Tech and Medicine: Jessica Mega, Verily's Medical Leader

Eric J. Topol, MD; Jessica Mega, MD, MPH

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Eric J. Topol, MD: Hello. I am Eric Topol, editor-in-chief of Medscape. I am delighted today to speak with Dr Jessica Mega, who is chief medical officer at Verily.

Jessica, you have an amazing background: You were an undergraduate at Stanford, Yale Medical School, and Harvard all the way through for medicine and cardiology, and then a major academic force, as senior investigator of the TIMI Group, running cardiovascular treatment trials around the world. What was it like to be a major leader of clinical trials and genetics for cardiovascular research around the world?

Jessica Mega, MD, MPH: I thank you for your kind introduction. The most important thing I learned is that every day, you have to find what's most interesting for you to do. You never know where things will end up. Thinking about the genetics work, for example; at the time, it was still relatively early days for applied pharmacogenetics. But it was an interest in understanding why people respond differently to therapies that drove finding the right technology to use.

It has been a tremendous journey. The most recent phase at Verily has been equally challenging and interesting in all the great ways.

Dr Topol: But you were really leading these trials; you were really on a roll. Wasn't it tough to say, I'm not going do that anymore? When you decided to leave, were you thinking, well, maybe I'll just try this out and come back? What were you thinking?

Dr Mega: It felt like a natural extension of what I was doing, even though it was in an entirely different environment. I caught the clinical trials bug about 15 years ago because of this idea of how to get the best evidence to treat patients and how to help providers know what to do. You remember the days very well. We have made so much progress, and that continues.

What became evident to me is that evidence and information generation is beginning to come from all different places. Although it feels different going from a place such as Harvard Medical School to a tech company, the underlying premise is the same.

Dr Topol: Were you bored?

Dr Mega: No.

Dr Topol: You weren't bored. You still loved what you were doing.

Dr Mega: I loved what I was doing. I was one of the happiest academics. I absolutely loved and still love that work. It is odd to make a leap or transition when you absolutely love what you're doing.

Dr Topol: How did Google enter your world?

Dr Mega: We were hitting a moment when we were looking at all the data in the large trials, trying to aggregate the data, and then layer on genomics and proteomics. This idea of understanding health

information and making sense of it led me to start to think about other infrastructure that could be built. One day, I got a call from Andy Conrad, who was at Google X at the time [and later became CEO of Verily]. He told me that they were trying to do something different. Our core is from Google, he said, a company trying to organize information, but we want to do it in such places as healthcare and transportation. The driverless car was in the same unit. At first, I thought it was incredibly odd that Google X was calling a physician, a cardiologist, a clinical scientist, but I was compelled to go out and take a look.

Dr Topol: Andy Conrad got you to come and take a look at Google. What enticed you to take this new career path? You're a pioneer, going from a traditional leading academic to the information technology world, right?

Dr Mega: What I saw—and I believe this is what you've spent your time recently uncovering—is that there are many tools emerging from what we once would have thought of as atypical places. When I went and visited, I met a group of incredibly talented, passionate engineers and designers [who were] asking, how can we take these tools and apply them to healthcare? It was that sense of commitment I saw.

You and I have talked about this before. If people like us don't lean in and partner, then we cannot provide that voice at the table. What does it mean to take care of a patient? What does it mean to give patients advice and know that they are going to go outside the four walls of the clinic or the hospital and not have the tools that they need? There was a moment during that visit when I felt that I needed to step up and represent our voice. It seemed like a group that was interested in hearing it.

Dr Topol: I remember running into you on your very first day of actual work. I think then Verily was called "Google Life Sciences." Google X became Google Life Sciences at some point before it became Verily, correct?

Dr Mega: We were part of Google X, and then we realized that we were forming our own identity that could become separate from some of the projects. That was an incredible time for us. We became Google Life Sciences.

Dr Topol: When you were in the Googleplex, did you ride around on those bicycles, the primary-colored bicycles, and eat at the Googleplex and all that stuff before you moved to the Verily campus? Were you an integral part of that world?

Dr Mega: When I got to campus, I remember one of my colleagues, who'd been there for a little bit, said, "Have you taken a bike ride?" Things had been busy, so I said that no, I had not. He said, "We've got to get on a bike." We got on a bike and drove over to one of the cafeterias that was across our campus, and we had a fabulous meal. We came back after dinner and continued to do our work. Yes, I fully embraced the culture.

Dr Topol: You lost that when you moved to the Verily campus, right?

