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Opinion:

The role of new technologies in the next generation of drug development

By Mark Polinkovsky,
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The last century saw rapid progress in medical treatments. Early successes include antibiotics and chemical compounds like Aspirin. More recent breakthroughs in "biologics" like antibodies, cells and RNA-based therapies have expanded treatment options for complex diseases. However, pharmaceutical and biotechnology companies are facing challenges in developing the next generation of medicines.

Research and development costs are increasing, particularly for diseases without adequate treatments. To address these challenges, innovative approaches are necessary. Recent technological advancements, from digitalisation to artificial intelligence (AI), have the potential to streamline drug development, that could result in more accessible and efficient treatments for patients globally.

DIGITALISATION REVOLUTIONISES LAB WORKFLOWS

When you imagine a scientific research laboratory, what comes to mind? You probably picture a scientist hard at work, bent over beakers and flasks that hold obscure, colourful chemicals. They might test their solutions using complicated instruments. When they find a reaction that works, they probably shout "Eureka!" and write notes frantically in their laboratory notebooks. You may be disappointed to find out that scientists tend to work in teams, testing and measuring carefully-designed experiment plans – Dr. Frankenstein was fictional after all!

Often, however, scientists do make measurements on different instruments and copy the results, along with their notes, into paper lab notebooks. Those not using paper notebooks, use electronic lab notebooks (ELNs) instead, though most of these resemble a word processor with a few strict templates built in (imagine an online form from a government agency).

For the last few years, there has been a growing realisation that digitalising the work in the lab would have enormous benefits. Those measurement instruments can be connected directly to data systems, so the results can be sent to the scientist's ELN experiment automatically.

Improving data connectivity of the lab instruments has several advantages – the data is more complete, is more reliable, and is available across the entire organisation so others do not have to repeat the same experiment (experiments are repeated much more often than one might think).

ELNs based on modern software architectural principles are also evolving to provide more and better functionality to scientists: they can connect to other systems, act as a common data and workflow platform, and improve lab operations (experiment planning, material management, and experiment automation). Pharma and biotech companies are now realising how much the digitalisation of their labs can speed up their development efforts, and in turn, allow them to offer new medicines to patients faster and cheaper.

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AI AS A RESEARCH ASSISTANT

Improving lab operations is just one aspect of the revolution in research and development. Until very recently, scientists have had to solve all the technical challenges they encountered when researching new medicines by themselves. AI is now able to help them increase their capabilities. AI systems can help scientists predict how the molecules they are researching will behave and if they will be safe for humans to take. Can they be dissolved in water, and how quickly do they degrade? Are there other, similar molecules that may be better? Having these answers immediately will allow researchers to focus on the most promising drug candidates and eliminate unsuitable ones without needing to test them.

AI can also be employed to find drugs for specific disease targets without resorting to resource-intensive methods such as high-throughput screening. Examples could include a molecule that targets a type of cancer cell more specifically, or one that effectively targets amyloid plaques in Alzheimer's Disease with fewer side effects. Recent, surprising results from AI in other fields suggest that it could suggest options from outside the normal range of scientists' research. Ultimately, AI may be able to cut two to three years from the current 10-year-long drug development process.

Skeptics might argue that instead of improving drug development, AI could lead to dangerous substances being developed. This possibility is extremely unlikely, as any AI-generated drug candidates must still pass through the very rigorous development and testing process.

ORGANISATIONAL CHANGE MANAGEMENT (OCM) PROMOTES ADAPTABILITY

Another key area receiving more attention in our rapidly changing world is OCM. As companies adopt more digital and AI capabilities, it is important for the people working in those organisations to be trained to use the technologies effectively.

OCM is the practice specifically concerned with preparing the members of an organisation to deal with changes in their ways of working. Simply implementing the technologies mentioned previously will not improve the drug development process. Instead, the scientists (and the rest of the organisation) need to understand how they can best use the new tools available to them. For this reason, pharmaceutical and biotech companies have begun to focus on OCM much more.

CONCLUSION

Pharmaceutical and biotech companies are facing challenges in developing future medicines and are turning to several technologies to help them overcome those obstacles. Digitalising lab workflows will help scientists work more efficiently in the lab. Similarly, AI has started to provide researchers with better drug candidates in their search for effective treatments. Lastly, OCM is an increasing area of focus, to help scientists utilise their new capabilities most effectively. With these capabilities, patients can look forward to the faster arrival of more effective medicines.

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About Arcondis

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Our solutions and services include Digitalisation, Data, IT & Infrastructure; Development & Operations; Product Lifecycle Management; Quality, Regulatory & Compliance and People & Culture. As an independent solutions and Managed Service provider, we have the flexibility to prioritise our clients' best interests without being constrained by exclusive partnerships. We follow an outcomes-based approach – from strategy to hands-on delivery and beyond.

With a well-established reputation built over two decades, we have earned the trust of leading companies in Pharma, MedTech, Healthcare and Start-ups. Headquartered in Switzerland, we employ more than 250 specialists and professionals, with offices in North America, Europe and APAC.

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