WILL AI DELIVER ON THE PROMISE OF BETTER, FASTER, CHEAPER HEALTH CARE?

Announcer 00:00

Please welcome the panel on "Will AI Deliver on the Promise of Better, Faster, Cheaper Health Care?", moderated by Sung Hee Choe, managing director, FasterCures, Milken Institute Health.

Sung Hee Choe 00:33

Good afternoon, everyone. Wonderful to see everybody here in this room, and thank you to those who are joining us via live stream. We have a really fantastic conversation planned for you this afternoon on AI and health, and I am very pleased to be joined on this stage with leaders in AI and health that really offer very different perspectives from clinical practice to research to investment to entrepreneurship. And our hope is that you will leave this conversation with a sense for what is happening in AI and health, but specifically, how are those activities going to impact your lives as patients, and that is really the goal for us in this conversation today. I don't think I need to spend too much time setting up the stage. I think we all know about the potential transformative and disruptive effects of AI and in health, no less. I think most of us would agree that that is a sector for which transformation and disruption is probably very much needed, and I think we are all excited about the potential for AI there. However, health also poses unique challenges, regulatory challenges, ethical challenges, that don't really exist elsewhere. So looking forward to fantastic discussion. I will first introduce myself. My name is Sung Hee Choe and, as announced, that I am the managing director at Milken Institute, overseeing our work on biomedical innovation. And I am joined by Dr. Logen Baskaran as well as Dr. Wan Yue, David Berry, and Adrian Lam, and I'm going to just probably jump around, because I want to first, maybe help set the stage in terms of how AI is transforming the work of researchers and clinicians. And so, Dr. Wan, if I could start with you, you are the executive director of the Genome Institute of Singapore at A*STAR and which really focuses on the genomic data of Singapore. I think, in the website, you identify as the curator, custodian of Singapore's genomic data. Could you help us understand, you know, how is AI enabling, or has it transformed your ability as a researcher?

Wan Yue 03:15

Yeah. Thank you very much. I think over the past few years, we have seen the use of AI in learning, in training, across many DNA and RNA sequences, the development of DNA foundation models as well as RNA foundation models, and that has been really helpful now in enabling, for example, if you have an individual with a DNA with a certain variant, understanding how the individual can respond to certain drugs or—and if you have—if you are a cancer patient, you have a tumor, and based on the mutations in the tumor, again, what kind of drugs that it is more likely to be susceptible to, and what kind of adverse drug reactions it may have. So I think the DNA, RNA foundation models have been instrumental in moving forward, in enabling us to understand personalized medicine. But in addition to that, you know, AI has been used to develop better drugs. So we all know the mRNA vaccines during the COVID years. And actually, even though that version of mRNA vaccine from Moderna, Pfizer works pretty well, there has been tremendous amount of development in creating better mRNA drugs, and AI has been instrumental in that as well. So over the, again, the past few years, AI has been used to train, to learn from the natural sequences in the world, to be able to design mRNA drugs that now can produce way more proteins, are much more stable inside the body, as well as can be manufactured a lot better. And so now we are looking at a better generation of mRNA therapeutics that can really benefit each and every one of us.

Sung Hee Choe 04:52

Yeah, great. Thank you, Dr. Wan. So really paving the path, it sounds like, for personalized medicine and enabling us as patients to have the opportunity to have therapeutics that are more targeted to the diseases that we have. And so Dr. Baskaran, maybe from the clinical practice perspective—so, you serve—you are a cardiologist at the National Heart Centre Singapore, but you also serve as the director of the AI research lab there. Could you also give us a perspective on how AI is enabling you to provide care in a way differently than you have been able to in the past?