Dr Mega: We have tried to hold on to the pieces of Google that make it such a spectacular company, both in terms of the products that are created as well as the culture. We have access to fun snacks, and in terms of transportation, we've tried to come up with some alternative fun transportation. It's really about trying to bring that energy, enthusiasm, and technical expertise with us. But we needed to find more space [for Verily].

Dr Topol: I'm delving into this because some Medscape watchers will say, why are you talking about this stuff? It's because it's so different from the environment of an academic or even the regular doctors' workplace—this access to bicycles and free food and hanging out with a lot of young people, the electricity of that.

Where did the name "Verily" come from?

Dr Mega: These names mean something. You start to have to live that name. We were Google Life Sciences, and that name was resonating with us, but then we realized that we were forging a new pathway.

We went through a naming exercise, and Verily came to us as a name. I think the reason it resonated with many people, and particularly with Andy Conrad, is from thinking about Verily and the roots and origins of the word, [which] go back to truth and a search for truth.

You know that, as someone who's taken care of many patients, we may or may not always be able to alter what happens or the things that are sometimes bigger than us. Our job is to try to uncover those truths and try to walk patients through them. We believe in that. With these new tools and technologies, we are trying to get to a deeper understanding of health and disease and of how we can provide insights. This is a search for truth as well.

Dr Topol: You are involved with overseeing many different projects. One of these is Project Baseline. Can you tell us about that?

Dr Mega: Project Baseline was one of the things that drew me to the company. It interested me for two reasons. First, as we move forward, we have data coming directly from patients from sensors, such as the study watch I'm wearing today; molecular information; claims data—the data are coming from so many different places. How do we create an infrastructure that can actually handle it and surface insights in real time?

As you know, traditionally, years ago, when we were running clinical trials, we would ask for some data output. We might get a PDF file. I would circle [data points] and attach Post-It® notes, and put it in a notebook and then the next data file would come out. Again, I would circle information and try to remember it. And we start to outstrip the human capacity to look at all these data. Certainly, the raw wave forms that are coming off all these devices are something that requires the infrastructure to integrate data to surface insights.

The second piece was to think deeply about what we mean when we talk about the "modern human," and about all these different insights. Can we get a signal before someone actually has disease? As people who have taken care of very critically ill cardiac patients, if there were some trigger, something that we could have acted on earlier, maybe we could have changed the course of the illness.

Part of [Project Baseline] is about building infrastructure to deal with multidimensional data. We are actively working on that. Then we hope to get to that Holy Grail of looking for new insights. For me, the opportunity to be part of this initiative that is partnering with thousands of patients, putting them at the center of this project and conducting this next generation of research, felt incredibly compelling.

Dr Topol: You are drawing a true Google medical map with these people, with every different sequence and microbiome sensors—the whole shooting match. It is really pretty remarkable. I know you have already started enrolling, and plan to include some 10,000 people in this. Any other projects that you would like to comment on?

Dr Mega: With [Project] Baseline, we are looking at comprehensive health and all of the different signals to try to bring to the surface what I call "unknown signals." We know that a lot of research has already been done, and we have made a lot of medical progress. Some signals are already known. We can work to try to surface those and make them meaningful to patients and to clinicians.

One example of a signal that is well known is the relationship between glucose and diabetes. We are thinking about what it means to be a patient who is living with diabetes day to day. What tools would help make that person's life better and make their health better?

We started with a few specific "capabilities," or tools. One of them is creating an incredibly small continuous glucose monitor, so that people could understand how their glucose fluctuates during the day. We are thinking about ways to put this into a platform where the patient is not left alone with those data and we pair patients with support, whether it is coaches or other ways to help the diabetic understand these insights and make meaningful changes that have a meaningful impact.

Earlier today, we talked about treating someone within the four walls of the hospital and then, that person leaves and we're not giving them or empowering that patient with the tools they need to surface that information. We are now beginning to see that transformation. I love this continuum of creating the right environment for known signals, so that we can empower people. But the fun thing about a company such as Verily is that we also want to think about the long-term—5 years, 10 years, 20 years down the road. What are the insights that we need to bring to the surface?

Dr Topol: You are getting at this one-off medicine that has been practiced through the years, where you see someone in the clinic or hospital setting. The only time you get data, or the exam or history, is at that occasional, very limited perspective. You are talking about a whole different look.

