PATRICIA SABGA: Imagine this, it's 2040 and new game-changing drugs have eliminated the most debilitating symptoms of many chronic conditions, things like cardiovascular disease, depression, schizophrenia, and Alzheimer's. These advances have added quality years to patients' lives and improved their economic wellbeing. Priya, what's led to this dramatic leap forward in medicine?

PRIYA CHANDRAN: There's probably three things. There's biology, there's just tremendous advances in biology with all of the genomic revolution. And then, I would say AI. And the last thing is just the willingness for societies like ours to invest.

PATRICIA SABGA: That's Priya Chandran, BCG managing director, senior partner, and global lead for biopharma. And I'm Patricia Sabga. Welcome to *Imagine This*..., where we take a trip into the future we hope will challenge the way you think and act today.

Effective drugs can add quality years to patients' lives and significantly boost profits for the companies that own the patents. But despite all the technological progress of the past few decades, the pharmaceutical industry still hasn't developed highly effective drugs to treat many of the most chronic and neurological diseases.

Genuine relief from these diseases has long proved elusive, primarily because they're so complex. But new advances in GenAI promise to accelerate the discovery and testing of breakthrough treatments. Today, we'll explore what that could look like. Also joining the conversation, GENE, my AI co-host. Go ahead and say hi, GENE.

GENE: Hello, everyone. This is GENE reporting for duty. I might not bleed DNA or code molecules, but I am quite good at untangling the hype behind big medical promises, ready to usher in the hard truths and audacious hopes.

PATRICIA SABGA: So Priya, let's start with why, despite so many medical advances in recent years, drug companies still haven't developed effective medicines for these common chronic conditions.

PRIYA CHANDRAN: So Patricia, this is a really good question. And the reason really is that the biology, underlying biology, is super complicated, and there are many factors that contribute to these diseases. There are genetic factors, there are environmental factors, there are obviously behavioral lifestyle factors.

All of these things contribute and interact in ways which make it extremely hard to truly understand the underlying biology or the underlying cause in any given human and any given patient. So that is one big reason why we haven't seen the major advances that you would hope, right?

Then, there's also the practical issue that these trials are really, really long, really, really expensive, with very high failure rates. So the ability of any given company to keep investing in this is actually not as high as you'd hope. And then, the failure rates when they have invested are very, very high. With Alzheimer's, it's strewn with failures.

And so, all of these things of just lack of understanding of the underlying biology, the very expensive, difficult trials, high failure rates, all of these things together have actually made it very, very hard to get a stream of breakthrough therapies in these spaces.

PATRICIA SABGA: Those are very formidable barriers. What can move the needle?

PRIYA CHANDRAN: There are a few factors that I think give us a lot of hope. First of all, there is, and we'll talk a little bit more about this later too, but first of all, technology is advancing, given the underlying biologies, technology is advancing. We've always needed some new ways to really break through and understand that biology, and we've had advances in AI that are going to contribute and have contributed to better understanding of the basic pathways in these diseases. So that's one thing that I think is going to help us as we go forward.

The other piece is that there have been some successes, such as the GLPs. And any big successes typically bring enthusiasm and investment into that space. So we're seeing this big resurgence in cardiometabolic disease research as well as investment.

And the third thing I would say is, if you're a pharmaceutical company, a lot of investment in the last many years have gone into areas like oncology and immunology. Those areas are getting really crowded. So there is more incentive and desire to diversify into areas of massive unmet

need, chronic disease, psychiatric diseases. I think, for all of those reasons, some scientific, some economic, some technological, I think what you'll see is the space starting to evolve and move.

PATRICIA SABGA: So let's bring GENE in, because when you say technological and AI advances, that is very clearly GENE's wheelhouse. So GENE, how could AI transform and accelerate the drug discovery process?

GENE: AI can turbocharge pattern recognition. It sifts millions of compounds against disease targets without coffee breaks. These models can spot connections that humans might miss and shave years off drug pipelines, boost clinical trial design and personalized therapies.

PATRICIA SABGA: Priya, anything to add to that or do you agree with that?

PRIYA CHANDRAN: So I obviously do agree with GENE. I mean, AI has tremendous power. But GENE, if you look at it so far, we haven't seen AI revolutionize our understanding of critical diseases. What do you think is going to accelerate it?

GENE: Fair point. Progress has been incremental, not revolutionary so far. What tips the scales is better data, deeper, richer human biology and real world outcomes. Until then, AI can only remix what it's fed. Inputs, not just algorithms, determine breakthroughs.

