting and, and ready, uh, to fight? Vaccines prime that system so more of them are waiting and ready and also that they are specifically ready for the pathogen you will encounter.

Diane (20:24):

So you're building up your army in essence, yeah.

Dr. Riveria (20:26):

You are building up an army-

Diane (20:27):

Mm-hmm.

Dr. Riveria (20:27):

... instead of waiting for the infection and having to build it at that moment when you're already in the thick of the fight. So the other thing regarding disease severity is for some people, like I said, they may not survive the actual infection. So would you rather be ready-

Diane (20:46):

Mm-hmm.

Dr. Riveria (20:46):

... beforehand or as ready as you can be, or would you be rather be caught off guard and try to build your army on the spot?

Diane (20:55):

I know the answer to that question for myself.

Dr. Riveria (20:57):

(laughing).

Diane (20:58):

Oh my goodness. You know, we are talking about, um, the different vaccines. You're talking about the inactivated vaccine, is that right?

Dr. Riveria (21:06):

Mm-hmm.

Diane (21:06):
And then the live attenuated, is that how you pronounce that?

Dr. Riveria (21:10):
Yes.

Diane (21:11):
Could you explain, because that's pretty critical too. Could you explain those, doctor?

Dr. Riveria (21:16):
Yes, I will try my best here (laughs).

Diane (21:18):
(laughs) You're doing a fabulous job.

Dr. Riveria (21:19):
Okay. So basically when we think about vaccines, we have to think about how they're made, what they're made from. So it can actually be the germ itself, or a part of the germ, maybe something like, I think of what the germ is wearing, you know, um, it's protein coat, um, it's sugar coat, something like that, or it can be made from a toxin that the germ produces or from a vector.

Diane (21:46):
Mm.

Dr. Riveria (21:47):
So vector, the best way to think about it is a conduit. So for example, if you think about a mosquito, usually mosquitoes themselves are harmless, but they actually can carry from one to the next. So a mosquito might bite an animal and then carry something from that animal to a human. That mosquito is a vector.

Clay (22:07):
And we've seen that.

Dr. Riveria (22:08):
Yes, we have seen that and we've seen it also in tick-borne diseases too.

Diane (22:11):
Mm, mm-hmm.

Dr. Riveria (22:12):
So viruses that are made from vectors. They actually use other viruses to carry messages and your immune system. But just getting back to your question of inactivated versus live attenuated. So inactivated viruses are basically ... uh, I'm sorry, vaccines are basically where you have a germ and

that germ has been killed. So it cannot replicate. It cannot spread throughout your body. It cannot infect someone else. It is killed, and it is used only so that the form, the actual, the way it looks, your body will recognize it and then mount a response. Live attenuated technically means the virus has been weakened in some way, or the pathogen has been made to be weak. And in the lab, that can be done by just continuously culturing it again and again, or killing it or, or weaken it rather by heat or by some chemical.

Diane (23:11):
So attenuated, that means weakening, correct?

Dr. Riveria (23:14):
Yes. attenuated means weaken.

Diane (23:15):
Okay. 'Cause that's a big word.

Dr. Riveria (23:16):
Yes (laughs).

Diane (23:16):
I don't think a lot of people are familiar with.

Dr. Riveria (23:18):
Yes. Yes. So you can think of it either as a inactivated means the particle or the germ is present, but not alive, cannot replicate. Live attenuated, it's living or active, but it's so weak that in the form that it now exists in, it generally cannot cause damage.

Clay (23:43):
What's an example of a live attenuated?

Dr. Riveria (23:46):
Okay. So one example is the measles mumps rubella-

Clay (23:49):
Okay.

Dr. Riveria (23:49):
... vaccine, um, chickenpox. Those are live attenuated vaccines. And with those vaccines, they do allow, again, it's live, there's some replication-

Clay (24:04):
Mm-hmm.

Dr. Riveria (24:04):

... but it's such a small amount, and again, the immune system comes and attacks it, that it generally doesn't spread through your body. It generally doesn't recombine, generally doesn't impact others.

Clay (24:15):

Is there a dormancy for any of these? Like ly- lying dormant for a while before affecting you that it's, that you carry it, but it, it doesn't do anything? Or is it instant the moment you contract some kind of virus that attacks your immune system?

Dr. Riveria (24:30):

Well, I think the way I would think about it is, let's think of these live attenuated vaccines as soldiers-

Clay (24:37):

Yeah.

Dr. Riveria (24:37):

... 'cause they're, but they're for the opposite army, right? Foreign army, but they have no arms, no legs. All they can do is, they, they're still waving their flag-

Clay (24:45):

Right.

