

Global Innovation

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The AI revolution – Getting drugs to market faster

Can you imagine your employer enrolling every single one of your colleagues into a mandatory AI learning academy? It would be a serious commitment to the belief AI is going to transform the way we work. Well, Moderna has done precisely this, tasking its entire workforce, all the way up to the CEO, to become fluent in AI.

It might be surprising that a healthcare company is pursuing AI with such fervency, but Moderna is really a technology company. It produces mRNA molecules, which, just like the software of a computer, carry sequences of code. While computers follow instructions in the form of the binary coding system of a series of 0s and 1s, the building blocks of life, proteins, follow code in the form of the four letters (or nucleotides) carried in mRNA. Four letters might sound like a short and limited alphabet but it provides a near infinite number of possible sequences with which to produce proteins – and so drug discovery is really a mathematical problem, which is ultimately cracked with data.

Wherever data is key, AI may be a powerful solution. We believe the potential for AI to accelerate the pace of drug discovery is enormous. Bringing a drug to market can take over a decade, with only 8% of drugs making it through Phase III clinical trials. One of the reasons commercial success is so scarce is the challenge of predicting the correct protein structure (for drugs to bind to in order to work) and identifying the right compounds that bind to the specific protein site. Even the most talented scientists are constrained by the law of large numbers – we are talking about an infinite number of protein permutations, after all – hence the power of leveraging AI.

What does this mean for patients? Potentially life-saving and life-changing outcomes. AI is helping to predict the design of molecules that will achieve the desired results in fighting illnesses from flu to cancer. Yet the use cases of AI across pharma extend beyond drug discovery in injecting productivity to a historically inefficient sector. Take Moderna's RSV vaccine candidate as an example (expected to come to market in 2024, representing the company's first non-covid commercial opportunity): using AI to forecast and ID for clinical trial enrollment helped move the vaccine from the idea development phase to phase III trials in just two years. This process typically takes six or seven years.

Moderna's ten-year data advantage renders it a front runner when it comes to AI, but opportunities exist across the pharma value chain. Contract development and manufacturing organisation Lonza (who as it happens was responsible for scaling up Moderna's Spikevax Covid vaccine in 1/3 normal time and has long-term contracts in

place to develop the company's pipeline candidates), is integrating AI and machine learning into the drug manufacturing journey. AI is assisting in product quality optimisation through computer vision technologies, helping the company navigate the complexity and speed requirements of manufacturing novel treatments.

It is very early days for AI's application in pharma, but we are starting to see the benefits of improved production processes from early adopters. No sector sees more R&D spend go to waste. R&D consumes over 25% of sales on average in the industry, yet 92% of drug approvals fail. At the same time, no other sector holds more potential to change lives and the economy in the 21st century. This makes the potential of AI to drive this sector forward all the more exciting.

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