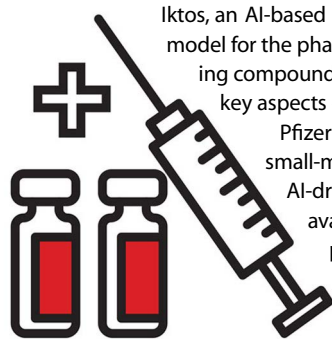


Iktos Partners with Pfizer for AI-BASED DRUG DESIGN PROJECT

► **Trend Watch:** COVID-19, Parkinson's, Alzheimer's All Benefiting from AI Platforms



Iktos, an AI-based chemical research solution provider, and Pfizer are creating a design model for the pharma company's selective small molecule discovery programs. Generating compounds in silico within the confinements of program endpoints is one of the key aspects of this technology that helps in exploring the chemical space.

Pfizer has been deploying Iktos's generative modeling technology to small-molecule programs. Earlier this year, Iktos released Makya, its generative AI-driven de novo design software for Multi-Parametric Optimization (MPO), available either as a SaaS platform or for implementation on customer premises or in the customer's Virtual Private Cloud (VPC). Makya's user-friendly interface enables it to be used by medicinal or computational chemists. Makya can also be operated as a Python package through a Jupyter notebook interface.

AI Helps Evaluate PAIN SCALE IN PATIENTS

A research team led by Northwestern Engineering faculty and alumni has found it's possible to understand a patient's pain level by examining data from vital signs.

In a new study, the team developed and applied AI, or machine-learning, algorithms to physiological data, including respiratory rate, blood pressure, heart rate, body temperature, and oxygen levels from patients with chronic pain from sickle cell disease. Not only did the researchers' approach outperform baseline models to estimate subjective pain levels, it also detected changes in pain and atypical pain fluctuations.

The study was published March 11 in the journal PLOS Computational Biology. This is the first paper to demonstrate that machine learning can be used to find clues to pain hidden within data from patients' vital signs.

Currently, patients must assess their pain based on a scale of 0 to 10. This can be a difficult task because many people experience pain differently, and young children and unconscious patients cannot rate their pain at all. The researchers believe these subjective assessments of pain could be supplemented with a more objective, less invasive, data-driven approach to help physicians treat pain more precisely.

"Pain is subjective, so it's tricky to assess when trying to treat patients," says Daniel Abrams, senior author of the study. "Doctors don't want to undermedicate patients and not provide enough pain relief. But they also don't want to overmedicate

their patients because there is a risk of side effects and addiction."

To conduct the study, the researchers used data from patients with sickle cell disease who were hospitalized at Duke Medical Center due to debilitating pain. The sample included data from 105 hospitalizations of 46 distinct patients. When healthcare workers routinely collected the patients' vital signs, those patients also rated their subjective pain levels.

To simplify the task, the researchers divided pain levels into three categories: low, moderate, and high. After using machine-learning strategies to mine the data, the researchers compared their model's assessment of pain to the patients' subjective reports.

Although hospital data can be difficult to acquire due to confidentiality issues, researchers are in the process of obtaining a much bigger dataset with pain reports from hundreds of thousands of patients with pain due to sickle cell disease and other causes, including postoperative pain and pain from unknown sources.

The researchers next aim to use their model to try to predict how pain relievers might affect pain and to forecast when patients with chronic pain might experience an excruciating flare-up, which is currently nearly impossible to predict.

The study, "Can Subjective Pain be Inferred From Objective Physiological Data? Evidence From Patients with Sickle Cell Disease," was supported by the National Institutes of Health.

AI Drug Discovery Firm Valence JOINS PARKINSON'S DISEASE PUSH



Canada's Valence Discovery has joined a University of Montreal-led project to try to find new drugs to treat the involuntary movement complications that can accompany treatments for Parkinson's disease.

The alliance between Valence (formerly InVivo AI), Montreal University, and Canada's Institute for Research in Immunology and Cancer (IRIC) will use AI to design drug candidates against a new target discovered in the lab of Dr. Daniel Levesque of the university's pharmacy faculty, who has been working on the Nur77/RXR nuclear receptor complex, a promising new pharmacological target for movement disorders, and the partners will attempt to design highly selective drugs that can bind to and affect the activity of that receptor.

Valence's machine-learning drug discovery platform, which the company says can design candidates based on very small data pools, will underpin the project. The platform is powered by technologies developed at Quebec's deep learning research institute Mila.