Dr. Riveria (24:45):

... somehow.

Diane (24:46):

(laughs).

Dr. Riveria (24:46):

So let's say the flag is attached to their back, yeah (laughs).

Diane (24:48):

To their back. Okay. That sounds good (laughs).

Dr. Riveria (24:50):

But, but no arms, no legs. So can't really walk, run, shoot, do anything. But that flag tells the immune system, okay, this looks like this virus, so let's prepare. Now, that message can stay in the system for a short time or a long time. It can disintegrate, um, before the immune system recognizes it or not. Um, it can also shed in body fluids, so it, it just depends on actually the person's immune system, how that is handled. And that's why we see with some people, they may need boosters, uh, particularly for these, uh, live attenuated vaccines, um, and, and other vaccines as well, depending on the strength of your immune system, but-

Diane (25:30):

And the MMR that you said, that was an example-

Dr. Riveria (25:33):
Mm-hmm.

Diane (25:33):
... of this, that also goes back to the fact that these are, are stronger and you do not need to keep being boosted for it.

Dr. Riveria (25:41):
Right.

Diane (25:42):
That's why we have the MMR as a child than as the adult shot too. Is that right?

Dr. Riveria (25:46):
Yes. Depending on your, your own immune system strength.

Diane (25:47):
Oh, okay. Okay.

Dr. Riveria (25:48):
So yes, these live attenuated vaccines needing a booster is rare.

Diane (25:51):
Okay.

Dr. Riveria (25:51):
The immune system response is generally long lasting with these. Yes.

Clay (25:57):
And, and that leads to COVID 19, you know, because of the need for the first shot, the second shot, the booster and now there's a, there's a second booster. Let's talk about the strength of it requiring so many more vaccinations.

Dr. Riveria (26:09):
So yeah, so actually, you know, that's even a whole nother category of vaccines. So we have our live attenuated, we have our inactivated, we have many other types and then you have your mRNA. So remember when I was saying that you can either be dealing with the germ itself, either weakened or killed or some component of it. So COVID vaccines, two of them at least are mRNA vaccines where-

Diane (26:34):
The messenger, the messenger.

Dr. Riveria (26:35):

Yes. The messenger ribonucleic acid (laughs).

Diane (26:38):

Mm-hmm, yeah.

Dr. Riveria (26:38):

Which is, you know, the proteins actually within a cell that tell the cell how to make itself. That's part of it. And then, you know, it's also similar to DNA, but it is basically a type of protein coding. So instead of dealing with the germ itself or an outer coat of the germ, the mRNA vaccines, they actually deal with the part of the genetic code. So you never have to see anything that looks like the virus, all you're seeing is how that virus could be made. And based on that code, you can mou- mount a defense. And then there's also a, a, a second type of COVID vaccines, the, and there, it's a viral vector vaccine and that's the Johnson & Johnson.

Diane (27:21):

Mm, okay.

Clay (27:23):

It's interesting. You said earlier that some of these vaccinations can mimic the, the virus and you heard a lot of people talk about after getting their vaccine, how they felt like they had COVID. Can you explain a little bit of, of, I guess in broader detail, why that is?

Dr. Riveria (27:39):

Yes. So the basic way I like to think about it is that anything that looks like the real thing can cause a response in the immune system, like the real thing. And as I was alluding to before, part of the attack of the immune system can mimic those cold-like, or flu-like symptoms because your body is at war. So your temperature may rise, your muscles may ache. You, uh, your tissues may become inflamed therefore the sore throat. Uh, your mucus, you know, your nose were run because all of that is part of activating the immune system. So actually for an example, when we produce mucus, there are cells being carried in that mucus they're trying to get somewhere.

Clay (28:25):

Mm-hmm.

Diane (28:25):

Mm-hmm.

Dr. Riveria (28:26):

Sometimes those cells have eaten up a viral particle and your body's trying to expel that, but that's why we tend to get those disease-like illnesses, uh, but not actually the illness itself. Now, in a-

Diane (28:38):

And they're short term, they don't last long-

Dr. Riveria (28:40):

Yes.

Diane (28:41):
... the symptoms there.

Dr. Riveria (28:41):
Yes. Now, in a live attenuated vaccine, it's a little bit different because there is a small amount o-

Diane (28:46):
Mm, mm.

Dr. Riveria (28:46):
... of that there, but in any other type of vaccine, it's really your body's response that is causing those symptoms. Does that make sense?

Clay (28:56):
Yeah, Mm-hmm.

Dr. Riveria (28:56):
Okay.

