The Future of AI in Biotechnology

On the Precipice of the New Technological Revolution

The artificial intelligence revolution kicked into high gear seemingly overnight. Generative AI platforms like ChatGPT and Google Bard have dominated headlines for months as we explore the possibilities for this powerful new technology, which has potentially significant implications for nearly every industry on the planet.

One of the most promising uses for artificial intelligence is its applications in biotechnology. Doctors and scientists are leveraging AI and machine learning to devise entirely new treatment solutions for diseases and chronic conditions affecting millions around the world. AI is even changing how we interact with our very DNA, not only helping scientists and researchers build safer, more effective drugs and vaccines, but better understanding how biology works and how species evolve over time.

Although it's still early days, there are many indications that we're on the precipice of a technology revolution unlike anything we've ever seen before. AI is allowing biotechnologists to augment the very building blocks of life in service of a healthier future for humanity. We are in uncharted territory, and how this shakes out will have world-changing ramifications.

Developing New Drugs and Vaccines

Biological systems are immensely complex and contain far more data than human beings could ever possibly keep track of. And so historically, drug development has been a protracted, expensive process primarily relying on trial and error. Artificial intelligence can rapidly process this data, make informed predictions about pathways and pathogen targets, and design new drugs to combat potential health threats.

This allows pharmaceutical companies to significantly reduce the time to market for biologically derived products. Given that biological systems contain so much data, the drug development process involves a great deal of experimentation and repetition. Artificial intelligence gives researchers the power to automate many of those tasks. We saw this firsthand with the development of the COVID-19 mRNA vaccine, which was devised and released to the public faster than any other vaccine in history thanks in large part to AI and machine learning technology.

"We are able to control biology in ways we never have in 4 billion years," said Michael Specter, author of Higher Animals: Vaccines, Synthetic Biology, and the Future of Life on a recent episode of Amanpour and Company.

"We're able to make things, alter things. The COVID vaccine was basically assembled in a couple of days once it was downloaded from the internet. And those words ought to be profound – we downloaded the blueprints from the internet. When you can do that, you can do a lot of things. It means biology moves at the speed of light now."

The breakneck speed of biotechnology's evolution was also on full display with the recent release by DeepMind's AlphaFold about the 3D structure of 200 million proteins. AlphaFold, a subsidiary of Google's parent company Alphabet, had a longstanding grand challenge of accurately predicting the 3D structure of every known protein sequence. AlphaFold could provide a sharp view about the 3D structure of malaria surface proteins, allowing researchers to test new vaccines targeting malaria. DeepMind's release was a striking example of artificial intelligence's ability to assist researchers in the process of discovering new drugs.

Developing new bioproducts can take years, and typically costs millions of dollars. Biotech leader TeselaGen serves as an operating system for biotechnology, leveraging AI and machine learning to reduce both cost and time to market. "We provide an end-to-end integration combining powerful software modules for designing, building and optimizing different biological products," said Teselagen Founder & CEO Eduardo Abeliuk. "Our AI-enabled enterprise platform radically accelerates the development of everything from therapeutics, high-value chemicals, and agricultural products. "Teselagen' high-throughput capabilities greatly shortens development times. The platform is not just a set of tools, but an Operating System for Biotechnology", he added.

Transforming Genetics for a Healthier World

Surprisingly, a big portion of the information we need to treat the world's worst diseases

is contained within DNA. It's at the heart of scientists' understanding of not only what causes disease, but how they can be prevented and cured. We now have the ability to manipulate DNA in ways that allow us to alter the basic genetic structure of both animals and humans, clearing the way to developing new and more effective therapies.

Malaria, for example, kills millions of people every year, particularly in the poorest regions of the globe. In recent years, researchers have figured out how to alter the DNA of mosquitoes so the females are unable to produce viable offspring. Such genetic modifications are an alternative to vaccine development and have the potential to wipe out the gene pool of malaria-carrying mosquitoes, which could result in millions of lives saved. Eradicating diseases like malaria that chiefly affect the world's most vulnerable populations is a core focus of the Gates Foundation. In a recent blog post, Bill Gates cited AI as a technology that will "dramatically accelerate the rate of medical breakthroughs." He says the upcoming generation of solutions "will be much more efficient, and they'll be able to predict side effects and figure out dosing levels."

Gene editing can also be used to help save the lives of endangered wildlife. The black-footed ferret is one of North America's most endangered animals, due largely to their high susceptibility to the plague. Researchers are working on a way to embed the plague vaccine into an animal's germ cells so its offspring will be immune to the disease. "Those progenies will basically be born with a heritable vaccine," says Specter.

TeselaGen's platform takes this ability to edit and assemble genes to the next level, while allowing researchers and enterprises to automate, manage, and track everything in the lab. Our design tools are built for industrial biotech and biopharma companies to digitally design modified biomaterials including DNA, oligos, strains, microbial materials, proteins, enzymes, or any other configurable, domain-specific biomaterial type. Our Build toolkit then lets users execute on the Design protocols and optimize their product with lightning speed.

We've entered an exciting and unprecedented new era for AI-enabled drug discovery and disease prevention. As the science advances further, expect artificial intelligence and biotechnology to be at the forefront of efforts to eradicate the world's diseases and ensure a healthier future for us all.

Dr. Eduardo Abeliuk

Dr. Eduardo Abeliuk is a U.S. based entrepreneur and technologist with over twenty years of experience driving technology development and innovation at various high-tech companies in the US. He is the Chairman and CEO at TeselaGen Biotech., a Silicon Valley based company working at the interface between Biotechnology, Artificial Intelligence and Enterprise Software. Dr. Abeliuk holds an M.S. in Bioengineering and a Ph.D. in Electrical Engineering from Stanford University. He holds multiple U.S. patents on computational biology and AI.