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Breaking Down Barriers to Accessing mRNA Medicine

Announcer:
Welcome to *Innovations in Medicine,* sponsored by Moderna. This is a non-certified educational series produced and controlled by ReachMD and is intended for healthcare professionals only. Here's your host, Dr. Charles Turck.

Dr. Turck:
Welcome to ReachMD. I'm Dr. Charles Turck, and joining me today to explore barriers to accessing mRNA medicine are Dr. Laila Woc-Colburn and Dr. John Cooke. Dr. Woc-Colburn is an Associate Professor at the Emory University School of Medicine. She's also an attending physician on the Infectious Diseases Consultation Service at Emory University Hospital.

And Dr. John Cooke is the Director of the Center for Cardiovascular Regeneration, and Medical Director of the RNA Therapeutics Program at the Houston Methodist DeBakey Heart and Vascular Center.

Let's start by taking a look at this in the context of the COVID-19 pandemic. Dr. Woc-Colburn, what has the pandemic taught us about mRNA medicine?

Dr. Woc-Colburn:
Well, mRNA medicine was a game-changer for us. It gave us the possibility of developing two vaccines in a very, record time of productions. The field has been transformed because of COVID-19, and being able to test out, mRNA against SARS-CoV-2.

Dr. Turck:
Now, Dr. Cooke, would you tell us about the disparities that have impacted the public's ability to access this medicine?

Dr. Cooke:
That's a great question, Dr. Turck. Initially, the accessibility to the RNA vaccines was a problem for everyone. Manufacturing was an issue. RNA vaccines had not been made at this scale ever. So, manufacturing had to be scaled up. And that was a big risk to start scaling up the manufacturing before there was any evidence that the RNA vaccine was going to work.

Operation Warp Speed assisted with that risk, because the government shouldered some of that risk by providing funding for scaling up the manufacturing also helped with logistical issues and mandated that contractors had to supply the vaccine re-agents that were necessary for going forward and to address the issue in large scale.

So once those manufacturing issues were resolved vaccine accessibility in this country was less of a problem. 80 percent of our population has received at least one vaccination, and 70 percent are fully vaccinated. So in this country accessibility to RNA vaccines really is a matter of choice.

And one interesting study that was published back in January from University of North Carolina researchers showed that a major obstacle to vaccine administration was education. So individuals that had a high school education or less, were less likely to get the vaccination than those that had a college education, for example. So education remains somewhat of a barrier in this country. And I think we need to do a better job of educating the population about the benefits and risks, but the benefits that outweigh those risks for vaccination.

So, accessibility to RNA vaccines remains a problem in low- and middle-income countries. And that's also an issue that is going to have to be partially addressed by government industry collaboration. And the establishment of manufacturing facilities in those low- and middle-income countries is going to be necessary with some agreements between industry and collaboration with governments to do that specifically around intellectual property that allows that manufacturing to take place.

Dr. Turck:
And as a quick follow-up to that, Dr. Woc-Colburn, how have these disparities impacted the distribution and even the public's perception of mRNA medicine?

Dr. Woc-Colburn:
Yes, it's an important question. One of the things is because mRNA vaccines are kind of new in the field. There was a lot of mistrust, and misinformation throughout. One thing is knowing that a lot of folks thought that this was something that we just created, over the pandemic, and that is, not being on trials for several decades. The other part was the misinformation carried by social media, especially about myths. You know, going from interfering with the G5 to having, a magnet and they will show you putting a spoon around there on a TikTok, or for example, saying that the government could track you, because you had this new quote-unquote, chip in you because of this. That it was altering your genetic material and that you were going to mutate and become like a zombie or something like that. So, the disinformation was something that was very hard, and is still very hard to fight today. Secondly, the other part, especially in underrepresented minorities, and people of color, bipods, it's that there's been traditionally, mistrust of science, and that has to do with clinical trials like the Tuskegee, the HeLa S3 cells, and a lot of other things that have happened. And, so that created a lot of mistrust in the African American, as well as the Latino, community about treatment. So that had a big impact in trying to vaccinate and have an acceptance of the vaccine throughout the different communities.

Announcer:
For those just tuning in, you're listening to *Innovations in Medicine* on ReachMD. Dr. Charles Turck is speaking with Dr. Laila Woc-Colburn and Dr. John Cooke about what we've learned about mRNA medicine from the COVID-19 pandemic.