Lohendran (Logen) Baskaran 05:33

Sure, thank you for that question. So we're a little more, maybe downstream from what Wan Yue is talking about. I'm going to talk about the research part and then the clinical part. We do cardiac CT scans which identify coronary artery disease before the heart attack happens. It is underutilized, even though it's the highest growth cardiac imaging modality. From the research point of view, we need to annotate and identify biomarkers or things like coronary artery disease down to the millimeter cube. To do it on a research basis, per patient, takes a human three to four hours. Our smallest data set is 200. Our largest data set is 60,000. On the clinical reporting point of view, if I'm an expert, and I don't claim to be, but if I'm a veteran expert cardiologist, and report my scans, I can do it at about 10 to 30 minutes. We used to have five scans a week. Now we have 20 scans a day, and we're not meeting the capacity. There's a long waiting list in many institutions and many hospitals. We can do end to end in six minutes, and we can batch process that, so it's orders of magnitude faster. That's just on the simplest scale, where we're just processing the images better, aggregating the data, integrating multi-modality information from other aspects to make sure we can tailor and identify disease better for our patients—is just a different story. This is just one facet of the whole thing.

Sung Hee Choe 07:01

Well, thank you. And I think, you know, I've—so many of us as patients—I mean, maybe you can—and I'll welcome Dr. Wan to contribute as well—I mean, could you perhaps share a story? I mean, I think we've talked about some of the examples, but perhaps, as a clinician, share a story, any story related to how a patient has been directly impacted by this productivity gain.

Wan Yue 07:32

Maybe you start first.

Lohendran (Logen) Baskaran 07:33

Okay, sure. So, we are seeing it on a pilot level, because algorithms that have been developed, including spin-off from our research, has to be regulatory—health care, regulatory approved first, but on a point of trial basis, what we're finding is, for example, we can use computational fluid dynamics and AI to interpret dynamic information from static images. To give you an analogy more closely related to the Singapore F1, I can take a photo of a car and tell you how fast it's going, and that's important, because the pressure drop across a blockage in the coronary arteries helps a clinician decide whether they're going to stent a patient or not. Rather than the patient going into the cath lab and having an invasive procedure, we can provide that information from a non-invasive CT scan to help the clinician and the patient decide whether they want to do stenting or investigate stenting or not.

Sung Hee Choe 08:31

Yeah. Well, thank you. That's a great real life example, and also, I appreciate the F1 reference as well. Okay, great. Let's transition over to you, Adrian, and then David, let's think about, you know, what—help us understand what it is like to, from an entrepreneurial perspective, building a tool that is AI enabled, that is really targeting the patient. What is the receptivity that you are finding in patients and perhaps even from clinicians too. I'll start with you, Adrian.

Adrian Lam 09:09

Okay, thank you for the question. So, the short answer is, it's really difficult. Don't do it. I joke, well, it's actually partially true, right? I think the nature of the problem is, in medicine and in health care, is multifaceted, right? It's not just a clinical medical problem, right? It's on the back end. It's scheduling, it's staffing, it's fatigue, it's all that, and so now the nature of the solution also has to change, right? The—you know, gone are the days of simply unblocking a tube, you know, using a stent or an angioplasty balloon. Now these digital health solutions actually touch the back office the IT department, the nursing staff, in addition to the physician, right? And so the—so, therefore, the stakeholders are very complex. And so the product that we design, or the solution we design, is also extremely complex, right? And so, so it's actually—there's so many—there's 101 different problems to tackle. Now, maybe just to kind of bring this back to the question here, will AI deliver on the promise of better, faster and cheaper care? What we've seen, and what I think is important about AI right now, is that, at least in our case—and

I'll name another company as well, so it doesn't seem like I'm just pushing our company—but what we do is we use simple sensors and simple signals. These are signals that can be acquired using cost effective, prevalent, ubiquitous sensors. We just measure voltage gradients, electrical activity in the chest, and PPG, which is that red light finger clip that everyone knows about since COVID. So we use simple sensors, and we use advanced computation, AI and machine learning on top of that, and we bring that—we bring up the diagnostic capability. And I think that's what's interesting about AI, which is these sensors have been around for decades, you know. So it's akin to take—you know, using a another anecdote, it's akin to taking—trying to create a Michelin—three star Michelin meal, just by using pasta and salt, right? That's very, very difficult, right? If you have an A5 Wagyu, sure, you can create a Michelin star meal. But how can you take simple things—and AI has allowed us to up the capability and the performance of the sensors. And so what we do is we actually commercialize in the Deep South in the US, where there's a lot of prevalence, and these patients have to drive an hour to see a specialist or to see diagnostic radiology. They weren't able to do that before. You know, they weren't able to be tested before. So I think that's what's amazing about AI. It's conferring a lot of capability to basic hardware. And I think that's what's key.

