December 22, 2020

CONVERSATIONS WITH MIKE MILKEN

Esther Krofah, Executive Director, *FasterCures*

Sir Andrew Witty, Co-Leader, COVID-19 Vaccine Development, *World Health Organization*; President, *UnitedHealth Group*

George Yancopoulos, President and Chief Scientific Officer, *Regeneron*

Mike Milken: I'd like to welcome three individuals that have played an unbelievably important role this year. Sir Andrew Witty, former CEO and head of one of the world's leading pharmaceutical companies, GlaxoSmithKline, who came to lead as the president of United Health and the CEO of Optum, and took a leave of absence earlier this year to lead the effort to accelerate work on a vaccine for the World Health Organization. George Yancopoulos, and George is a chief science officer and co-president of Regeneron; for emergency use their antiviral combination has been approved and has had a major effect already in the world on those that have been afflicted with this virus. And Esther Krofah. Esther has not only put herself, but her entire team on the line this year with the idea that they would on a daily basis update what was going on with all vaccines and what was going on in antivirals.

Esther, I'd just like to start with you, if I could. Where do we stand? What vaccines have gone into humans and how has this been distributed throughout the world?

Esther Krofah: Thank you so much, Mike. It's been an incredible effort on behalf of the entire team to update this COVID-19 tracker, really on a daily basis; there are about five to six who are working on it. And let me take this opportunity to thank them for their efforts. When we look across the world there are over 237 different vaccines in development; there's no part of the globe where medical research is not happening to try to find a cure for COVID-19. Over 50% of these development efforts are happening either in the U.S. or Western Europe, but we also see number of programs that are happening across

China, as well as Russia. In fact, 34 different candidates that are in either pre-clinical or clinical testing.

But we also see in parts of Africa we have 38 candidates that are in clinical trial in some phase and nine that are in Phase Three. We're tracking 319 different treatments that are also in some phase of testing for COVID-19, whether we're talking about antivirals or antibodies, even devices that are being contemplated. So, the scale is incredibly enormous. I think about this as a really a worldwide response approach. But even as we're seeing a vaccine in broad use, we can't let our foot off the gas with the progress that we've made so far because we really need many, many options on the table to reach over seven billion people around the world that we need to protect from COVID-19.

Thank you, Esther. Sir Andrew, your own experience and career gives you a perspective that's quite unique. The head of one of the world's leading pharmaceutical companies, the president of one of the world's leading healthcare providers and insurers, and lastly, the World Health Organization in a worldwide effort to accelerate vaccines.

Andrew Witty: Mike, it's great to be here. Back in March I had a call from the World Health Organization to invite me to co-lead their response, and then that developed into co-chairing with Ngozi Okonjo-Iweala, who's hopefully going to be the next World Trade Organization president, a lady from Nigeria. But the two of us would co lead the broader global response called ACTA; that's Access to COVID Tools Accelerator. That goes beyond vaccines, Mike, so that includes diagnostics, includes drugs, and includes provision of PPE and oxygen globally, but particularly with respect to maybe the 100 lowest-income countries.

> ***"We can't let our foot off the gas with the progress that we've made so far because we really need many, many options on the table to reach over seven billion people around the world that we need to protect from COVID-19. "***
>
> \- ***Esther Krofah***

That's been a fascinating role for me to play. What you're seeing is an unprecedented level of collaboration across all of the world's major health agencies, whether that be WHO, Gates Foundation, Wellcome Trust Global Fund, UNICEF and others – really quite extraordinary engagement. I chaired that coalition, the principals of those organizations came together every Thursday trying to make sure that as a comprehensive program we stepped forward on all of those dimensions of

diagnostics, therapeutics and vaccines. We did it on a global basis and we tried to tackle some of the big issues; not just capacity expansion, procurement, but also things like indemnification for untested or very early on unproven technologies in emergency use situations and that type of thing.

If I look at the pharmaceutical industry, I think you've seen an extraordinary level of step up, both in terms of the acceleration of innovation and that willingness to deploy new platforms and technologies, but also the collaboration that you'll see between companies within the industry; large companies, small companies, engaging with academia and engagement with government.

