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QUESTIONS FROM PCMA'S MODERATOR AND WEBINAR AUDIENCE

There are so many misperceptions and myths about vaccination, specifically that vaccines cause infertility, can you address that and tell us about the myths and where they come from?

The first time I was asked about infertility and COVID-19 vaccines and it kind of took me by surprise because scientifically I had a hard time even seeing a link there. Apparently early on, when the vaccines were being developed, it was noted that there were some sequence homologies between the DNA of SARS-CoV-2, the virus that causes COVID-19, and a protein that is highly expressed in placenta. DNA sequences are made of four different bases and the order they present shows whether something is exactly the same or has some similarity. The degree of similarity here was not high, but a question was raised, and I think it's important for us as scientists to raise these questions and address them.

If you look at anything sort of lined up against something else you can always see patterns. If I took my phone number and your phone number, I bet they have some numbers in common with each other, probabilistically. But, if you call me you're not going to get you. There is a similarity but it's not high enough to be concerned that you're going to get the wrong person on the phone.

Even though pregnant women were not included in the clinical trials, there were women who got pregnant and there was no difference in those pregnancy rates versus the control groups. And now we have data beginning in December 2020 with the first Emergency Use Authorization vaccines in the general population and there's no signal for infertility.

As you've described, infertility is not a side effect, but there are some side effects of vaccines in general and the COVID-19 vaccines. Can you go over them?

For the COVID-19 vaccines (we have three that are available in the US, and there are others that are available outside the US), the side effects are typical vaccine side effects: pain, redness, and swelling at the injection site. You're probably used to getting that with other

vaccines, like the flu vaccine, for example. There are more systemic symptoms like tiredness and muscle pain, chills, fever, nausea. Again, you can get those same type of side effects with other vaccines, although I will note they seem to be a little bit more common with COVID-19 vaccines than with other vaccines. The thing about it, though, is that when you get a vaccine and then you get those symptoms and you know you're going to recover from that quickly and then you're going to be immune.

We don't really have anything to protect us in the way vaccines protect us against this virus, which can be deadly or make people sick enough to go to the ICU, and the recovery from that can be very long. For me it's a no-brainer to choose the vaccine and its possible side effects that will get better.

Those of us who rushed to get the vaccine at our first opportunity hoped that it would be an impenetrable force field, but that doesn't seem to be the case. Can you elaborate?

Like you, I hoped that with vaccines this would all just go away and we'd be done with this. But if you think about this as a microorganism, we know microorganisms and viruses evolve and this is just something natural that we expect to see. Vaccines boost our immunity, but they don't create that impenetrable forcefield. For example, the flu vaccine. We know that you can still get influenza if you take the flu vaccine, and you still should take the flu vaccine because it's going to lessen your chance of getting it, and if you do get sick you're going to get less sick because of the vaccine. The chickenpox vaccine, measles mumps vaccine, none of them are perfect and there's still a chance you could get infected with those microorganisms. Boosting immunity against these microorganisms is a helpful strategy. In fact, if we had complete immunity against all the things that we've developed vaccines against we'd be in a position, potentially, to eliminate a lot of infectious diseases.

Is mask-wearing alone, in place of a vaccine, enough to eradicate the COVID-19 virus?

Mask wearing is very important and serves an important role for preventing transmission of the virus from people who are infected with it symptomatically or asymptotically. But at the end of the day, mask wearing alone won't get us out of this pandemic because the virus would still go on. We do need to be wearing masks at the appropriate time, but it's the vaccines that are going to enable us to get to a better place.

As someone who attends conferences yourself, what would make you comfortable attending a conference or large gathering right now?

Some considerations are the number of cases that are happening in the community around the event that you might be holding and whether the number of cases is increasing or decreasing. You have people coming to your meeting who might require travel to get there, and there are exposures that could happen along the way as they're traveling to get to your venue. Then there's the setting of the event, is it indoors or outdoors? What does the ventilation look like if it is an indoor event? How long will this event go on? If it's a short period of time there's less risk than longer periods of time. How will people be positioned with respect to one another? Will they be sort of on top of each other or will there be some way of physically keeping people apart from each other? Sometimes keeping people more distanced at a meeting can make it more difficult to communicate or accomplish objectives,

but for a virus like SARS-CoV-2 spreading people apart may be helpful.