Diane (28:57):
So the inactivated vaccine, could you explain that just a little bit?

Dr. Riveria (29:00):
Yeah, so-

Diane (29:01):
'Cause we have it really, so we were talking about the other. Okay.

Dr. Riveria (29:04):
Okay. So the, the inactivated vaccine, uh, and some examples are hepatitis A, uh, the flu shot, [inaudible 00:29:11].

Diane (29:10):
Oh, okay. Mm-hmm.

Dr. Riveria (29:12):
Um, also the polio shot (laughs), because as you know, there was an oral polio, um, vaccine as well that we no longer have, but if we use, let's say just the hepatitis A vaccine, uh, for example, so that is basically the hepatitis A virus that's been killed and it basically can require several doses. And as we know-

Diane (29:34):
Mm-hmm.

Dr. Riveria (29:34):

... we get hepatitis A and then six months later, we get a, another shot. And that's again, because although that vaccine is showing you what the pathogen looks like, it takes time to mount more of a response when you're not dealing with the real thing. So it takes some time. You may require a booster. Hopefully that-

Diane (29:56):

Mm-hmm.

Dr. Riveria (29:57):

... makes sense, but each of these types of vaccines prime the immune system in a slightly different way. So of course, anything that looks the most or acts the most like the real thing is gonna have the quickest response. So as you go from live attenuated, you know, that's the quickest response, then inactivated a little bit slower, but robust response, et cetera, down the line.

Clay (30:23):

She's setting us up pretty good for ep-

Diane (30:24):

Yep.

Clay (30:24):

... for the second episode [inaudible 00:30:25].

Diane (30:26):

I think so too, we've had so much information right now to digest and to try to figure how this is applicable to us and to our families. And I gotta tell you doctor, thank you so much for putting it in average everyday terms, that we can, that we can figure this out too, because you live with this every day. We have just, as Clay said in the past, you know, 12 to 24 months-

Clay (30:53):

Yeah.

Diane (30:53):

... that's when all the virus has been in the forefront of everybody's minds, trying to figure out and get the right information. So, oh, God bless you-

Dr. Riveria (31:02):

Yeah (laughs).

Diane (31:03):

... for, for doing this, for helping us.

Dr. Riveria (31:04):

Yeah.

Clay (31:04):
A- and, and, you know, I think inaccurate information is worse than no information.

Dr. Riveria (31:08):
Yes. I, I agree with you. And then next to that is disinformation.

Clay (31:10):
Yeah, right.

Dr. Riveria (31:11):
So purposefully inaccurate information. But one thing I would like to just say regarding the mRNA vaccines, I think part of the inaccuracy and hesitance around that is that people perceive it as new. And you know, this, the use of mRNA has actually been around for 60 years. It's just that the technology has been understudy. So about 10 years after it was discovered, it started to be researched. And with the advent of nanotechnology, that really allowed very quick production of, of these types of vaccines, but the actual study, how, what mRNA does, how it's manipulated in the lab, that's been under study, like I said, for more than half a century.

Diane (31:55):
So that did just start in the early part of 2020.

Dr. Riveria (31:58):
No, it did not start.

Diane (31:58):
I mean, it didn't start from scratch-

Dr. Riveria (32:00):
Right.

Diane (32:00):
... like people were trying to say. It's too quick. It's too quick. It's too quick.

Dr. Riveria (32:03):
Exactly.

Diane (32:03):
That's not the case at all.

Dr. Riveria (32:04):
Exactly. And I think if, if you, if people are exposed to that scientific side of things, you know, they might understand more that, um, this is not just, you know, a random shot in the sky. This is, this has been studied and vetted-

Diane (32:16):

Mm-hmm.

Dr. Riveria (32:17):
... and really long hours from experts who have worked on this.

Clay (32:20):
Do you know how fascinating, fantastic and under said that point is? Think about that. The argument that this was too fast-

Diane (32:31):
Mm-hmm.

Clay (32:31):
... it hasn't been tested, and you saying it's a myth. This has been going on for some time, half a century. I think that's an important piece of information to get out.

Diane (32:40):
And a lot of people just ... that just kind of slides by them.

Clay (32:43):
Mm-hmm.

Diane (32:43):
They don't understand, or maybe they don't want to understand it.

Clay (32:46):
Right.

Diane (32:47):
Because they're the ones that ... well, they have challenges when it comes to vaccines. So we'll talk about more, but I have to tell you, if today is in the indication of the insight we'll get in the next episode, I can't wait for it. Thank you for tuning in to today's show, and be sure to join us for part two, that is coming very soon.