Italy-Based Angelini Pharma ADOPTS AiDEA CRM PLATFORM

Angelini Pharma has chosen an AI-driven CRM platform from Trueblue, a provider of AI solutions for operational and analytical CRM in the life science industry. The CRM solution AiDEA is the first AI-digital cloud pharma CRM solution based on Microsoft Dynamics 365. Angelini Pharma is a pharmaceutical company committed to helping patients in the therapeutic areas of central nervous system and mental health (including pain), rare diseases and consumer healthcare.

Angelini's new digital vision is to reposition and elevate its customer engagement capabilities using AI by implementing an innovative AI-Driven CRM system. This outlines not only a clear path towards digital, but also the willingness to go international through best practices that enable interactions with key customers while supporting the company's global growth, thus evolving its commercial and operational capabilities.

Angelini Pharma will implement the AiDEA CRM suite in more than 24 subsidiaries worldwide, offering its employees a wide range of AI applications.

KPMG SURVEY: Healthcare AI Investment Will Shift to Five Areas in the Next Two Years



The COVID-19 pandemic has accelerated the pace of artificial intelligence adoption, and the majority of healthcare and life-sciences executives want to see their organizations more aggressively adopt AI technology. AI investments will shift over the next two years to prioritize: clinical trials, diagnosis, telemedicine, robotic tasks such as process automation, and delivery of patient care.

At life-sciences companies, AI is primarily deployed during the drug development process to improve record-keeping and the application process, the survey found.

Companies also have leveraged AI to help with clinical trial site selection.

Moving forward, pharmaceutical companies will likely focus their AI investments on discovering new revenue opportunities in the next two years, a pivot from their current strategy focusing

on increasing profitability of existing products, according to the survey. About half of life-sciences executives say their organizations plan to leverage AI to reduce administrative costs, analyze patient data, and accelerate clinical trials.

Industry stakeholders are taking steps to advance the use of AI and machine learning in healthcare. In the study, *Living in an AI World*, 77% of life-sciences leaders and 67% from healthcare say AI is at least moderately functional in their organizations.

The majority of the life-sciences and healthcare business leaders surveyed are confident in AI's ability to monitor the spread of COVID-19 cases (94% and 91%), help with vaccine development (90% and 94%), and distribution (90% and 88%), respectively.

AI Market Report 2021 Highlights LACK OF SKILLED WORKFORCE



Although projected for growth, lack of skilled professionals may hamper the progression of AI in the pharma market, according to the 2021 report, *AI In Pharma Global Market*. In 2019, Indeed.com revealed that AI job postings increased 29.1% over the last year and yet, with no uncertainty due to the AI skills gap, searches for AI-related roles decreased by 14.5% over the same period. The shortage of AI skills is seen as a major barrier to the pace of technology's adoption. In fact, 56% of senior AI professionals thought that a lack of additional, qualified AI workers was the single most important hurdle to be overcome in terms of obtaining the necessary level of AI implementation beyond business operations.

The global AI pharma market is expected to grow from just less than \$1 billion in 2020 to \$1.27 billion in 2021 at a CAGR of 39%. The growth is mainly due to the companies resuming their operations and adapting to the new normal while recovering from the COVID-19 impact, which had earlier led to restrictive containment measures involving social distancing, remote working, and the closure of commercial activities that resulted in operational challenges. The market is expected to reach \$5.94 billion in 2025 at a CAGR of 47%.

The AI pharma market consists of sales in pharma and related services that use an automated algorithm to perform tasks that traditionally rely on human intelligence. It can be useful in handling data and presenting results that encourage better decision-making and save human efforts, cost, and time. The report segmented life-science uses by technology into context-aware processing, natural language processing, querying method, deep learning; by drug type into small molecules and large molecules; and by application into diagnosis, clinical trial research, drug discovery, R&D, and epidemic prediction.



Smart Speaker MONITORS HEART RHYTHMS

Researchers at the University of Washington have developed an AI-powered sound system that can detect irregular heartbeats. The system sends inaudible sounds into its close environment and then analyzes the reflected waves to identify individual heartbeats from someone sitting close to it. The technology may be useful in detecting heart rhythm disorders, such as cardiac arrhythmias.

Using the fact that smart speakers have multiple microphones, researchers designed a new beam-forming algorithm to help the speakers find heartbeats, as opposed to breathing noise or other noises. The AI-powered speakers employ an algorithm that uses the signals from multiple microphones on the device to identify the heartbeat, which is similar to the way that commercial smart speakers, such as Alexa, can use multiple

microphones to listen to one voice in a room filled with other noises.

Researchers have tested the technology in a group of healthy volunteers and a group of patients with a variety of cardiac conditions, and compared it with a commonly used conventional heartbeat monitor. The results suggest that it is comparable in terms of accuracy. The system is suitable for a quick spot check of the heart rhythm, and a user needs to intentionally position themselves close to the device before it can analyze their heartbeats. Researchers hope that future iterations of the technology may be able to monitor heart health continuously, even during sleep.