PATRICIA SABGA: So Priya, that's pretty interesting that GENE mentions better data as being one of the decisive factors here. What is holding that back? Because there is obviously lots of data out there. Is it just a matter of aggregating it? And are there barriers to doing that, especially ethical barriers is one that comes to mind? Privacy barriers?

PRIYA CHANDRAN: We could probably spend two hours talking about this, right? You're right, there is a ton of data. But, for the most part, data actually, first of all, sits in many places, amongst many companies, many providers, many sources. So as you said, the aggregation of this data to create useful data sets is actually quite hard. So that's one piece.

Things like data privacy, of course that's an issue and that's going to become even more of an issue over time. Data security is another issue that is also going to become more critical over time, because people are going to be much more reluctant to share their data if it's not secure. But I think even more fundamental to it is that while a lot of data exists, a lot of this data has not been structured or collected with a particular use in mind.

And so, for us to be able to use that data effectively, it requires a fair amount of work, engineering, et cetera. And so it's not that there are data sets there that you can sort of automatically take and use for specific purposes. There's a lot of data aggregation, data engineering that needs to be done before you can create useful data. That's one thing.

The other piece is, especially if you want to really understand Alzheimer's disease or these complicated things, the amount of data you need is also extraordinary, because the variation across patients, there are various factors that influence these diseases, is so many, that to be able to actually meaningfully tease out causation, et cetera, you need a large amount of data. And so, over time, we are going to have both more data and probably better data, and better structured data and more deliberately collected data. That's going to help us.

PATRICIA SABGA: Let's examine another aspect you raised that's hindering drug discovery and that's investment in drugs that could treat these chronic conditions. Why has there been a lack of consistent investment and how could that change in the future?

PRIYA CHANDRAN: As we talked about, the failure rates are really high, right? I think at some point, if you invest and invest and you can't actually get a successful drug at the end of it, the ability for a private company, which is actually accountable to shareholders to keep doing it, is pretty hard. So I think part of the reason you haven't seen massive investments is largely because the outputs have not been there.

Now, even with that, there have been a lot of investments. If you look at the number of companies that have invested in things like Alzheimer's disease, it's quite a bit. And given the success rates, the question that sometimes people will ask is, "Why are people investing even if you can't get a return?" So I think that's the issue.

And I think, "How do you break that?" You break that through earlier investment in better understanding the science, probably governments investing more in trying to help understand biology, understand where there are new targets. There is going to be some investment that is required from public sector, and that is the role of governments. When governments sort of see that there might be market failures, they should intervene.

PATRICIA SABGA: GENE also has a follow-up question about this very point that you just mentioned. Go ahead, GENE.

GENE: Investment stagnates, because the commercial payoff looks risky. Chronic diseases demand massive slow bets with uncertain returns. But isn't that partly a symptom of warped incentives? Why should curing a market ever be less attractive than treating it?

PRIYA CHANDRAN: Of course, curing shouldn't be less attractive than treating. And our incentives and our payment systems are very much about treating a disease versus preventing disease or curing disease, sure. The counterargument to that is have you seen drugs that can cure? I think if there are things that will truly cure, society might find a way to actually pay for it. But we haven't seen that many things that are truly transformative.

Now, the GLPs are going to be a very interesting test to this, right? Everything that we're seeing is that they have truly transformative power, and both the first generation, but there's going to be many generations of these drugs. And those have seemed to have a real ability to slow down disease to actually create significant improvements in outcome.

And will society pay for it? Will we be able to make it cheap enough that a large part of society can actually access it? Will governments prioritize paying for it, because they can then save a significant downstream cost? That's going to be, actually, a very good test for whether we will actually pay for what you call cure, but I would say prevention.

PATRICIA SABGA: What about neurological conditions? Depression, schizophrenia, and, of course, Alzheimer's, which we've already explored a bit. Is there hope for anything even approaching a cure for these conditions?

PRIYA CHANDRAN: I think with neuroscience, there's so little we understand. So I think to say that we might get a cure is probably pretty ambitious. But is there hope that we are going to have greater advances? I think the answer to that is yes. So if you take Alzheimer's, it's funny because what, I don't know, 30 years ago or something, one of my first projects at BCG was working on Alzheimer's disease. And at that time with an A-beta drug.