And then if I look from a UnitedHealth Group perspective, and we have about 58,000 physicians in the U.S. alone, it's been an extraordinary year for them as well. And, if you just look at the way in which the health system helped to make sure liquidity was made available to hospitals and physicians on behalf of the government. If you look at the way in which United came out really in the first few weeks and committed to any imbalances so any windfall gain that might accrue to the insurance company because of under-utilization of health resources, that would be essentially neutralized back to the payers and there will be no advantage taken. And then I've just got to acknowledge the clinical staff within Optum who have been literally on the front line 24/7 since this began in the U.S. Our nurses, our doctors, our clinicians generally have played an extraordinary role to respond and to maintain a compassionate-ready 24/7 service for patients.

Thank you, Sir Andrew. George, when I think of an individual or a company that is mission driven, Regeneron is one of the first I think about. Take us inside of Regeneron and the decisions that were made to put you in a position to where you are today to provide these antiviral treatments to people that have come down with COVID-19.

George Yancopoulos: The story really starts long before the beginning of this year. It's the dedication of thousands of scientists as we built our company to develop breakthrough new platforms and technologies that can deliver new medicines, biologicals, antibodies at unprecedented speed and with unprecedented precision. We had mobilized likewise before to respond to other epidemics; the first FDA approved treatment for Ebola came out of our laboratories using these platforms and technologies that we built internally over the years. We did likewise for MERS; luckily that epidemic did not really materialize. So when the first accounts of this potential new infection started at the beginning of the year, our team jumped in.

You heard from Esther how many efforts worldwide are ongoing to bolster all these vaccine efforts, and World Health Organization is involved as Andrew mentioned. Vaccines are so critical, but despite the best efforts to get vaccines to enough people to really end this tragedy, we're going to need to treat the people who are already infected and keep them out of hospitals, keep them from suffering from severe disease, keep them from dying.

And so we had showed that our technologies produced these antibody-based antivirals. For example, in Ebola, which is a much more universally lethal disease, that they had dramatic survival benefits. We reasoned the same might be true here. The team really jumped on that. They started making these antibodies, but we also recognized the need to make as much of these antibodies as possible and deliver them to as many people as possible. We also simultaneously made the big decision to clear out our North American manufacturing facility; it's one of the world's largest bio-manufacturing facilities. We moved all of our products from it to Europe so we could make this potential antibody cocktail that we hadn't even made at that point yet. We did everything at-risk, with the fear, of course the hope was that this pandemic would not materialize. But, we realized it was our obligation.

"If you compare the trillions of dollars committed to stabilize the financial systems to the billions of dollars, which are being committed to stabilize the health system, they don't compare. They really don't."

\- ***Sir Andrew Witty***

Our team delivered a very potent antibody cocktail, the first one to receive emergency use authorization in the United States. Right now it's approved via the EUA [Emergency Use Authorization of the FDA] for infected patients who are at the early stages of the disease to keep them from progressing. And it looks like it can have profound ability to prevent people, particularly high-risk people who are at the most risk of requiring hospitalization and doing badly, from progressing to that point. We are over the next month or so providing about 300,000 doses through the Department of Defense and the U.S. government to the United States.

We entered into a major relationship with Roche Genentech, one of the, if not the largest, bio-manufacturers. They decided to join us at-risk before they even knew that our cocktail was effective. They knew that the startup time until you can get your manufacturing facility actually making your doses takes at least six months. Together

we're hopefully going to be producing at least a few hundred thousand doses a month starting next month [January 2021]. The challenge is that until the vaccine comes along, that may just be addressing a small percentage of the individuals who are getting infected and who are going to be at risk.

You can be saving thousands and thousands of lives, but if we can't collectively as a life-sciences community figure out how to make even more of this antiviral antibody cocktail available to people, unfortunately we're not going to save as many lives as we can until we get widespread herd immunity from the vaccine. So, I'm really proud of how everybody at Regeneron did everything they could do to really step up, whether it was the people in the labs who really designed, created and used our platforms to make the antibody cocktail; whether it be our manufacturing capabilities; whether it be our clinical people who designed and did all the clinical trials.