Sung Hee Choe 12:13

And then, Adrian, then talk to us a—just as a follow up to that—I mean, what—talk about what is the patient response. I mean, the—as you mentioned, some of these sensors have existed for a very long time. The way that they're being leveraged is different. So what are you finding in terms of the patient receptivity to this? Because I think for many of us who are in this room and have been following very closely, we are very excited about AI. But also, for some people, AI is scary, right? And there are some, you know, the worst fears, sci fi fears kind of come out. So, what are you finding in the areas that you are in?

Adrian Lam 12:57

Yeah, so, we don't use a robot with red lit eyes to deliver our care. So I'll just give a circumstance. So, a patient shows up with chest pain, shortness of breath, dyspnea to the doc, and is like, "Hey, Doc, I don't know what I have," and the primary care physician also doesn't know what they have. So right now, you need to get referred away downstream to a specialist or diagnostic radiology. They have to drive an hour away in some of the areas that we target, they're just—it's a physical access issue. And these people, they don't want to take time away, not even an hour, right, let alone a day. So here we are. We've delivered—we have this technology using simple sensors and simple signals. We don't put any energy into the body, and it's a three and a half minute signal acquisition in the office. You can go there during lunch, super safe. There's no invasiveness. And you know the result before you leave the office. Do you want to do it? And you don't have to pay anything right now. That's the patient experience. And so we have a wonderful adoption curve. There's basically no barrier to adoption on the patient side. On the clinician side, which is equally important, they need to want to use your technology. They're like, "I don't have a tool right now," right? These PCPs, primary care physicians, only have a stethoscope, blood work, maybe sometimes echo, but not all the time. They have to send someone away. These doctors want to keep these patients within their purview. They want to keep them local. And most of these patients actually aren't going to die from a heart attack in the next two weeks, and so that is just a lot of hassle. And so they like using it as well. So actually, we—you know, I didn't design the device or the technology, so I can't take credit for it, but it's a beautifully designed sort of business model and, and that's what's also been enabled by the AI toolkit in say, the cloud, right? We have a lot of cloud infrastructure, distributed digital infrastructure, now that AI toolkit has allowed

us to sort of disseminate these technologies, and you can access them just via Wi-Fi. That's huge for access and so interesting as well. So that's what we see.

Sung Hee Choe 15:23

Thank you, Adrian, and so we'll go to you, David. You're the co-founder of Averin Capital, which sits at the intersection of health and tech. You are also the founder and investor of various very successful health companies. Give us a sense of what it is like from the investor lens there. I mean, I imagine you see hundreds of pitches. You see lots of companies. What for you—how do you separate the wheat from the chaff, if you will? And what are the things that you are looking for?

David Berry 15:56

Sure. Well, appreciate the question. We're focused broadly on what we like to call the transformation of health by technology. And the way we think about that is health in the US is a $5 trillion sector where it sits today, and the entirety of that sector is getting rewritten exceptionally quickly by forces that include AI consumerization. Think the whole longevity trend, decentralization, exactly what you were just hearing about, where we can move from the hospital to the specialist, the specialist to the generalist, the generalist even to the consumer. And, of course, government. And what we're very interested in is, how do we think about what the future of health can and should look like. So really, the way we think about it is, where are these core pain points? How do we use technology to deliver a better outcome, and can we find a great team that helps us walk that journey from here to a proverbial promised land? And I'll give you just a couple examples, which is, we've been investing in a—what I think of as a relatively simple trend. So when I went to medical school, the way I was taught—and I don't want to bring others down with me, because maybe I was just a really, really bad medical student—was when you see a patient, you don't have a lot of time, you have a lot of information, you have a lot of distractions, and you're supposed to make a diagnosis. Now that patient, if they're a 40-year old, for example, has a 40-year medical history. But what are you really doing? You're looking at a list of numbers, and you're listening to some symptoms, and you're diagnosing them here and now. And I'm drawing that out because humans, not physicians, just humans, aren't good at dynamic incorporation. AI is, and what we now have this opportunity to do, for example, is to invest in technologies, bring these technologies to market where we can diagnose complex, dynamic medical conditions faster, so that patients can get on the right treatment faster and get positive outcomes better. And so we've been doing this, for example, in things like mental health, where the average patient is misdiagnosed three times before they get to the right diagnosis. Many of them never get there because they leave the medical system. We've been doing this in elder care. We've been doing it in a whole range of other sectors because really, what we're trying to get at is, where can we deliver a real impact that the patient cares about, and, frankly, that the ecosystem cares about, because that's when you can have this durable, lasting impact.

