Boehringer Ingelheim and IBM Collaborate to Advance Generative AI and Foundation Models for Therapeutic Antibody Development

Ingelheim, Germany and Armonk N.Y., November 28, 2023 – Today, Boehringer Ingelheim and IBM (NYSE:IBM) announced an agreement that will enable Boehringer to use IBM's foundation model technologies to discover novel candidate antibodies for the development of efficient therapeutics.

"We are very excited to collaborate with the research team at IBM, who share our vision of making in silico biologic drug discovery a reality," said Andrew Nixon, Global Head of Biotherapeutics Discovery at Boehringer Ingelheim. "I am confident that by joining forces with IBM scientists we will develop an unprecedented platform for accelerated antibody discovery which will enable Boehringer to develop and deliver new treatments for patients with high unmet need."

Boehringer will be using an IBM-developed, pre-trained AI model that will be further fine-tuned on additional Boehringer proprietary data. "IBM has been at the forefront of creating generative AI models that extend AI's impact beyond the domain of language," said Alessandro Curioni, Vice President Accelerated Discovery, IBM Research. "We are thrilled to now bring IBM's multimodal foundation model technologies to Boehringer, a leader in the development and manufacturing of antibody-based therapies, to help accelerate the pace at which Boehringer can create new therapeutics."

Foundation models for antibody discovery

Therapeutic antibodies are central in the treatment of many diseases, including cancer, autoimmune and infectious diseases. Despite major technological advances, the discovery and development of therapeutic antibodies covering diverse epitopes remains a highly complex and time-consuming process.

Together, Boehringer and IBM researchers will aim to accelerate the antibody discovery process through *in-silico* methods. The sequence, structure and molecular profile information of disease-relevant targets as well as success criteria for therapeutically relevant antibody molecules, like affinity, specificity and developability will form the basis for the *in-silico* generation of new human antibody sequences. These methods rely on new IBM foundation model technologies, designed to increase the speed and efficiency of antibody discovery and quality

of predicted antibody candidates.

IBM's foundation model technologies, which have demonstrated success in generating biologics and small molecules with relevant target affinities, are used to design antibody candidates for the defined targets which are subsequently screened with AI-enhanced simulation to select and refine the best binders for the target. In a validation step, Boehringer Ingelheim will produce in mini-scales and experimentally assess the antibody candidates. Moving forward, the results from the laboratory experiments will be used to improve the *in-silico* methods via feedback loops.

By collaborating with leading academic and industry partners, Boehringer is building a leading digital ecosystem to enable the acceleration of drug discovery and development and create new breakthrough opportunities to transform patients' lives.

This work also serves as the latest in IBM's efforts to use generative AI and foundation models to accelerate discovery and creation of new biologics and small molecules. Earlier this year, the company's generative AI model efficiently [predicted physico-chemical properties](#) of drug-like small molecules.

The IBM biomedical foundation model technologies rely on a wide range of heterogenous, publicly available data sets, including protein-protein interactions and drug-target interactions to develop pre-trained models. The pre-trained models are then fine-tuned on specific proprietary data of IBM's partner to offer newly designed proteins and small molecules with the desired properties.

About Boehringer Ingelheim

Boehringer Ingelheim is working on breakthrough therapies that transform lives, today and for generations to come. As a leading research-driven biopharmaceutical company, the company creates value through innovation in areas of high unmet medical need. Founded in 1885 and family-owned ever since, Boehringer Ingelheim takes a long-term, sustainable perspective. More than 53,000 employees serve over 130 markets in the two business units Human Pharma and Animal Health. Learn more at www.boehringer-ingelheim.com

About IBM

IBM is a leading provider of global hybrid cloud and AI, and consulting expertise. We help clients in more than 175 countries capitalize on insights from their data, streamline business processes, reduce costs and gain the competitive edge in their industries. More than 4,000 government and corporate entities in critical infrastructure areas such as financial services, telecommunications and healthcare rely on IBM's hybrid cloud platform and Red Hat OpenShift to affect their digital transformations quickly, efficiently, and securely.

IBM's breakthrough innovations in AI, quantum computing, industry-specific cloud solutions and consulting deliver open and flexible options to our clients. All of this is backed by IBM's long-standing commitment to trust, transparency, responsibility, inclusivity, and service.

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