



CONVERSATIONS WITH MIKE MILKEN



Andrew von Eschenbach

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Mike Milken: Andy, thank you for joining us today.

Andrew von Eschenbach: Mike it's always both productive and certainly a great pleasure to join you and be with you.

Andy, you and I have devoted much of the last 50 years of our life to accelerating medical research. We've worked as a team for decades, but never has it been more important to find a solution in a short period of time. You have served our country as the head of the National Cancer Institute, as the head of the FDA. If you were running those two organizations today and were told we only had 60 days to get this under control, what would you be doing?

Michael, you and I have both witnessed this disease as well as cancer not just taking individual lives, but destroying lives, destroying the lives of others who are around and watching people suffering and dying. So if I was back at the National Institutes of

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Health at NCI or at the Food and Drug Administration, first and foremost, [I'd] bring together the incredible wealth of knowledge and understanding we now have of these basic fundamental biological processes – the genetic, molecular and cellular mechanisms that drive diseases like cancer and are responsible for why this coronavirus is creating so much disruption and destruction of lives.

So we now have made that investment over a period of decades – an investment that you have been principally responsible for driving and creating. What that investment has enabled us to do is to now have new knowledge and new tools where we can rapidly understand this virus, understand the fact that we can dissect its genetic makeup. And we can immediately identify targets for things like antibodies. We can figure out how this virus is invading and multiplying in cells and so we can begin to imagine what antivirals we can create or what medicines we even have on the shelf that we can repurpose, like hydroxychloroquine and the antibiotic azithromycin.

But from the point of view of capitalizing on all of that knowledge and understanding and focusing it on this immediate pandemic from the research and National Institutes of Health perspective, we need to move over to the Food and Drug Administration because from the perspective of the American people, all that knowledge has to be delivered and disseminated to them in the form of a solution to this problem. And the FDA is probably right now the most central and critical of all the federal agencies.

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If we think of the game-changers, of what is going to solve this problem for us and save lives and restore our economy and get America and the rest of the world back up to functioning normally, those game changers are going to involve for people the availability of diagnostic testing. For patients who are infected and sick, we need a therapy. We have to be able to deliver those. And that requires the FDA to assure the American people efficient and rapid access to those products, but that they are also effective and safe. So from the perspective of NIH, NCI, and our former life of driving progress, it's time to capitalize on that progress.

So Andy, they are moving very quickly in vaccines. We know the first vaccine went into a human being in the middle of March, and even the accelerated rate that Johnson and Johnson and the more than 50 others that are trying to bring a vaccine, we probably aren't going to have wide distribution at best until the fourth quarter of this year or 2021 which will be the fastest they've ever come. What is going to work in the short

run? And when you talk about the FDA, we need to know what exists that has actually gone into humans that might work. Can we take these antibodies and put them into humans and protect them, our healthcare workers or even the people at a grocery store who never thought of themselves as frontline in this war on disease? Once again, let's take you to the FDA. You're the commissioner, you've called everyone in. What are you telling them today?

Michael, you're absolutely correct: we need to work across the entire agency. We need a long-term and a short-term strategy. From the long-term perspective, as you pointed out, we need to continue to drive the development of a vaccine. We need to capitalize on modern technologies such as cell-based methodologies for being able to rapidly produce these vaccines and not take the normal year to 18 months, but to cut that immediately down to six months or less.

To your point, that vaccine is for the future – to protect us going forward – but right now to save lives and to restore our lives, to be able to come back as a society, we need treatments. We need therapies. So we need to look across that portfolio of therapies, from what we need to discover and develop right now and what we already have that we can repurpose or utilize in a different way.

We know that there are opportunities to develop antivirals. We know that there are opportunities to develop new things that we have not previously done, such as being able to develop monoclonal antibodies by finding people who have conquered the virus, have already made an antibody within their own system to destroy or fight off that virus, and we take that and ... give it to other people. Or we can break it down and figure out rapidly how to recreate it at scale.