Now the craze is on artificial intelligence (AI), machine learning, deep learning of a person's data, as you were alluding to with diabetes. If you had their glucose and their activity and their sleep and everything they're eating and then medications and all these other levels, such as the microbiome—where will we go once we have all that data, and cannot just ingest it but meaningfully learn from it for that person? Will that take us to the next level of being able to help people stay healthy?

Dr Mega: I'm starting to see early applications where it makes a lot of sense. If you think about images that we have to look at, such as a fundus image, what we have done in conjunction with our partners at Google is to think about how can we create new algorithms that would help us recognize those images so that you don't need to have humans going through each one. You actually liberate healthcare providers and clinicians, so that that work is taken care of and then physicians can spend more time with their patients.

Being a doctor is one of the best jobs that you can ever have. I believe that will always be the case. We are just going to get the next set of tools. We have been using the stethoscope for two centuries. We have been using imaging. We embraced cardiac imaging when that helped us, and now we'll have the next set of tools to help us do our job well.

Dr Topol: You described being a doctor as a very happy, fulfilling thing. As you know, there is a lot of burnout among physicians. Is AI the answer? Will it decompress the workload so that doctors will have more time with patients and have better lives for doctors who are having a rough time?

Dr Mega: There are going be clear applications. The other thing that I've learned now, after spending a lot of time with designers and what we call "user experience researchers," is that we can also start to change some of the experience. A lot of times, patients are in our waiting rooms and they are filling out multiple different forms, and then we see them and we are trying to go through all this paperwork. There are ways to streamline that experience and design environments that make our jobs and the life of the patient easier. I believe it will be a combination of rethinking the right design and the right layer of technology, so that physicians can get back to loving their jobs.

Dr Topol: The nihilists will say, look, I walk into a hospital and the alarms are still going off 150 times a day in each room. I try to work on electronic records, and the process is hell; it just takes me away from patients. Is this a tech wave that's going to work? Previously, of course, we have seen a lot of disappointments.

Dr Mega: Here is an interesting or alternative perspective: I believe this push toward having electronic health records was the first step toward figuring out how to get the information so that it can be transferrable and live with people. When we used to write something down and it would go into a filing

cabinet, it died. I loved your article recently in the *Wall Street Journal*,[1] where you commented on people who would end up getting the same test over and over because the information was locked away. This transition to more electronic and transferrable information is, I think, the first wave.

And the next wave—you and I were talking just now about the physician experience—puts the physician in the center, designing tools that help their lives. This set us up for the next wave, which will actually be a more optimistic experience. That's the way I would frame it.

Dr Topol: I wanted to get your perspective on this, because it isn't just Verily, of course. You have Apple, Microsoft, IBM, probably Facebook, Amazon—all of the tech titans are into fixing or improving the healthcare landscape. What do you think about that? Is that the solution? Medicine can't fix itself; it has been a tech disappointment to date. Is this arrival of the likes of Verily and so many others now, plus no less than hundreds of start-ups, the impetus to get us to where we need to be to have a better practice or experience for patients and for physicians and all clinicians?

Dr Mega: Two things. One is that I think that all of us are going to have to prove our value. When something is valuable, people use it.

It goes back to the examples I talked about before. You and I order echocardiograms, or maybe now have portable echocardiograms, because they give us useful information. Each one of these companies, including Verily, is going to have to produce things that add value. They make people healthier, or they make our lives more streamlined.

That is where we are today. For example, we have a project involving surgical robotics, where we really try to think about how you make this experience a better experience all around with better outcomes.

The second thing: I think that these tech companies could be focusing on a lot of problems. We talked earlier about the driverless car. Certainly, Google is spending some time with access and energy. To be honest, I am thrilled that they and we are starting to turn our attention to health, because what's more important than that?

Circling back to the beginning of our conversation about why I was intrigued [by the Google proposal]: Take people who understand the problems and who care about patients and providers and hook them up with some of these incredibly enthusiastic technologists, and I use that word broadly. It's great that people are thinking about health.

Dr Topol: You have been leading the charge, and it's great to have the chance to get in your head a bit about why you went this way, why you charted a new path. You are a pioneer going from the pinnacle of academics to now leading Verily, one of the main forces in the medical space for trying to change the future of medicine.

Jessica, thanks so much for joining us at Medscape. Thanks to all of you for tuning in to this one-on-one interview. We look forward to many more with some of the most interesting people in medicine today.

References

1. Topol E. The smart-medicine solution to the health-care crisis. Wall Street Journal. July 7, 2017. https://www.wsj.com/articles/the-smart-medicine-solution-to-the-health-care-crisis-1499443449

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