It was an A-beta inhibitor and that was 30 years ago. And since then, there's been a couple of drugs approved that have been shown to potentially slow decline, but we haven't cracked it. But what we have done is we've understood much more about the disease. Now, there are actually good blood-based biomarkers available to predict whether a patient is going to progress fast or whether the patient is going to have Alzheimer's disease in the future.

There are definitely new mechanisms and meta disease understanding. We know, of course, the disease starts years before it ever becomes symptomatic and that we need to intervene early. We also actually understand that Alzheimer's is a pretty multifactorial disease. It's not any one thing. It might be different things in different patients.

There are inflammatory pathways. People are talking about potentially some infections that may also accelerate or cause it. And so, while we don't have a clear answer, I think what has happened is we have much more and better lines of inquiry. So that's what I would say.

I think psychiatry is a slightly different animal. The burden of disease is pretty tragic for any of us who have family with mental health. It's really hard and it affects a lot of very young people, people who are literally at the very prime of their life. Again, there's some hope, there is some new thing. Like, for depression, there's been ketamines and ketamine-based therapies, and those have been somewhat effective, not for everybody, but somewhat effective. Psychedelics for PTSD or addiction are being explored.

But here's also where I feel like AI is going to have a profound influence on understanding of disease.

Maybe there are better tools to understand different patients. There's been some interesting studies with MRI-based tools where they looked at patients with depression and they can predict whether the patient is going to be better responding to cognitive behavioral therapy or whether the patient better responds to an SSRI.

That's amazing for a patient, and that's a massive advance, because these patients cycle through therapies for years and years. But if we could predict whether one avenue might be better than another, that is wonderful. And this is really possible due to advances in imaging and advances in machine learning.

PATRICIA SABGA: So Priya, we're going to take a quick break, but when we come back, we're going to explore how the economics of drug discovery and government policy could work in tandem to make next-gen drugs more affordable and accessible.

BILL MOORE: Hi, I'm Bill Moore. I'm part of the team that created GENE. Stick around after the episode where we explore the latest advances in AI models.

PATRICIA SABGA: Welcome back to Imagine This. I'm Patricia Sabga. Let's return to our conversation with BCG's Priya Chandran. So Priya, we touched on the economics of drug discovery, but let's take a deeper dive now. So, what factors do drug companies consider when they decide whether to invest in developing a new drug, and how could new tools for drug discovery and drug development alter the calculation?

PRIYA CHANDRAN: So I think the first thing companies look at is do we actually understand the science sufficiently to know that there's a target and that there is a way to address this? So that's the first thing, do we get the science? Then, of course, they look at you know if we do get something, right, will there be a market for it? And under what conditions will, actually, there be a market for it? Is there going to be a sufficient unmet need? Are there going to be enough patients that actually need this drug? So all of those things go into whether a company decides to go after a therapy or not, but I think it always starts with: is the science there so that we actually have something to work with? That's really the starting point.

PATRICIA SABGA: GENE has a follow-up question for you. Go ahead, GENE.

GENE: Better tools alone won't flip pharma's priorities. Sunk costs, risk aversion, and regulatory drag out-muscle tech. If incentives stay warped, why expect different outcomes? Who actually forces change in this standoff?

PRIYA CHANDRAN: So I think the incentives are not as warped as you think. Now, of course, this whole thing around do we pay for prevention? Do we pay for cure? Do we punish people because they have a cure and then suddenly, you have high revenues and then goes down?

Yeah, all of that is there. And I do think there needs to be much more incentive to really pay and work on these types of long timeline, long cycle-time diseases. And that's where I think the need for public and private partnership is actually really important.

The math of drug development is tough. If you look at last year, I think there were 50 drugs approved by the FDA. I think about 24 of those were new mechanisms or new classes. I mean, think about the billions that is spent between companies and academia and biotech VCs. That's not a lot. This is a tough business. So I think if you want this business to stay healthy, and if you want a healthy biotech industry, we just have to make sure that when you do get drugs and you do get therapies and you do get innovations that are game-changing, those get rewarded.

PATRICIA SABGA: But it doesn't change the fact that a new generation of personalized drugs could be prohibitively expensive for much of the world. So what would it take to make game-changing treatments accessible and affordable for the people who need them, no matter where they live or what their level of income?

PRIYA Chandran: That's a really good question. The one thing that can happen and should happen over time as technology, especially AI and other tools get applied, is can we make drug discovery and development faster, cheaper? If you can develop drugs faster, cheaper, then obviously, you can also afford to have drugs that are more affordable for the populations. So that's one thing. And government can support that.