"Mankind is facing truly existential threats, not only from disease, but from environmental disasters and climate change. The answers to almost all of these must involve science. If we don't have the fundamental belief in the science, but also in the ways that we innovate in science … and frankly in our free enterprise system, we will have no chance beating these existential threats"

- ***George Yancopoulos***

We have clinical trials ongoing to see whether this can help late-stage patients and also whether it can also help at earlier stages before vaccines. If you have a widespread outbreak, let's say at a nursing home, it's too late to use a vaccine at that point. But our treatment is being tested in those sorts of settings as well. So, there's enormous need, there's enormous good we think we could be doing with what we're doing now. We're just humbled by how big the problem is, and how if we as a society and a life-sciences community had been a little bit better prepared, maybe we could even be doing more to save more lives.

Sir Andrew, you've seen companies taking enormous financial risk, shutting down manufacturing to prepare to produce products before they even know they would work; collaboration between significant competitors – Roche Genentech and Regeneron teaming up; companies like Gilead opening up their patent libraries for people to make their products, and whether they're in Pakistan or India without royalties. Is this the future? Will this change, in your opinion, how life sciences work?

Andrew Witty: Well, first of all, I hope there'll be fewer skeptics about the life-science industry after this than there were before. I think the teams of people like the Regeneron and those in academia as well, have really demonstrated their humanity, they've demonstrated their willingness to put others first, and they've also shown that there is enormous depth of innovation. There's always a lot of technology that isn't quite ready for primetime, but what this has done is it's accelerated a whole wave of that in areas like vaccines and therapeutics, and of course also in diagnostics. So, I hope people will admire that. I don't think anybody's done any of this for praise. They've done it because they felt a sense of solidarity with their families, their neighbors, people they've never met before who were in an extraordinarily tough position.

None of the issues that we've dealt with here are really new issues, Mike. As George referred to, none of the ideas about building capabilities and new ideas, they were just never adopted. Nobody was willing to commit to it. Nobody was willing to accept that there might be a worse situation than the one that they just dodged. We're in the middle of a really bad one. It's not over yet, but it could have been a lot worse. And as George referred to, he's worked very closely, very successfully on an extraordinarily dangerous pathogen like Ebola.

I think the real test is, are we willing to do for life sciences and global defense what we were willing to do for the financial environment in the 2008 financial crisis? Because if you compare the trillions of dollars committed to stabilize the financial systems to the billions of dollars, which are being committed to stabilize the health system, they don't compare. They really don't. And even in this crisis, if you look at what's been invested to keep economies going through stimulus, and rightly to keep people on payroll, to what's actually been invested in terms of fixing the problem not simply dealing with the symptoms, it's an order of magnitude difference.

We're spending an order of magnitude more money to make sure that we're dealing with the economic consequence than we are actually resolving the issue. So, to the point George is making, how do you massively scale antibody production? We'll have two or three billion doses of vaccine next year. Well, that's a billion-and-a-half people; that's about 20% of the world population. It's not everybody. So how do we fix that? I think that is the issue to really address.

I think the behaviors through the crisis have been exemplary, but we've had way too many people who've been having to build really fundamental new supply chains, new technologies, new ways of working in the middle of a crisis, much of which should have been ready to go before the crisis. I want to see as we come out of this, I want to see G7, I want to see the G20, I want to see the key leading countries step forward and accept that COVID probably won't be the last threat of this scale that we have to face.

We need to make sure that we have in place the right platform and foundations for the next go round. Then I think you'll see these great behaviors of collaboration, of inventiveness, of risk-taking, of cleaning out the bureaucracy. I think those will become standard ways of working, and not only will they be beneficial in preparedness for a pandemic, they'll help us develop the next cancer drug more quickly. We'll get the Alzheimer's programs moving more quickly. We will learn a better way of working, not just to the effect of pandemic defense, but broader life-science delivery and improvement in healthcare for folks worldwide.