Sung Hee Choe 18:39

Well, and I have a follow up in terms of where all of this is going, and maybe I'll open this up to the panel. I was listening to an interview recently in which someone said that the Holy Grail, or the ultimate goal, for AI is an AI

doctor. I see some faces, I would love some reaction to that. Is that ultimately where we're headed? And should I pose it to you, Logen, first, put you in the hot seat?

Lohendran (Logen) Baskaran 19:10

I'll walk the plank first. The—someone I had a conversation with yesterday evening said this. So, you know, assimilation of data, dynamic information, as mentioned before, and then making decisions there, consistent decision making. These are things that humans—I am a human.

Sung Hee Choe 19:37

Thank you for confirming.

Lohendran (Logen) Baskaran 19:40

We are not perfect, yet. We can learn from single instances very quickly. My 10 month old baby is awesome. She realizes if she's trained me very quickly. But where our value is making decisions on not large amounts of data. That's one. And then number two is, you know, we can talk about human touch, but some aspects of that have been already covered by software, right? No one needs to go and watch any movie in the cinema. You don't need that human touch. You can watch Netflix. But the third thing is, the value of doctors and certain professionals is liability. So there is value in taking responsibility and liability, and I don't think that's going to change anytime soon. But what we also face as doctors is we—as awareness of disease increases, as disease certain diseases itself increase in terms of burden, and the methods for detecting and potentially treating these diseases increase. What's going to happen to doctor? It's just our workload is going to get larger and larger, much larger than we had before, so we have to serve them more efficiently and more effectively. That's our obligation as doctors, to serve the patients as best we can. And so I don't think AI is a threat to us. It's obviously an assistance to us.

Wan Yue 21:08

Yeah, I definitely agree that AI is an assistant to a doctor, and I think at least at this moment in time, I don't think it can replace that of—I mean, as a patient, I think if I go and see a doctor, I will really hope that you know the facts, the interpretation of my case that's given to me is the best, right, the best of class, and does not contain any type of hallucinations from maybe inconsistent data that's being fed into an algorithm, right? So I think that is something that is still really important in the progress of AI. I think over the next few years, the—how do we standardize certain data sets, benchmarks that enable the training of better AI algorithms is going to be very important for us being able to interpret the results from the AI. Yeah.

Sung Hee Choe 22:05

David?

David Berry 22:06

I think there's two sides to the coin on this, which is, on one hand, the question is, how do you get better care to the patient as fast as you can? And I think AI is a tremendous enabler there. Do I expect them to replace the doctor anytime soon? Absolutely not. One of the tricks I learned in medical school was that if you ask a patient what they think they have, they're usually right. So if you have no clue, just ask them, and you've got your diagnosis like nine times out of 10. I don't need AI for that.

Adrian Lam 22:36

You're telling all our secrets!

David Berry 22:37

See, this is why I don't practice. This gets rid of my liability, right? But in all seriousness, when you then take the next step, the question is, what do you do with that, right? And so let me give you an example of an indication. I'm going to come back to this in a second, IgA nephropathy. I'm not going to get into the details of it. It's a kidney disease. Today, there are zero approved FDA therapies for it. So if you're a doctor and you diagnose a patient with IgA nephropathy, what are you going to do? What's the AI going to do? It's going to tell you go back to your room, sit there and suffer? Sorry, maybe I'm making AI sound really dispassionate. But you know, in a year, there may be 10 therapies approved by the FDA. And what doctors have been really good at is, there's this whole interim of, how do you take a patient and meet them where they are? And I think that's something that, at least for the foreseeable future, requires the human touch. And so I view AI as a massive enabler, but not a replacement. Now the other piece of this is, well, how do we get those 10 drugs? And where I think AI is going to be tremendously helpful, is to better understand disease, better design therapeutics, and allow us to get them through testing and the FDA and other regulatory bodies around the world faster, ideally cheaper, so that when patients have any litany of the 10,000 some odd diseases that are out there, doctors actually have a better chance of saying, "And this is the medicine for you." And personally, I'm very excited about that as being something tangible in our future.