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And then we can explore some of the progress that's been made in other areas. This is particularly true and interesting from the perspective of the incredible investment and the new way of doing business with regard to cancer research. You were a critically important part of that. You not only advocated for dramatic increases in funding at the National Cancer Institute and the NIH, but I remember you almost 30 years ago telling me that the academic and scientific community needed to do business in a different way. What you did was force us to collaborate and cooperate to break down silos. What did that get us? What it got us was a transformation by working in cancer research to create this new era of molecular medicine. Now we can take that progress in cancer and transfer it to this pandemic. How could we do that? One of the things we've learned, one of the more recent advances in cancer research has been our understanding of the immune system, how a body, our bodies can recognize and fight off a cancer cell.

If our bodies can recognize a cancer cell, they can recognize a cell that's been infected by a virus. So, there's work being done as we speak in developing innovative ways – and FDA has approved clinical trials – to use our own body's immune system, including using natural killer cells that are already in our body and particularly happen to be abundant in our lungs.

We need to also look not only at what research and development is making immediately available to us and accelerate that, we also look at what we already have on the shelf. And it turns out that people quickly recognize that by looking at the epidemiology of this virus, seemingly there were people who were taking certain medications for malaria or rheumatoid arthritis, [who] perhaps were better protected against the virus.

That resulted in the opportunity to use off-the-shelf medications already approved by the Food and Drug Administration and able to be prescribed by physicians. So what we've seen is an explosion of utilization of hydroxychloroquine, which was used for malaria and rheumatoid arthritis and lupus, and an antibiotic: azithromycin, the Z-Pak that everybody's familiar with when you get an upper respiratory tract infection or bronchitis.

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Where we find now the opportunity, we also have a challenge. There's the opportunity that it's readily available, but what we need is data. We need to understand when and how and for whom those off-the-shelf drugs are working. It's not the kind of answer that we can get from taking the time and trouble to do complicated long-term, prospective, randomized controlled trials. What we have to do is benefit from the experience that's happening right now in the real world. And so we'll have to capitalize on the opportunity to acquire, aggregate and analyze real-world data and understand how and why and for whom these drugs are working, and then make that the immediate part of our attack to save lives, to restore the quality of life, and in fact restore and salvage our economy.

With the number of patients, there's no difficulty of accruing patients to clinical trials, which in many cases was a long, arduous process of delay. But what we're seeing today is the ability to quickly accrue patients for these clinical trials. Should we gear up a large volume that could be used if it works? If you were at the FDA, what would you be saying?

Well, let me take that in two parts if you don't mind. The first I think is really critical. Patients are willing to provide their data, but we need a sophisticated way to capture that data. We need to capitalize on the healthcare systems that are already in place

based on an electronic medical record, recruit and utilize them with patient's permission to be able to get access to that data. We need to have that data flow. We need a way of being able to connect all those various sources of data so that it can be aggregated and then shared. And then beyond that we need sophisticated data analytics.

To your other point, as we're doing that, as we are seeing that there are clues, indications that this particular intervention may be quite effective or quite useful, we need to parallel process. We can't wait for this to be sequential. When the earliest indications are sufficient that this is a solution to this problem, we need to start in parallel processing the development of that product.

It may very well be that we will develop a vaccine and spend a considerable amounts of money, hundreds of millions perhaps, and it may not be the absolute best vaccine in the long run, but that's okay. That would be an investment well worth making because if it *did* work then the multiple of that investment is almost exponential. You're the economist. You have to help me understand the ROI, but I believe to your point, we should first create the opportunity to acquire, aggregate and analyze the data, look immediately for clues as to what looks like it will be the more likely effective and safe therapy, and immediately in parallel start to produce that. So at the end of the day we can deliver to the American people on the promise.