"I think that the life-sciences industry is at a really critical moment, because what we're seeing in terms of the progress has to translate to individual lives. People have to see the effect of the benefit of the vaccines and the therapeutics changing their own life circumstances to believe in the promise of the future."

- ***Esther Krofah***

Esther Krofah: I actually also think that the life-sciences industry is at a really critical moment because what we're seeing in terms of the progress has to translate to individual lives. People have to see the effect of the benefit of the vaccines and the therapeutics and changing their own life circumstances to believe in the promise of the future. And so the reason why I say it's a critical moment is because we have that science really almost at our fingertips, but we have to do that hard work of the distribution, of working with local communities, of the partnership bringing people along through that journey.

The public probably now more than ever before are familiar with clinical trials, right? Clinical development. What does medical research look like? They understand Phase One, Phase Two, Phase Three clinical trials. But if they don't begin to see that in their own individual lives, not just for COVID, but for other chronic conditions, we might lose the

momentum for bringing more people into the medical research community. I think we are at this juncture where absolutely the life-sciences industry has shown us the promise of science, and the people also have to see the benefit of that in their own day-to-day lives.

Esther, as we think about the creation of FasterCures and the concept decades ago that time equals lives, what have we learned in your opinion about accelerating medical solutions, as Sir Andrew and George have addressed here that we're going to carry forward?

Esther Krofah: We've talked a little bit about the platforms that we need to invest in moving forward. I just want to re-ground us that 1.7 million people lose their lives every year to chronic conditions. And we have 30 million-plus people who live with a rare disease. We do have this opportunity to take learnings coming out of COVID and accelerating medical research for those conditions as well.

> ***"Money has been used to buy down risk and to buy acceleration. That's why these vaccines have taken eight months and not eight years. So that's a lesson. If we crowd more resources in, we can bring faster cures not just for a pandemic threat, but for a broader healthcare agenda."***
>
> \- ***Sir Andrew Witty***

We have seen the FDA respond in a way that is remarkable: being able to provide guidance documents and provide regulatory flexibilities, many which existed before, but the speed and the pace in which they're doing it, looking at things in an iterative fashion. We can see the potential of other disease conditions. When we think about clinical-trial design, we need to certainly have patients involved in the process, not responding just out of a pandemic, but clinical-trial designs and how we can leverage a platform for making sure we have enrollment for diseases where there are smaller patient population and master protocol designs. These are opportunities. How do we design these platforms in terms of data standardization? What's quality evidence? How do we use that in a real-world setting?

And finally, what we've seen through COVID, which is devastating, is the impact on minority populations, right? The black community, the Latinx Hispanic community. The entire healthcare system has stopped and said, what can we do differently? What can we do better? We have the opportunity to learn from these examples. We can certainly

bring that, going forward, into these other disease conditions. Where are the unmet needs? Where is the public health burden? And then the apparatus from the entire ecosystem wraps around a question and tries to solve it.

George, it wouldn't be surprising that some people in the population would wonder why they would go into a clinical trial today. You have vaccines that are approved. At some point, there'll be available to all of them. But in many ways clinical trials might be more important today than they were a year ago. As we've discussed, there are still going to be millions of people unfortunately in the world that get COVID-19. And as we are trying to move so many other therapeutics, what's your message to the citizens of the world of the importance of clinical trials today?

George Yancopoulos: Well, actually I want us to take a step back to something that Esther was talking about, also that Andrew touched upon. We actually viewed the challenge of this pandemic as much more important than just this pandemic, which as we all know is so catastrophic in its individual implications. But we thought that the implications of how we responded as a life-sciences industry was actually much bigger than COVID-19.

> ***"You can be saving thousands and thousands of lives, but if we can't collectively as a life-sciences community figure out how to make even more of this antiviral antibody cocktail available to people, unfortunately we're not going to save as many lives as we can until we get widespread herd immunity from the vaccine."***
>
> \- ***George Yancopoulos***

I, like many others who have devoted their lives to science, believe that mankind is facing truly existential threats, not only from disease, but from environmental disasters and climate change, from so many challenges. And the answers to almost all of these must involve science. If we don't have the fundamental belief in society, in the science, but also in the ways that we innovate in science, belief and trust in the life-sciences industry and frankly in our free enterprise system, we will have no chance beating these existential threats as a species and the future of mankind was at stake. I think that we have started to deliver on the vaccine potential, on these antibody cocktails and antivirals and so forth.