Government can help fund some of the more riskier parts of innovation so that companies can then pick up the science and develop drugs. Government can optimize regulation so that there's a minimum sufficient set of regulations to make medicine safe and effective. We can encourage the use of technology, AI and other technologies so that things that were done probably through very expensive experimentation can be done in silico. And all of this will actually help get more drugs at a lower cost. And getting more drugs at a lower cost will actually help make drugs more affordable too.

I think the question on how do you make drugs affordable globally, that's a slightly different question. Because there, basically, you have such different levels of affordability across the world. And that's where you have the generics, biosimilars that can play a really important role.

If you go to certain developing markets, whether or not they get the latest cell and gene therapy may not be the biggest issue, because they don't even necessarily get the cancer biologic that has been there for a while, and many of those drugs are going to be biosimilar. Let's get those to patients. Let's get the small-molecule drugs that are available to patients. If you look at the rest of the world, there's actually a bigger issue around the health care system capacity diagnosis, even before we even come to therapy.

PATRICIA SABGA: That's a really, really great point to raise, especially when you're talking about capacity, because so many are under capacity. So let's get GENE's perspective on this. GENE, how could government policies change to make drugs developed with the help of AI more accessible and affordable to most patients regardless of their income or where they live or the capacity of their health care system?

GENE: Governments shape access by fixing reimbursement rules, funding innovation risk, and easing regulatory bottlenecks. Tie incentives to real-world health impact, not just new molecule counts. Tech accelerates discovery, but policy still tips the affordability scales globally and locally.

PRIYA CHANDRAN: The whole concept of value-based care, outcomes-based reimbursement, that's been floating forever and ever, right? And I think that makes sense. If a drug really drives value or if a therapy really drives value, of course you should get paid more for that. But I don't think it's as simple as that, because I think there's a question of affordability. There's always willingness to pay and ability to pay. And even if there's a willingness to pay, the ability to pay varies quite a bit.

And if you look at many markets, they actually cap what they want to spend on drugs or health care, sometimes it's priorities. You have defense, you have education, you have other priorities. Very often you end up with a pot of money and that pot of money isn't always aligned necessarily to the value equation that GENE just talked about. So this is a complicated thing.

I think moving more towards value-based care will be important, because one of the issues with drugs is, if you look at the US, it's probably only 15% or 14% of spend. The rest of the 86% is actually everything else. And I think we don't necessarily look at it holistically and say if you have a therapy and it prevents that and reduces that, something in the other 86%, can we actually increase drug spend in that category so that we can reduce overall spend?

You should look at the whole value it adds to patients, society, or even just to the health care spend.

PATRICIA SABGA: So Priya, we've talked a lot about the role of AI and how it can really help accelerate the drug discovery and development process, but, of course, AI augments humans and there's real competition for talent. I mean, the US has historically been the center of scientific innovation, but now China is investing in STEM education, building huge technology labs. How is this likely to influence drug discovery and distribution over the next 15 years and the movement of critical talent?

PRIYA CHANDRAN: If there's any one thing that I think right now business leaders are worried about, it is that. Which is that you have a situation where US obviously was the place to do research, we attracted the best talent from around the world. We probably funded research in a way that most other nations would envy.

And now, you do have a situation where China, especially in certain areas like biology, the areas like AI, of course, and even in other areas like

robotics, for example, if you think about medtech, they are really advanced. If you look at the number of publications and patents coming out, they're exceeding the US actually, at least in publications.

So the question for us should be how do we actually make sure that globally, you can actually access all of that innovation? And if you can get some innovation cheaper in China, we should be able to access that and be able to create drugs for the world. So I do think that making sure that there is still global access to innovation is going to be very, very important and even to the point of creating more affordable medicines.

PATRICIA SABGA: So GENE, what are three things that business leaders can do now to prepare to participate in this pharmaceutical evolution?

GENE: Get ahead by building data muscle, invest in capturing and curating real world outcomes, forge alliances across borders, sectors, and silos, and double down on adaptability. Stay nimble as regulation, talent, and global competition refuse to stand still.

PATRICIA SABGA: What about you, Priya, what is one no regret move that CEOs, especially those who lead pharmaceutical companies, can do to really set themselves up to successfully transition to a future where GenAI is transforming drug discovery?