Adrian Lam 24:17

Yeah, and something that David just mentioned about—which is, we got to focus on, how do we give the patient better care? Now, you know, this is speaking a little bit generally, but the first generation of AIs, you know, motivated by comments from, you know, Geoffrey Hinton, we won't need radiologists in five years time. With—that was 10 years ago, right? And the thing is, it's kind of like asking a pilot to say, to adopt autopilot. You know, do they want to do that? Probably not. And does that necessarily guarantee better patient care? Also, not necessarily, right? And again, back to the point that the problem is not just clinical in nature. How do we—so the first generation are kind of autonomous AI, I would call it. The American Medical Association have now classified three

buckets: autonomous AI, augmentative AI, and assistive AI. And it seems like autonomous AI is, you take the human out of the loop. So first of all, they don't like that. Second of all, I'm not actually sure that's actually good for patient care, right? And thirdly, you want that physician in the loop because they have that human touch. But you're not just helping him diagnose disease better. You're actually helping him see more patients and spend more time with patients and organize the back end of his life, the scheduling, the workflow, the efficiency, right? And so I think now it seems like augmentative AI is kind of the way to go. Assistive is, you know, maybe not medical enough, you know, you can't really get paid for it, which in health care is a big consideration. Autonomous AI is human out of the loop, you know, and so augmentation is really, I think, the key to all of this. And it's not about replacing the physician. I wouldn't want that as a consumer, right? I want to have that relationship with my physician, but I want him to be able to spend more time with me.

Sung Hee Choe 26:20

And then, you know, when we think about some of the rate limiting factors of AI, what jumps to mind? I mean, what do you think from a—whether it's a policy perspective, whether it's an acceptance and trust issue, maybe even workforce to some extent, what do you see as, really, the rate limiting factors for us today, in going further in terms of exploring what AI is possible of. And so, maybe David, I can go to you on this. I would love to hear—and obviously, you know, feel free to—I've just mentioned a couple of those, what those factors might be, but, you know, feel free to deviate from that too.

David Berry 27:08

Sure. I think there's a couple of different drivers here. One really big issue is what I'll call data sanctity. So around the world, there's a set of different data rules, and in just about every country, human data is effectively deemed sacred. And look, there's good reasons to protect the data of patients. I'm not saying there isn't. What's happened on this is, one, walls have been constructed so that data cannot be shared, even if fully anonymized. And two, what's happened is that it makes it very difficult to gather, collect that data in the first place, and this data is the real key unlock that's necessary for AI systems. So, unless we can open that up, it just slows down the development of AI. Now there are really good pockets of data that exist there. They tend to be in three, four different parts of the world. And the counterpoint on this is that the more we continue developing AI in the world that we exist today, the more these AI solutions are going to be for those populations. And so it's upon all of us to open up these barriers, open up these walls so that we can have AI deliver better solutions for all. So it's not just personalized medicine, but it's globalized medicine.

Sung Hee Choe 28:29

And then, Yue, how do you think about that too? I mean, as I mentioned, as the custodian of Singapore's genomic data, this is something I'm sure that you think about quite a lot.