But we have to show the world that we can successfully bring back normal life in society. We can use the science to defeat this pandemic, and I am hoping that that resurrects

the trust and the faith in the things that got us here. It's not what we did in the last six months or the last nine months that will have led to saving us from the pandemic, if we can successfully complete these efforts that we've undertaken, it will have been the decades of investments in science, technology and platforms that put us in a position to respond. And we can certainly do better as a society being better prepared. I think we have to build manufacturing capacity and all that, but none of that matters if we're not constantly innovating, if we're not constantly creating new abilities, new technologies.

"1.7 million people lose their lives every year to chronic conditions. And we have 30 million-plus people who live with a rare disease. We do have this opportunity to take learnings coming out of COVID and accelerating medical research for those conditions as well."

- Esther Krofah

Twenty years ago you couldn't make antibody cocktail antivirals. Twenty years ago, there was no such thing as mRNA vaccines. Much of it starts in academia, but so much of it depends on investments that people are willing to make at-risk in the private sector. We need a very robust and interactive ecosystem that includes a very robust life-science industry. And I am really hoping that we do respond successfully to this pandemic, that the vaccine, the antivirals, the antibodies, that we really collectively all make a difference and that the world right recognizes and regains its faith and trust in the ability of science and in the need for innovation and the need to incentivize for innovation, and that our free enterprise system actually works.

Esther Krofah: I would also say likewise in terms of funding for traditional public health, like the CDC that we have traditionally underfunded. I do think right now we have this incredible opportunity to realize the importance that they make in terms of any response. The science and helping us be prepared really falls to a lot of these public health agencies. When we have budget lines and need to find some savings, they're usually the first to go. So, I think it's a balance. The contact tracing, the testing, the diagnostics, a lot of that really includes our public health colleagues. So, we need to make sure that that sector is just as funded as we continue to see what's coming out of life sciences.

Andrew Witty: I think the point you make Esther and public health is a really important one. The other thing I would say is it's been remarkable the degree to which

exceptionalism has been revealed through this crisis. How many times we've seen a country watch another country go through a tough experience, somehow convince itself that it wouldn't happen to them. We need to really open up our minds to accept that we're all humans, we're all going to have somewhat the same experience plus or minus, and we need to start working together to understand some of that.

To your point on funding, CEPI [Coalition for Epidemic Preparedness Innovations] is really important. It's one of the critical bricks within the whole foundation. CEPI is one of the very few things that we did manage to get established after the Ebola crisis, essentially investing in novel vaccine technologies agnostic to what the next threat might become. And as we came into this crisis, four or five of their platforms they've invested in are among the lead vaccines. And right now, CEPI is going to run out of money because they said, 'look, we need to do something for COVID.' There's a real risk as we stand, Esther, that organization won't invest and back the entrepreneurial startups who are coming forward with new vaccine ideas stimulated by COVID. I'm not going to get the kind of funding that was available five years ago, because those agencies aren't being topped up right now.

"There's obviously going to be hundreds of thousands, millions of people, for whom the vaccine will be too late. And for those people, the only opportunities are either therapeutics that are already accessible to some degree like ours or entering clinical trials to see if the next generation of therapeutics may also broaden the impact."

\- ***George Yancopoulos***

If you look at the WHO's assessment of what it would take to essentially deliver a stabilizing amount of technology, vaccine, diagnostic, and therapeutic on a global basis, excluding the U.S. and Western Europe – so we're talking really about the developing and the emerging economies – it's about $30 billion to $40 billion. That would get you about two billion doses of vaccine. It would get you 500 million tests, 250 million courses of therapeutic plus all the R&D involved, plus the delivery, everything else.