So Andy, I know you were one of the key proponents for – both at the NCI and at the FDA – not just U.S.-based data but international data. Are we doing enough today to take the information out of South Korea, China, Singapore, Israel, Italy, Spain? If you were at the FDA, there's a lot to be learned from what these countries experienced and how the patients reacted. Is international cooperation at a level that I know you tried to move faster during your days at both the National Cancer Institute and the FDA. Is it today at a level that we're sharing data on an international basis?

It's not at the level, Michael, that it needs to be or it should be, but we have made important progress in that regard. As you pointed out, when I was at FDA, I recognized that we were living in a global economy where the production of, for example, active pharmaceutical ingredients and excipients even, but the gelatin that you find your medicines encapsulated in

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and many other things were occurring and being developed outside the United States. It was no longer made in the USA. In many cases it was assembled in the USA with components, whether it be for drugs or devices, coming from a global marketplace.

It was apparent that we could not serve the American people by simply sitting here waiting for all that to arrive on our shores and then be able to make regulatory decisions. So we created FDA beyond our borders and actually put FDA personnel and offices in China, in India, in Europe, in Central America, and eventually in the Middle East.

To the point that you're making, we need to be engaged globally, and we need to be there globally. We need better ways of communicating globally. And I think there are areas in which that's worked quite well. Cancer, I think is one of them. And there are clearly areas where we need to improve and do better. We're living in a digital world. You and I are having this conversation essentially using digital technology. That has to become part and parcel of our communications as well. We should be electronically transferring data and information in real time, not waiting for a conference, not waiting for a meeting scheduled six months or a year from now where we all come together. This has to be a way of being able to conduct our mission in real time by recognizing it is now a partnership. This virus is teaching us things. It's teaching us things scientifically and medically, but I think it's also teaching us things from a cultural, societal point of view.

Andy, this virus in many ways has brought the world together. Understanding what happens in one country vastly affects another. For me and for you, it's also brought us back to another point in our lives. In the 1970s I had enormous success, but I could never share my success with my father because he was dying of melanoma. No matter how many cancer centers I visited or what I did, I could not accelerate science to save my father's life, and it has forever changed my life and my commitment to science. For you, Andy, as we stood on the steps of the Capitol, honoring the doctors, scientists that had made dramatic changes in cancer and cancer research, I remember you telling me how you wish your father could be there that day, but he had died of cancer and you, a young doctor, scientist could not save your father's life.

Today, to me, every day is a month. All of our skills, not just you and I, but thousands of others are required to turn this solution into a couple of months, not years. Is there any message that you would like to give to America in trying to get through these difficult times?

You and I have both been wounded by that loss, that loss of someone who at one point held those in their arms and nurtured us and cared for us, and that wound changed us. There are thousands and perhaps millions of lives right now who are being wounded by this experience. Either they're dying of the virus or they're watching someone else they're caring for or caring about dying. They're being wounded by watching their lives torn apart. They're being wounded by not knowing what tomorrow is going to bring. What you and I did was to take that wound and recognize that it was also a legacy – that we had to, from that experience, learn from it and use it so that we would not allow

someone else to be wounded in that way, that we would go about finding a way to eliminate the suffering and death due to cancer.

We need to move beyond this wounding of ourselves and of our society to create a legacy, to make sure that this does not happen again. Because the threats will happen again. Whether it's another virus or whether it's just the continuing evolution of disease, be it cancer or Alzheimer's or any of the other things that are wounding us. We need to learn from this. We need to be better from this. We need to do more from this. And we need to do it efficiently and effectively for everyone. That's the legacy that your dad gave you. That's the legacy my father gave me. That's why you and I are on this call today, years later, and there will be others perhaps listening to this call who will have to do what you and I are doing tomorrow.

Andy, I want to thank you for joining us. I want to thank you for your service to our country and we look forward to you helping to accelerate in the next 30 to 60 days a solution, a short-term solution, and then someday a long-term solution.

Well, Michael, the good Lord has blessed me far more than I ever deserved in my life, and I must always tell you and the world that you, Michael Milken, have been one of those very, very special blessings in my life. God bless you and thank you for all that you have done.