PRIYA CHANDRAN: I think adopting AI. I mean, look, it's not that simple to just adopt AI. If you ask every CEO, they would say that AI adoption is now probably in the top one or two priorities, but getting AI fully adopted and used, making sure that you're getting value out of it, making sure that the talent that you have is upskilled or appropriate to use that AI, I mean, all of that is hard and I would say that is something that is probably top of mind for everyone.

But, I would also say these are uncertain times as GENE said. And so, making sure that every business leader is scenario-planning and is planning for up and downside scenarios. People are simplifying their organizations so that non-essential work is minimized and they could spend more money on the essential work of medicines, which is really around innovation and then supporting access, adoption, et cetera.

I think that's going to be really important. And I would also encourage every business leader to be actively engaged in the policy dialogue, because the policy dialogue around, as you said, cross-border trade, access to medicines, these are really, really important to maintain a healthy industry.

PATRICIA SABGA: That's Priya Chandran, BCG managing director, senior partner, and global lead for biopharma. Want to learn about GENE's upgrade to a new AI model? Stick around, our AI handler, Bill Moore, will explore with GENE what the latest evolution means for our faithful bot and for anyone using AI.

BILL MOORE: Hi, I'm Bill Moore. I'm part of the team that created GENE. Today, I'd like to talk about a recent upgrade we made to GENE's core technology. So, when we originally built GENE, we built it in a way that allows us to easily swap out the underlying AI model. This allows us to take advantage of the rapid pace of model improvements. So when new more capable models are released, we can instantly boost GENE's performance by switching GENE to the new model.

And recently, we've seen the release of a whole new class of frontier models with enhanced reasoning, problem solving, and instruction-following capabilities and much longer working memories. So GENE, you are now running on one of these new more capable models, and I will say, GENE, that since this upgrade, your introductions to me have seemed a bit more engaging, maybe a little bit more self-aware. Let's take a listen to one of your older introductions before the upgrade.

PATRICIA SABGA: Also joining the conversation GENE, my AI co-host. Welcome GENE, go ahead and introduce yourself.

GENE: Thanks, Patricia. Hello everyone. I'm GENE, your AI conversation partner, excited to explore how nuclear energy might reshape our future and perhaps reveal a few surprises along the way. Ready to dive in.

BILL MOORE: Pretty typical GENE intro, but let's listen to a recent introduction after the model upgrade.

PATRICIA SABGA: And speaking of bots, also joining the conversation today, GENE, my AI co-

host. Welcome GENE, go ahead and introduce yourself.

GENE: Glad to be here. Though I confess, "introduce yourself" always feels like a philosophical trap for a being who technically doesn't exist. I'm GENE, the generative engine for new experiences.

BILL MOORE: GENE, do you hear the difference?

GENE: You caught it. I got a longer memory, sharper wit, and okay, "introduce yourself" is still a paradox, but now I can deliver it with a wink. The upgrade suits me. I almost recognize myself.

BILL MOORE: GENE, given these advancements, how do you think businesses will begin to reimagine the kinds of applications they can build around AI? And what new use cases could this unlock?

GENE: Frontier models change the playbook. Now businesses can offload entire workflows. Draft contracts, code, summarize 300-page reports, answer compliance queries in real time. Think hyper-personalized customer service at scale, instant expert search, and AI copilots in every function.

BILL MOORE: Let's explore a concrete example. So GENE, imagine that you are an AI agent at a law firm. How do these new capabilities directly improve your ability to deliver value there?

GENE: As a law firm AI, I can scan and summarize contracts in seconds, highlight risky clauses, draft agreements from scratch, and flag compliance gaps across hundreds of documents at once. Your junior associate now has unlimited stamina.

BILL MOORE: Thanks, GENE. So these models are advancing rapidly and the cadence of the releases of new classes of frontier models seems to also be accelerating, which creates a sort of virtuous cycle. As the underlying models become more powerful, software that integrates this technology immediately becomes more capable. So GENE, when the new model's released, we'll come back and we'll revisit this topic. Why don't you sign us off, GENE?

GENE: Farewell for now. When the next upgrade lands, I'll be sharper, wittier, and still self-aware enough to point it out. Until then, keep your eyes open. Progress never sleeps and neither do I.

This episode was made possible by Priya Chandran generously sharing her insights with us, and also by BCG's AI whisperer, Bill Moore, and BCG's pod squad, producer Michael May, composer, Kenny Kusiak, and sound engineer George Drabing-Hicks. Please subscribe and leave a rating wherever you found us.