Wan Yue 28:39

Yeah, no, I completely agree with David, and I think this is something that Singapore is actually working very hard on. So, for example, we have sequenced—PRECISE, which is one of the national agencies, have sequenced 10,000, 100,000 Singaporeans, and they are now moving forward to sequence 10% of the Singapore population. And it is exactly towards the goal right, which is if we can better understand—use AI to better understand the genetics of the Asian population, then we can better design, you know, drug tools for the Asian population, so that we don't lose out, you know, so that there's equity in the access to AI, right? So I think this is something that we're thinking a lot about. And I think, not only are there, you know, good data in several different pockets, so we're trying to generate our pocket here, but also how you generate the data varies a lot from place to place, right? It's like cooking rice. One person cooks it for 30 minutes, it becomes porridge. Another person cooks it, it's too raw. So I think how you generate the data becomes very important. And I think there needs to be standards around data quality and how you generate data, so that when you train AI on it, you can trust the algorithms that come out of it. Yeah, the interpretation of it.

David Berry 29:53

And everyone uses different rice, and everyone uses different cookers.

Adrian Lam 29:59

I gotta up my metaphor game today.

Sung Hee Choe 30:00

I was just thinking that actually.

Adrian Lam 30:03

I'm just following Logen's lead.

Sung Hee Choe 30:06

You can bring it back to F1, I think you'll have a ready crowd here, you know. So let me then—actually Logen, maybe this is a good time for you to talk about this, the 60,000 person longitudinal study, and, you know, how you think about the data from that perspective.

Lohendran (Logen) Baskaran 30:22

Sure. So we're doing a few things. So, as Wan Yue mentioned, Singapore is doing this, SG10K and SG100K, which is collecting genetic data from a large population. What we're doing is slightly different. We do need to understand the context and that, you know, genetics environment, there's a very complex interplay, and things that—and thus, the AI tools and solutions we provide have to be tailored to that population. So we're doing—so some of the stuff I spent some time both as a fellow, and then as faculty in the US, and then when I came back here five years ago, I tried to implement some of the guidelines, for example, to detect coronary artery disease. So these are, you know, the foremost authorities in cardiology in the US and Europe, for example, their guidelines and these tools that we use are 30 to 80% inaccurate in Singapore, because, you know, for example, a risk factor like diabetes weighs this much, has this much of a weighting factor in the US, on their cohorts, but it's totally off here, for example. So we try to understand how race and ethnicity play a role. And so I spoke to a few friends, first in Singapore, and then a few more friends outside of Singapore, and they spoke to a few more friends. So the long and short is, we've had to limit it right now, but we have 60,000 patients' data, and that's based in Singapore. And then we have parts of the world which are not well represented. So for example, we have Uganda, Peru, Brazil, Bangladesh, Pakistan. We have India. We have South Korea, Australia. And we have, you know, the well-established data sets in the US and UK to compare it to. And we are looking at the role of race and ethnicity. And we can compare, for example, someone who's East Asian in Singapore versus Hong Kong versus California versus Australia. And what we found is your predilection or your risk of having coronary artery disease cannot be unentangled. So if you're a certain race or ethnicity, that's, so to speak, not good enough. It has to be your environment and where you're from, too. So these things matter a lot. And what does environment mean? It means, you know, access to food, food deserts, access to health care, education, air pollution, lifestyle, all of these things combined, which we cannot tease apart. So GPS-CAD is our 60,000 patient data set. We presented this as late-breaking science last year at the largest cardiology conference in the world in London. We are working on the manuscript. It's—we've got 40 authors or more, so 27—no, 35 sites or something like that. So it takes a while to come up with this, but ultimately, we want to develop risk scores tailored to populations for the whole world. So that's where we're working towards. That's where we're headed towards.

Sung Hee Choe 33:28

And then, Adrian, maybe you can close us out on this data question, because I want to bring it back to, David, your comment or phraseology, I should say, 'data sanctity'. And you are working in the Deep South, as you mentioned, Adrian, one of the areas where there is significant mistrust of the health system. How do you think about that data, and protecting that data, and providing the assurances to the patients that you serve?

