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Takeaways from AI Driven Drug Development Conference

Peter Flynn, from Choate's Patent and IP team, attended the 2025 AI Drug Discovery & Development Conference, on November 19-20 at the Boston Convention and Events Center. This year's conference brought together experts from biotech, pharma, and AI / machine learning industries. In addition to several keynote talks, the conference included several talks within 5 different tracks: biology, chemistry, AI Infrastructure, AI in Clinical Trials, and Process Development.

Below are takeaways from the conference. These represent the views of the conference speakers.

AI is Augmenting, Not Replacing Scientists

While AI can support scientists by handling repetitive tasks and analyzing large datasets efficiently, human expertise remains vital for interpreting complex data, making strategic decisions, and generating creative solutions in drug development. "Humans-in-the-loop" are also necessary for supervising AI and making sure it remains on task. In addition, for the industry to eventually gain widespread confidence and trust in AI-derived drugs and therapies, having humans involved at every step is essential.

Biotech and Pharma Remain Ripe for AI Disruption

On average, drug development programs take 10 years for FDA approval, cost in excess of $2 billion, and have a success rate of less than 10%. Meanwhile, the FDA is approving less than 50 new drugs per year. Accordingly, there is ample motivation to find ways of using AI to reduce the cost and time needed to bring new drugs to patients.

AI Deployment in Biotech/Pharma is Accelerating

Foundation models (trained on public data sets) are being used for analysis of phenotypes, functional read-outs of small molecule data, predicting protein folding and function, patient interfacing & data intake, predicting cellular responses, high-throughput screening, etc. With such catchy names as BioBERT, Me-LLaMA, MedSAM, and AntiBERTy, the repository of foundational models is rapidly increasing. Meanwhile, a report from Menlo Ventures indicates that there has been a 7-fold increase in the number of healthcare organizations that have implemented domain-specific AI tools in 2025 compared to 2024.

2025 has Proven to be the Year of the AI Agent

This year began with AI proving its worth in the form of narrowly-focused agents that are competent at accomplishing specific tasks. Throughout the year, agents have become more complex and impactful to the point where there are now domain-specific agents covering areas such as biology and chemistry. Biomni, Stanford's self-described "General-Purpose Biomedical AI Agent," is an example of this. The industry is using agents for an ever-increasing skill set.

Data Availability is Becoming the Biggest Limitation for AI

Data is key. An AI model is only as good as the data it is trained on. Unfortunately, available data often only covers a tiny fraction of the biological or chemical design space. In order to expand the AI design envelop, companies are employing physical automation,

lab-in-the-loop, and other high throughput strategies for streamlining the data collection process. "Physics-based" simulations are also being employed to extrapolate beyond the boundaries of the available data sets.

Breaking Data and Organizational Silos will Enhance AI Impact

The drug development ecosystem is saturated with siloed data living in incompatible systems. For example, data is often not translatable between data silos in the target identification, drug design, drug development, in vitro testing, in vivo testing, clinical trial, and real-world data domains. Similarly, large companies often have organizational silos by design, to ensure deep domain expertise (i.e., scientific, regulatory, safety, etc.). However, there is often a cognitive disconnect between these silos. Implementing centralized data platforms and some measure of organizational cross-training can help to break these silos, and enable adaptability between domains.

There are Opportunities in the Mundane

While the idea of using generative AI to revolutionize drug-discovery may seem enticing, there may be greater near-term opportunities in the mundane aspects of drug-development, particularly as it pertains to time-intensive regulatory processes. Using AI for tasks such as streamlining regulatory paperwork, patient recruitment and stratification, clinical trial data curation, and other "unsexy" tasks may be the lowest hanging fruit when it comes to reducing the FDA approval timeline.

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