Now contrast that to $25 trillion of economic destruction in the last nine months. And then realize that $30 billion to $40 billion is bigger than the annual global aid budget of all governments. So, if you wake up in the morning thinking that you're going to fund that through aid – never going to happen, because the requirement just to tackle this

crisis is bigger than the total global aid budget. So, you have to rethink the prioritization of health investment, and how you stimulate that.

Now I'm 100% with George: one of the key levers that needs to be done is, how do you get more private sector funding to support innovation risk-taking? Because if governments don't want to fund it directly, they can use all sorts of other mechanisms to make it more attractive for private capital to be crowded into the kind of areas that George and others are operating in so that these companies can expand quickly. They can pursue five platforms in parallel instead of two. They can take five years off a program. What we've seen this year, no material corners are being cut because money has been used to buy down risk and to buy acceleration. That's what's happened this year. That's why these vaccines have taken eight months and not eight years. So that's a lesson. If we crowd more resources in, we can bring faster cures, not just for a pandemic threat, but for a broader healthcare agenda.

> ***"I'm not sure is whether or not this is a short-term memory effect or a long-term memory effect. I think we have to not let any time be wasted in really ensuring that the voice of the people and the needs of the people worldwide are heard; this is a core issue for leaders, the private sector, and most crucially the public sector to really commit long term."***
>
> \- ***Sir Andrew Witty***

George Yancopoulos: And Andrew, I agree totally, but we've got to keep the focus on the early stages as well. Obviously public health issues are important. The late-stage stuff is important. But if you don't have the investment in the early new technology building, like I said, 20 years ago we didn't have any of the technologies that existed in the last year to respond. And it was the private sector investment to the tune of hundreds of billions of dollars. You have to incentivize individuals to take the risks, understanding that most new efforts are going to fail.

If we don't fund the early investment and incentivize people to take those risks, we're not going to have the new technologies are going to lead to the new medicines: obesity, diabetes, Alzheimer's, those epidemics are going to destroy society as we know it. We have no game-changing new therapies for these diseases that are coming in epidemic proportions. We have to recognize that we need new technologies, new ideas. And about exceptionalism, the most important thing that I think that as a society that

we have been not focusing on is finding the exceptional individuals; we have to embrace, acknowledge and celebrate kids who have that ability. And we have to nurture them because those are the only people who are going to be able to come up with solutions for these problems.

Sir Andrew, you pointed out the cost – $30 billion, $40 billion. It's a small cost relative to the world's economy. What is the cost of all alcohol abuse? What's the cost of smoking to society? What's the cost of obesity? You're now talking $800 billion a year, a trillion dollars a year. There are significant investments throughout the world in a standing military, when we can see here the enormous costs going forward of not being prepared from a life-science standpoint on the planet.

"Twenty years ago you couldn't make antibody cocktail antivirals. Twenty years ago, there was no such thing as mRNA vaccines. Much of it starts in academia, but so much of it depends on investments that people are willing to make at-risk in the private sector. We need a very robust and interactive ecosystem that includes a very robust life-science industry."

\- ***George Yancopoulos***

One of the areas, Esther, which we've spent a lot of time talking about is philanthropy. And 3% to 4% of all of the quote R&D that you were relating to George or Sir Andrew, really has come through philanthropy. It's really the venture philanthropy. And we are looking for a tremendous increase. Some countries have adjusted contributions if you gave them for medical research, so you'd get a higher tax deduction to encourage people in this area.

But as we go forth, I'd like to come back and address one more time this issue of clinical trials and why a person should go into a trial today as it relates to COVID-19. We can understand in the future that everyone who has served in these clinical trials has been a hero that has changed the course of medical research. Esther, let me start with you. What is the call to action of the importance of going into clinical trials today and continuing with them as it relates to COVID-19?

Esther Krofah: You're raising a really important point in terms of where can we realize insights that can benefit different patient populations. And if you see disease burden in a particular population that suffering from, whether it's chronic heart failure or they're suffering from a rare disease, they need to participate in that medical research to benefit

from the cutting edge of science. And that can then translate to broader populations. I think many times we tell people that your insights today are not for you, but they're for someone else. I think we need to do both. In the case of COVID-19, we need to continue the clinical trials, because as George mentioned earlier, we're not quite there yet in terms of solving everything.

