Why is There a Decline in Pharma R&D?

This extract is taken from Proventa's longer AI in R&D White Paper. To read the full sector White Paper, including its expert look into AI's current uses in pharma and whether AI is enough to reduce pharma's R&D decline, click, click here.

The reason most commonly espoused for R&D's steady decline is one of naturally diminishing returns - the centrepoint of Stott's research. As pharma has found the 'low-hanging fruit' over decades each subsequent drug becomes both more expensive and more difficult to synthesise, given the increased standard of health and reduced number of targets with each successful drug discovery.

One professional, speaking from his expertise as a former Lead in Digital Innovation in a major pharmaceutical company, agreed with this theory. He noted that many major diseases received cures quite quickly, but once these low-hanging fruit had been hit cures became more difficult to find: "They become more difficult because even though companies like Eli Lilly and Biogen have been working on identifying the right compounds or targets to conquer the diseases, they've found no success because they're just not as easy as the ones already conquered.

"In any industry, if you start with a clean slate it's easier to achieve quite a lot. But once you hit the major milestones, achieving the next - in this case diseases like Alzheimer's or Parkinson's - are progressively more difficult."

Peter Henstock, AI and ML Lead at Pfizer, suggested that clinical trials represent a relatively new opportunity for AI. Most of the work in AI within pharma has focused on the drug discovery area, followed by the Real World Evidence. However, there are many opportunities in patient selection, patient engagement, and a number of other areas.

Another suggested reason for the decline relates to diseconomies of scale as a result of pharma's long history of consolidation and scaling-up: it was wrongly believed, some have said, that R&D can be scaled up, industrialised and driven by specific metrics. As R&D units became larger and more complex, what actually resulted was a considerable loss of accountability, creativity and risk-taking attitude.

Evidence for this viewpoint was gathered by an employee of Eli Lilly in 2009, who found that for the last 60-odd years annual new molecular entity (NME) output per company had remained constant, regardless of R&D team size or level of investment. With hugely increasing cost per NME, and the gradual loss of the "low-hanging fruit" that came out of this steady process, it can be seen why the number of NMEs discovered by the large pharmaceutical companies fell from 75% in the early 1980s to just 35% in 2007.

But there are many other reasons circulating for the rising cost and declining returns of pharma R&D: a potentially broken business model; the inherent unpredictability of drug discovery; and tougher regulatory rules which require more testing and evidence before a drug can go to market. There is certainly no one definitive reason given for the issue, which makes finding a solution considerably harder than it otherwise would be.

But looking at the statistics, it is clear that certain truths are self-evident: whatever the reason, pharmaceutical production is suffering, return on investment is faltering and not enough drugs are making it through to market. And the solution to all of these issues seems increasingly to rest on one idea: artificial intelligence and machine learning.

To read the full White Paper on AI in R&D, click here.

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