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Can Deep Tech Startups Propel Drug Discovery?

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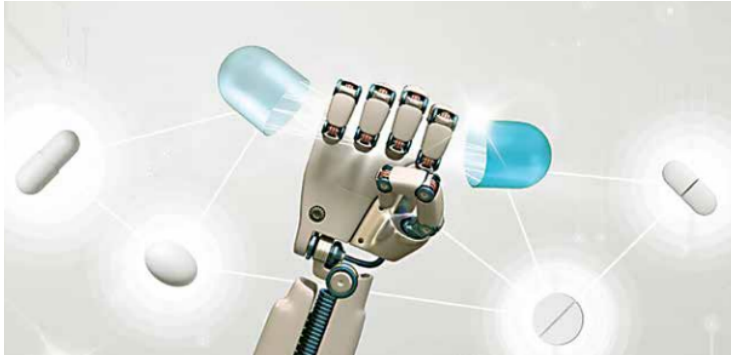
Data analysts believe that soon most of the drugs will be designed by machines using AI, and not humans



In recent years, the field of drug discovery has witnessed a remarkable transformation, thanks to the advent of Artificial Intelligence (AI). This revolution is not confined to any particular region; it's a global phenomenon reshaping the

pharmaceutical landscape. Experts believe that AI is proving to be a game-changer in the quest for new medicines across the world.

“Developing a medicine means putting thousands of pieces in a puzzle together. AI has been used in some form or the other for the last 30 years, even in designing drugs and developing formulation, but in the last 10 years, it has come to be used in almost all the processes of drug discovery,” says **Dr Sudip Roy, Founder, Prescience Insilico**.

One of the initial steps in drug discovery is the identification of potential drug targets, which conventionally takes years. But now, AI algorithms, particularly machine learning and deep learning, analyses vast datasets to identify proteins and genes associated with diseases, which not only expedites the process but also reduces the chances of failure.

Besides, AI is now being used to identify existing drugs that can be repurposed to treat other diseases. Using AI, a large amount of data on pharmaceutical compounds can be analysed to study any connection between the existing medicinal compounds and various diseases. The findings can lead to many cost-effective treatments. By analysing genetic and clinical data, AI can also identify the most suitable treatments for individual patients, what is popularly called personalised medicine. This, researchers believe, has potential to minimise the treatment’s side effects and improve its effectiveness.

Secondly, it has reduced the cost of drug discovery. Billions are spent on various stages of drug discovery such as early stage drug discovery, early stage target discovery, pre-clinical trials, biological trials, and clinical trials. ‘‘Currently, the average cost to bring a drug to the market is $2 billion. But AI is reducing the cost significantly,” says Dr Roy.

Besides, AI-driven predictive modelling is another breakthrough in drug discovery. AI algorithms help researchers analyse chemical structures and biological data to predict the potential efficacy and safety of a drug candidate. “By doing so, AI reduces the time and resources required for experimental testing, ensuring that only the most promising compounds move forward in the development pipeline,” says Dr Roy. “In fact, this precision in drug design not only expedites the development process but also reduces the chances of failure in later stages of clinical trials,” he adds.

Adding on, entrepreneurs believe that AI has proved to be a boon for startups as it allows them to excel despite smaller teams and smaller fundings. Today, there are many startups worldwide, which focus on one aspect of drug discovery. Some of them are believed to be much faster and more efficient than even the large-scale pharmaceutical companies, where multiple layers of approvals are needed for a molecule to move from one stage to another.

“We deal with biological molecules, a class of molecules which has been there for 30-40 years. So, there is knowledge and literature available but data is sparse, about these large molecules. We have a generative AI model that generates new antibody drugs from the learnings of the existing data. Also, we have a cross-domain team from both biological and computational domains because it requires experts from both sides to solve the problem”, says **Dr Aridni Shah, Co-founder and Chief Executive Officer, immunitoAI**.

But how easy is it for these pharma startups to get the required funding? Startups, says Dr Aridni, have been funded heavily in developed nations. But the investments biotech startups are getting in India are not enough. “There are two major reasons for that—first, the investors in India lack expertise needed for evaluating the potential of a biotech startup, and second their risk appetite is low. One who invests in drug discovery needs to be patient as the outcomes and return on investment take much more time compared to other fields,” she says.

Another challenge that the startups in industry face is the access to data, ethical considerations and regulatory framework around the use of AI in drug development. “For AI to work efficiently it requires algorithms, and building reliable algorithms requires a lot of preclinical and patient data. This data typically resides in silos within established organisations. It is difficult for startups to invest in generating the data. Different countries have different regulatory frameworks, which limits the adoption of this revolutionary technology across countries” says **Dr Achintya Das, Head, Data and Computational Science, Syngene International**. “In India, for example, as per Digital Personal Data Protection Act, only the Union Government has access to individuals’ data.”

Though under section 17 (3) of Digital Personal Data Protection Act, the Central government can allow this data to be used by some startups, they need to anonymise the data so that privacy of people is not compromised. “The technology that converts this personal data into anonymous data is expensive, and it will be a while before it becomes affordable,” says Dr Das.

Agrees **Dr Reji Joseph, an Associate Professor at the Institute for Studies in Industrial Development (ISID)** saying, “I recently came across a report in which CPHI, a global community for pharmaceutical professionals, predicts that 50 per cent of the drug approval in the US in the next 10 years will involve AI. This is the potential that AI is offering. It has a lot of potential for developing therapies for rare and difficult-to-treat diseases. Statistically, of 10,000 molecules identified, only one reaches the market. But AI helps researchers in narrowing it down.”

According to Morgan Stanley, an American financial service company, even the modest improvements in early-stage drug development success rates enabled by the use of artificial intelligence and machine learning could result in an additional 50 novel therapies over a 10-year period, representing a more than $50 billion opportunity. Morgan Stanley Research biotechnology analysts estimate that a 20 to 40 per cent reduction in costs for preclinical development across a subset of US biotech companies could generate the cost savings needed to fund the successful development of four to eight novel molecules.

Data analysts believe that soon most of the drugs will be designed by machines using AI, and not humans. Both researchers and pharma companies believe that AI has huge potential, especially for a country like India which has the 3rd largest startup ecosystem globally in terms of number of startups. All the country needs to do is fill the gaps.

“We need to invest in deep-tech startups which will strengthen our hold on AI. They will help pharma startups to do better. We need to foster collaborations and partnerships among researchers, AI experts, and pharmaceutical companies to accelerate the development of new treatments. Positively, in due time the industry can gain investor’s confidence too,” says Dr Joseph.

(The spokespersons were a part of the webinar titled: ‘How AI is revolutionising the drug discovery and development process’, hosted by BioStartUps, a BioSpectrum platform.)

Gunjan Sharma

(gunjan.sharma@mmactiv.com)