Artificial Intelligence & Pharmaceutical Developments

From starting out as a futuristic concept in science-fiction television to becoming a more palpable reality, advancements in today's technology are transforming the world as we know it. Progress with AI has affected a variety of fields–from science to entertainment to visual arts–in many ways; both good and bad. One of the main fields AI has greatly impacted is medicine, specifically drug production. Development of pharmaceuticals is a painstakingly long process—on average, taking more than "10 years and billions of dollars to develop a new drug"—which makes sense because a lot of problems could ensue if a drug which hadn't been tested properly became widespread (Douglas, 2023). But now with AI automation being deployed throughout drug development pipelines, the prospect of cheaper pharmaceuticals in less time is closer than we think. In fact, technology developed by one company in particular, Exscientia, was used to cure a patient with an aggressive form of blood cancer that six courses of chemotherapy had failed to eliminate.

Taking a closer look: 82-year-old patient, "Paul" (his identity had been obscured in the trial), had already gone through many trials, tests, and drugs prescribed by his doctors; none of which had been able to get rid of his blood cancer. With nothing to lose, Paul's doctors enrolled him in a trial set up by the Medical University of Vienna in Austria who was testing Exscientia's new matchmaking technology which "pairs individual patients with the precise drugs they need, taking into account the subtle biological differences" (Douglas, 2023). This technology took a small sample of Paul's tissue, containing both normal and cancer cells, divided the sample, and exposed them to various drugs. Then, using robotic automation and machine-learning models "trained to identify small changes in cells", they waited for the results (Douglas, 2023). Theoretically, what both this technology and what Paul's doctors were doing was the same: trying out existing drugs on the patient to see what would eliminate the cancer. But rather than putting Paul through multiple months worth of taxing chemotherapy, they tested dozens of treatments at the same time: some of which didn't kill his cancer cells, and others harmed healthy ones from the sample. Because Paul was too frail to take the drug that came out on top, he was given the matchmaker's

second-choice: a drug from Johnson & Johnson that his doctors had written off due to data from previous trials. This treatment, however, worked, and the cancer had been eradicated from Paul's body.

This selection process of drugs isn't the only thing AI has revolutionized–the company Exscientia also wants to use machine learning to effectively design new ones. As mentioned before, the process of drug production is one that involves years of rigorous tests, trails on human volunteers, and an onslaught of other procedures before the drug can be approved. Though AI is being used to streamline this process, the core of drug production–experiments on cells and tests on humans–is unavoidable. Many compounds which work in the lab end up failing in humans which explains the high cost of this process: multiple drugs have to be designed and tested to get one working treatment. However, though there is lots of progress and discoveries to be made, a lot of time still is being saved. With the help of AI, two drugs Exscientia developed in 2021 have started the process and they are on the way to submitting two more. This faster production of drugs can save numerous lives as there is always a need for new drugs to treat the substantial number of diseases that can't be treated or treated only with many side-effects. And there are a number of resources and startups, along with Exscientia, that are exploring the use of machine learning in the pharmaceutical industry as the more prevalent AI becomes in this industry, the more chemical and biological data there is to train the learning models.

Artificial intelligence has evolved a lot since its inception, but it still has a long way to go. But as more advancements are being made, newer technologies become more prevalent in our everyday lives. Though AI impacts many fields, medicine is one of the major ones being transformed. From creating an unlimited supply of organs to speeding up the drug synthesis process, the use of AI in medicine can save a lot of lives. And though the technology is still in its early stages, it helps scientists move past a lot of the messiness which characterizes this development process.

References

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