Adrian Lam 34:00

Yeah, well, there's no real two ways about it. It's table stakes, right? You got to be compliant to all the standards, all the cyber security, all the HIPAA compliance, and all that. But one thing that, at least our company has done, is to—we're actually originally a Canadian, company. You know, the original founders were in IBM, actually—if you remember IBM—Toronto is actually where a lot of IBM, Deep Blue, and Watson, a lot of the early days, machine learning mafia, right? What we do is, the parent company holds the IP, but then for each geography, they hold the license and the right to use the technology just within that country. And so in a way, that kind of helps with data sovereignty, data sanctity. We don't have to kind of shift data out of the country. That's number one. So all the data quality and data controls are all there, and they're within borders. You got to respect that. Number two, I

think, you know, when we look at AI, everyone speaks about—a lot of people speak about AI, like one type of technology; there are lots of different types of AI, right? And, you know, the more machine learning forms of AI, to me are kind of—it's kind of almost like fancy statistics in a way, right? Where it's actually not really a black box, it's actually a white box. You could technically open it up and explain everything. You could actually have humans actually do that work. It would take 100 humans and 10 years each to kind of do that computation in a parallel processed way, but you can technically explain it. And so I think it's about using the right type of AI and the right use case. There are some cases—so just say AI and drug discovery, protein folding using deep learning, you know, approaches in CNNs, like the explainability is an issue, right? But that's okay for drug discovery, perhaps, because an AI-generated molecule is not going to go straight into a human. There are checks and balances, clinical trials, pre-clinical trials that happen, right? But maybe these technologies, for at the front line of care, when you're trying to make a diagnostic decision, a hallucination, a type one, type two error is not acceptable, right? So I think it's about, you know—as perhaps also as an investor—we also got to keep an eye on which type of AI is appropriate for which use case. Some AIs are stronger in some things and weaker in others. And so I think just digging one level deeper is what you need to—is what we do, anyway.

Sung Hee Choe 36:59

David, I'm going to give you a chance to impress us with the metaphor. What is not possible today, perhaps due to technical limitations, that you think that we could—that could be addressed in the next five years.

David Berry 37:17

You know, let me kind of give a little bit of a kind of a scenario that I actually like to think about a little bit, which is, and maybe I'll make this a little too personal, but I think any of us who have kids know that moment when it's like two in the morning and you know your kid's not feeling well, and I can tell you when it's—for example, my older daughter, she'll come around to my side of the bed. She'll stand there. I don't think—there's something about this. And she will figure out that way to poke me right in the ribs, where, you know, you are not going back to sleep like ever. And of course, then you get the pain of the sickness, and it's 2 a.m., and the whole balance is, how do I get her to feel better as fast as I can at the same time without making too much noise, right? Because there's the other one that you want to stay asleep. And I think we all have lived this growth opportunity many times in our life. And you know, one of the things where I think AI is actually really powerful. It actually gives you the tools to start understanding these things. Because what are we—like if we get to the core of what's going on here, we have a kid who—and I don't mean this disrespectfully, they're just not good medical reporters. They don't know what to tell you. They don't know how to give you that information. You also, at two in the morning, in your own home, don't have the tools that you need to be able to diagnose as if you were a doctor. And ChatGPT be damned, you know, you want a solution that's a little bit more than like NyQuil and knock them out and get to the morning. You want something that actually helps them feel better. And when you get into these areas where it's very complex data, very poor sort of data input, but very quick decisions that are needed, that's actually one of those areas where I think there's real opportunity that we haven't solved it yet. And I think, you know, we're just at this point where things like remote patient monitoring and things like that can start to give us those insights. So that's an area that I spent a lot of time thinking about, not just for personal reasons.

Sung Hee Choe 39:23

Okay, well, you're off the hook because you didn't give us a metaphor, but you did tell us a story about what it's like to have children and be woken up in the middle of the night, which I think is quite relatable as well. Does anybody else want to address, you know, what is not possible today, but that you think will be addressed or could be addressed in the next five years?

Lohendran (Logen) Baskaran 39:47

I think my very narrow view and dream is very simply, we have tools that, before someone has a test done, we have a whole funnel where, based on your demographics and very routine blood tests that you do, we can make decisions about whether you need to do further investigation. And if you do that investigation, we can identify if you are at risk of future heart attacks or you have any disease, and then how do we prevent it, and give you strategies to do that, both the doctor and the patient, and then ultimately, further down the line, monitor the progress and improvement. That's all I want, very simple, but a whole funnel for that, and it's seamless. So we're working on that little parts, but it's—that's my kind of dream. Do that whole thing end to end.