We really need to continue the other vaccine development efforts as well, because we need billions of doses around the world. And two companies are not going to satisfy the seven billion dose need. We need to continue from a therapeutic perspective that, we have cocktails of things that could be effective. But we need to continue to look at all of the different manifestations of this disease in the body, and those clinical trials need to continue; not competing for enrollment, but leveraging what we unfortunately are still in the midst of this surge, leveraging that to get enrollment all around the country and around the world where these clinical trials are happening. So, absolutely I think for the benefit of both society today and tomorrow, we need individuals to understand what the importance of their participation is. We need these efforts to continue.

George, you told us maybe manufacturing 200,000 doses a month, and with Roche maybe you double that when they come on in January. We've seen in the United States, 200,000 people diagnosed in one day. What is capable of ramping up your production to deal with the millions of people that can be diagnosed with COVID to lessen their symptoms and what occurs?

George Yancopoulos: When we joined with Roche and we thought that maybe we could be providing a quarter of a million or maybe half-a-million doses a month to treat infected people. We thought that that could be a huge contribution. When you're looking at the numbers, just in the United States of a couple hundred thousand people a day who are getting infected, you realize how huge and vast the problem is. It does not seem at this point possible that just the antiviral cocktails themselves are going to be able to address that problem, which is why we need the collection of tools that Esther was talking about.

It also goes to your question about clinical trials. There's obviously going to be hundreds of thousands, millions of people, for whom the vaccine will be too late. And for those people, the only opportunities are either therapeutics that are already accessible to some degree like ours or entering clinical trials to see if the next generation of therapeutics may also broaden the impact to additional people as well.

It's a humbling problem. It shows how easy it is for nature to just overwhelm us and how hard it is for us to fight back. And the only thing that we have to fight back with are

brains and science. We have to do a better job hopefully in the future of being more prepared going forward, which means like we've all been saying, better strategic investments across the board in so many parts and sectors of this ecosystem.

The realization that no one is really safe unless everyone has some degree of safety. I know over the last five decades I've tried to talk to people who've just been diagnosed with a life-threatening disease, because at that point they are the most focused. You don't have to go very far anywhere in the world today to find a person who might be diagnosed with COVID. Do you think we will have a fundamental change in how we view the world going forward?

Andrew Witty: I think this has deeply affected many people in influential positions. I've seen a number of governments, just to pick one example, that were very quick to secure for themselves vaccines supply, but at the same time, committed enormous amounts of resources to ensure much poorer countries, developing countries, could get some degree of confidence and protection. They understood immediately that this was of course a domestic issue, but it was also a multilateral issue. I would say the European Union, the British, the Canadians, the Australians, many others have stepped into that space.

And I'm very proud of what's been achieved through the COVAXX global vaccine effort, which has really mobilized and is going to deliver a huge vaccine quantum for countries that either are too small to negotiate on their own, even though they have money, or they just don't have money. And there's now 195 countriess in the COVAXX operation. I think that is the single biggest multilateral effort ever undertaken in the world, which is really extraordinary. And it's been fueled by the multilateral mindset of a whole series of companies.

So I do think people have been affected, Mike. What I'm not sure is whether or not this is a short-term memory effect or a long-term memory effect. I think we have to not let any time be wasted in really ensuring that the voice of the people and the needs of the people worldwide are heard; this is a core issue for leaders, the private sector, and most crucially the public sector to really commit long term.

I just make one last comment. Scientists have been really given the time to explain their science and have found within their ranks great communicators who have been able to talk to large audiences in a super compelling and authentic way. They don't often get the chance to share what they're doing, and where that's happened I think we've begun to see real engagement from populations and real trust being developed. We will

continue to mobilize as a community to make sure we don't forget anything that we've been taught in the last eight months.

Well, I want to thank all three of you for joining us today, but I particularly want to thank you for your dedication and commitment to the life sciences. And maybe the lesson from this year will be the awakening of humanity worldwide Thank you for joining us and good health to you.