On top of that, we've learned that some behaviors are riskier than others, i.e., being with people you haven't been with before, singing, shouting and not wearing masks. Mask wearing can be challenging and hard to enforce. Even if you walk in with a mask on is everyone keeping it on and wearing it correctly? Also the question of eating.

I strongly believe in vaccination and I think we need to be doing everything we can to encourage people who are eligible for vaccines to get vaccinated. The question of requirement is somewhat outside of the medical or scientific area. I think we should be pushing to get a high level of vaccination through whatever strategies can be used, and one of those is to require it.

We've been on a rollercoaster ride of surges and variants, feeling like things are back to normal and then cases go up again. What does success look like to you right now in terms of getting through this pandemic?

From a medical professional standpoint I think, why is this such a bad virus? It's a bad virus because it's making some people very sick, landing them in the hospital and, in some cases, resulting in death. I think having the virus decrease in amount of severe cases that it's causing, with markers of hospitalization rates of infected individuals, death rates, other severe disease that might be caused by this virus is what I would be looking at. I'd love to say that we'll just get rid of it, but I don't know what's going to happen. We haven't had enough time living with SARS-CoV-2 to know whether there's going to be some sort of seasonality. I hope we get to a point where enough people are vaccinated, first of all, and then understand the ideal vaccination strategy going forward in terms of boosters. And finally, we need to understand the behavior of the virus because we still don't fully understand the enemy.

There has been a lot of talk of booster shots and if/when they might be necessary. Can you tell us what the latest thinking is?

The question applies differently to different populations, depending on when people received their vaccine. The question is how much of what we're seeing now in terms of cases is a result of waning immunity? How much is related to changes in strains that are circulating now compared to what was circulating previously and what's to come in the future? Right now, the recommendation for what I would call a third dose, or a booster, is immunocompromised patients. The theory is that they don't respond to vaccines as well in the first place and need that third dose in order to get sufficient immunity. I think it's important to acknowledge that in the US, and elsewhere, many people still haven't had a chance to get their first dose of the vaccine. It is more important for me to focus on getting those individuals vaccinated. If it's lack of availability, we need to work on getting vaccines to those individuals. If it's a concern about the vaccine, we need to have a conversation around why it's important to get vaccinated. And there are many who are still too young to get vaccinated. Hopefully soon there will be vaccines for younger individuals. After all of that we can talk about a third dose of a vaccine. Either the same vaccine or maybe

sometime in the future a reworked vaccine that looks at the circulating strains and what makes sense.

If someone had COVID-19 is that resulting immunity strong enough to not need the vaccine?

Certainly when you contract an infectious disease you do build some immunity, that's part of our immune system tracking with what you've been exposed to. What we do know, though, is that you'll build better immunity through vaccination. So even though you may have a degree of immunity through natural infection, it is recommended that you still get the vaccine on top of that.

What concerns you most about COVID?

I've realized how much the pandemic has brought out problems that have nothing to do with microbiology but that are impacting our ability to control this microorganism. Many of those were, of course, there before but they're just being highlighted so that concerns me.

What gives you the most hope about COVID?

There has been a lot of positive learning in the last 18 months. If we look at the diagnostics side, we've developed so many diagnostics for COVID-19, and usually microbiologists are behind the curtain developing diagnostics, but now we've been pushed center-stage. We have a lot of room for improvement in the way we diagnose infectious diseases and much of the possibility has been realized at a much faster rate because of COVID-19 than we would have ordinarily realized. Some of the advances that we've seen with diagnostics for COVID can be now applied to other infectious diseases. The same can be said for the vaccine side. We developed the COVID-19 vaccines at an unprecedented rate, both the initial Emergency Use Authorizations and now full FDA approval. It gives us hope for other infectious diseases where we either need vaccines that don't yet exist, or we need better vaccines as far as strategies to get them under control. Finally, I think we've learned to function differently. It has nothing to do with science, but I think you can probably reflect on how much this has changed everyday life and work.