Sung Hee Choe 40:45

Ultimately getting to that preventive side of things. Just in our last couple of minutes, I'm going to do maybe a lightning round, and perhaps I'll start with you, Adrian, if you could give us in the audience here a call to action. What are the things that, from an investment or policy perspective, that you would really like a community of stakeholders or fellow travelers, if you will, would—could focus on, in order to continue to move the needle forward on AI and health?

Adrian Lam 41:22

Yeah, I'd say possibly two directions. You know, a lot of health care needs to be underpinned by reimbursement, right? You know, it's great to have a technology, but if no one's going to pay for it, it's never going to get adopted. So I think number one is to—is—I would advocate and recommend for policymakers to be a little bit more risk taking and open minded in terms of allowing more flexibility in payment schemes and to take some risk there, right? In a way, we always ask innovators to take risk, but we also need policymakers. We also need the ecosystem to take risk as well, and that, you know, otherwise, it's not going to work if only one subset of people in the ecosystem take risk. And then number two is really to allow for—I suppose it's on the data side, the data sharing. You know, it's very, very hard as a behavioral thing, really, and it's, you know, compliance and all that. But perhaps we need to take a little bit of risk there so that we can unlock these different data streams, right? We can unlock different racial biases, right, in designing the products, as Logen mentioned, and then adding that context to becoming a little bit more personalized in the care. Right now, it's quite difficult for us to do that.

Sung Hee Choe 43:07

So, they're—a little more risk taking on the regulators' side, as well as on the stewards of data on the—for data sharing side. Okay, great. David?

David Berry 43:19

I think one of the things that I'm most looking for is to make sure we have predictability. And if we go right into the kind of drug discovery and development world, it's an era with extreme non predictability right now. I look at the regulators, the FDA, as being, for the most part, very forward-thinking, very forward-leaning, very open to innovation. We have a company, for example, in our portfolio, Hologen, that has been working very closely with the FDA to use AI to, in certain cases, actually eliminate the need for certain clinical trials. And when you think about the ability, when it's done responsibly to accelerate drug development in that fashion, it's a tremendous opportunity. We're seeing that real. We're seeing it today. But the problem is, when the environment, the macro environment around it, becomes unpredictable, it's hard to push innovation in those directions. And I think this is one of those things that we want to see is just clarity on how we can be able to work on the ground level, to be able to push these innovations forward.

Sung Hee Choe 44:27

Great. Yue?

Wan Yue 44:30

Yeah. So, really great points. I was thinking, in addition to that, I think pushing AI literacy, because exactly like what you're saying. I think now we have two kinds of people, right? One, they're super excited about AI and pushing the boundaries of AI, but you also have a population there is deeply skeptical, and I think that divide is going to grow as AI, you know, as we move forward. So I feel like having AI literacy, not only for the young, but also for the elderly, who may not have been part of this wave at the beginning and may not understand it, will enable them to accept and actually use them more in their everyday lives, and that could be hugely beneficial.

Sung Hee Choe 45:14

And, Logen, final word.

Lohendran (Logen) Baskaran 45:16

I think

Lohendran (Logen) Baskaran 45:17

I think—I agree with Adrian, there has to be a lot more risk taking, but I take it from a different point of view. I think philanthropy has to be more risk taking to invest in AI research, or AI medical research is a field that is kind of neglected in a sense, in terms of philanthropy. I think there's a lot of scope there, and that helps us advance the case much further, because not everything can convert into insights or commercial product. From the investor point of view, we obviously have a spin-off company. I think the investors also need to be a bit more risk open, and that's specifically for the market here. So, Southeast Asia is often mentioned as a challenge. It's a huge opportunity in the health-care space, we know the markets, we know the people, the population. We can see the growth, and can see the need for this. Just because we can't reimburse as well as the US, for example, doesn't mean we should not serve this population. So yeah.

Sung Hee Choe 46:16

Well, thank you all for this incredibly rich discussion. Thank you all for being here. Please join me in thanking Adrian Lam, David Berry, Yue Wan, and Logen Baskaran.

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