Dr. Cooke:
I think one of the major hurdles to message RNA medicines in general is delivery. At the moment, the RNA vaccines were delivered using lipid nanoparticles. And those work brilliantly for vaccinations, not quite so well when systemically administered because the lipid nanoparticles tend to aggregate in liver. If you're treating liver disease, that's fine. If you're trying to treat brain or heart or any other organ, the lipid nanoparticle distribution to the liver is a problem that is being resolved. There's several companies that are making progress on this issue, either by targeting the lipid nanoparticles or developing the lipid nanoparticles that are longer circulating that aren't taken up as avidly by the liver. So that's a problem that I think will be resolved.

Another issue with mRNA vaccines or, mRNA medications in general, is that the RNA doesn't persist for very long. That's not a problem if you're delivering a vaccine, you only need the antigens to be generated for a few hours, days, perhaps. The problem becomes when you're trying to do replacement therapy, and trying to replace an enzyme that's deficient, for example, because the RNA medication doesn't last quite as long. RNA has a short half-life. The protein that's generated may last longer, for days, but then it's gone, because the RNA is transient.

There are more durable RNA molecules being generated. For example, circular RNA persists for days rather than hours. So that was very promising. And then self-amplifying RNA provides for more RNA molecules which are generated within the cell by the self-amplifying RNA. So there's some solutions coming down the pike for the durability of RNA, and for the amount of RNA that has to be given to achieve the desired effect.

Dr. Turck:
If we focus on disparities for a moment, Dr. Woc-Colburn, how could we improve access to mRNA medicine?

Dr. Woc-Colburn:
It's a great question, and it's a question that we've been actually, asking ourselves, in the last years. One thing in that we're seeing is that we lack representation of the different minority groups in our clinical trials. So, people of color, African Americans, Latinos, Asian Pacific Islanders, and Native American indigenous folks are not equally represented in clinical trials. And that is important, if we're not going to know how the mRNA treatments are going to affect different people. So, increasing, representation and increasing, the participation is going to also break down that barrier on, not accepting it, and that is, in building a trust again.

The second part is doing a breakdown of the technology in layman's terms. It's a new technology, quote-unquote, and we all fear new technology. We all fear things that we don't know. So, by explaining it in an easy way, and in layman's terms, to our patients, there is going to be a better acceptance. And with that, we also want to be culturally sensitive and so put it in their language that they understand. So if they are Vietnamese, speak in Vietnamese; if they are Latino, in Spanish, in languages that they are able to understand, and then using the community outreach programs to help education. one thing that we lack is a lot of health education, and trying to explain how the treatments work, especially in mRNA that they're not going to affect their body. It's not going to change them. It's key in order to have a good success.

Dr. Turck:
Now, looking to the future, Dr. Cooke, what therapeutic developments might we expect to see in this area?

Dr. Cooke:
I think the future for RNA medicines is almost limitless. And I'm specifically referring to message RNA right now. But remember, there's other RNA molecules that have therapeutic application, but just focusing on message RNA for a moment, once some of these hurdles are addressed, in terms of the durability of the RNA and its persistence, the amount of RNA that needs to be delivered to achieve an effect the delivery vehicles once those obstacles are achieved, the opportunities are almost limitless.

At our Center for RNA Therapeutics, we are helping small companies and academic groups get their RNA ideas to the clinic. And we're seeing a lot of really interesting ideas. We're kind of at the bottom of a funnel here, seeing wonderful ideas passing through. We're helping people with their RNA vaccines for cancer, for example. RNA vaccines against infectious diseases of all types of parasites and viruses and bacteria.

And then applications for other fields. We are working on regenerative medicine applications and others are as well. RNA molecules that enhance the proliferation of cells or the rejuvenation of cells where we've seen molecules that replace a receptor that's deficient. One can also do gene editing with RNA molecules. The replacement of enzymatic deficiencies is something that's ongoing. Right now, several companies developing RNA molecules against diseases of intermediate metabolism. So, lots of opportunities for RNA vaccines, for RNA therapeutic molecules going forward.

Dr. Turck:
Well, with those forward-looking thoughts in mind, I want to thank my guests, Dr. Laila Woc-Colburn and Dr. John Cooke, for joining us to share their perspectives on how we can overcome obstacles in accessing mRNA medicine. Dr. Woc-Colburn, Dr. Cooke, it was great speaking with you both today.

Dr. Woc-Colburn:
Thank you for having me. It's wonderful, always, to be over here at ReachMD.

Dr. Cooke:
Thanks.

Announcer:
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