When do you think children under 12 will be able to get vaccinated?

I don't have the magic answer unfortunately, but it's coming soon I would say. I think highly likely by the end of the year or maybe before that. It could be as early as October or November.

Regarding boosters or mixing vaccines like Pfizer/BioNTech with Johnson & Johnson or Moderna with Johnson & Johnson, are there guidelines to that now?

This question can actually apply to first and second doses, as well as boosters or third doses. The studies were of course done with each company's vaccine so that's what the approvals are for. I would encourage people to stick with that, but then what gets approved in terms of boosters may be different. It will also depend on what's available to you as

you're making the decision. It's neatest to stick with the same vaccine, that's where the evidence is.

If you're feeling sick or experiencing COVID symptoms are you still eligible for the vaccine?

Yes, if you are not yet vaccinated, please go get vaccinated, you don't need any testing before getting vaccinated. If you're feeling sick you might want to figure out why that is – and that might include a COVID test – but there are not any rules or guidelines for testing prior to vaccination.

Are the efficacy levels different for different mask materials like paper, cloth, medical respirators?

Masks aren't perfect. The main benefit of masks is not to the wearer but to others around them. For example, if you happen to be infected there are viral particles that come out as you breathe and talk. The mask is going to keep some of them contained. There may be a small amount of protection to the wearer as well, but mostly it's to everyone else. There are some masks that are better than others, certainly. A complete sealing mask or respirator N95 provides the most protection to both the wearer and those around them. Depending on how many layers and what kind of material the mask is made of can make a big difference. But perfect is the enemy of good and I don't think we can all wear N95s all the time. We've got to get vaccinated, that's our best strategy. Everything comes back to vaccination. Masking is a form of mitigating transmission but it's not a way to completely prevent it. I would still recommend mask wearing out in public when there are a lot of people around, especially indoors. Wearing a practical mask that you feel comfortable wearing rather than a contraption that is going to drive you nuts (like a complete sealing N95 might) is the thing to do.

Are we seeing the last surge and now moving into an endemic versus remaining in a pandemic?

I think it's too early to tell, certainly things have not settled down this summer. Microbes and especially viruses tend to evolve. The Delta variant is our predominant strain compared to the past in the US, Europe, and certainly much of the rest of the world. The Mu variant has been brought up in the news recently, and there are others that are being watched for whether they have increased transmissibility compared to wildtype, whether they cause more severe disease, whether they affect different populations, among other things. Earlier I mentioned seasonality and what's going to happen this winter. The answer is we don't know between the virus, where we're at with variants, human behavior, vaccinations, etc. I believe the WHO declares the end of the "pandemic" but it's a bit semantic at that point, I don't think the virus is going away. But I am hopeful that maybe once we get more people immunized, we can decrease the numbers of seriously ill individuals in our hospitals and those still dying of this terrible virus.

What if someone doesn't want to get vaccinated because they want their dose to be used for someone in another country that doesn't have good access to vaccines yet?

I'm going to use reverse logic on this. We need to get our population vaccinated because we're privileged to have access to vaccines now. What ends up happening is we make every effort to make them available to people and if they are not taken, we continue to try to convince people and we end up wasting some vaccines through that process. Once we get everyone vaccinated then we're able to look at how much vaccine we have left to be able to make it available to places that doesn't have as much access. So, by getting vaccinated now, we get to that point faster. To think about it another way, we need to decrease the amount of circulating virus and we know vaccines help with that. Unfortunately, we know the virus can still circulate in vaccinated individuals but it's driving us in the right direction. By getting vaccinated you're not only helping yourself, you're helping those around you and really those in the rest of the world by making the population more immune to the virus.