"Availability of a low-cost test that can be performed frequently and at the convenience of home can be a game-changer for certain patients in terms of early diagnosis and management," says researcher Arun Sridhar.

Alzheimer's Research UK Partners with Exscientia FOR AI DRUG RESEARCH

The medical charity Alzheimer's Research UK has teamed up with artificial intelligence specialist Exscientia to find new drug treatments for Alzheimer's. Exscientia will work with the charity's Oxford Drug Discovery Institute (ODDI) to find therapeutics that target the neuroinflammation associated with Alzheimer's disease (AD), focusing in particular on the NLRP3 inflammasome pathway. The project with the ODDI will draw on research conducted over years by the Oxford group on the NLRP3 pathway, with its biology and

screening expertise fed into Exscientia's Centaur Chemist AI-powered drug design platform.

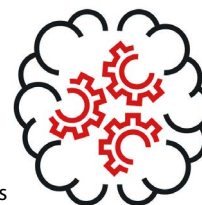
Inflammasomes are a group of intracellular proteins associated with the inflammatory response, and prior research has linked the NLRP3 inflammasome to the aggregation of amyloid beta and tau protein, which together form the characteristic plaques and tangles in the brains of AD patients.

One recent study has pointed to NLRP3 as a potential link between amyloid and tau disruption,

so drugs inhibiting it may be able to address two AD pathologies in one molecule.

UK biotech Exscientia has signed a string of partnerships with pharma companies and other research-based organizations to apply its AI-based drug discovery platform.

The use of AI and machine learning can trim years off the current 12- to 15-year cycle from early research to marketed product.



UCB Launches Digital Health Company to TRANSFORM THE COURSE OF EPILEPSY

UCB has launched Nile AI, a new independent company created to improve care for people living with epilepsy, their caregivers, and healthcare providers. Nile is developing an epilepsy care management platform that serves as a digital extension of the healthcare provider (HCP) and provides patients with peace of mind between consultations, with the ultimate goal of shortening the path to optimal treatment.

UCB's \$29.3 million investment is part of UCB's overall commitment to improving the lives of people living with severe diseases, including epilepsy, as digital technologies continue to change and impact the way healthcare is delivered. Nile's digital platform consists of a patient app and HCP

portal. The patient app is an intuitive, smart tool for patients to feel connected with their care team, learn about their journey, and understand their progress. The HCP portal shows the status of their patients at a glance, virtually informs and supports their patients in between appointments, and allows data-driven decisions on treatment and care. Nile is currently testing the platform in usability studies with two U.S. healthcare systems, Massachusetts General Hospital and Michigan State University Healthcare. The platform is expected to be commercially available in 2021.



Boehringer First to Collaborate with Google on QUANTUM COMPUTING



Boehringer Ingelheim and Google Quantum AI are collaborating to research and implement cutting-edge use cases for quantum computing in pharmaceutical R&D. The new partnership combines Boehringer Ingelheim's leading expertise in the field of computer-aided drug design and in silico modeling with Google's resources as one of the leading developers of quantum computers and algorithms. Google Quantum AI is advancing the state-of-the-art of quantum computing and developing the tools for researchers to operate beyond classical capabilities.

Boehringer Ingelheim is the first pharmaceutical company worldwide to join forces with Google in quantum computing. The partnership will last three years and is co-led by the newly established

Quantum Lab of Boehringer Ingelheim. Boehringer Ingelheim will invest significantly in the coming years to realize the full potential of quantum computing. The company has hired experts in the field of quantum computing from academia, industry, and quantum providers.

"Quantum computing has the potential to significantly accelerate and enhance R&D processes in our industry," says Michael Schmelmer, member of the board of managing directors of Boehringer Ingelheim with responsibility for finance and group functions. "Quantum computing is still very much an emerging technology. However, we are convinced that this technology could help us to provide even more humans and animals with innovative and groundbreaking medicines in the future."

The new collaboration is part of Boehringer Ingelheim's comprehensive digital transformation strategy with the aim to better leverage and accelerate the company's promising pipeline and ultimately bringing more medical breakthroughs to patients in need. Boehringer Ingelheim is significantly increasing its investment in a broad range of digital technologies, encompassing key areas such as AI, machine learning, and data science to better understand diseases, their drivers and biomarkers, and digital therapeutics.

AbSci Acquires AI-COMPANY DENOVIMUM

AbSci, a synthetic biology company enabling drug discovery and biomanufacturing of next-generation biotherapeutics, has acquired Denovium, an AI deep learning company. AbSci is integrating the Denovium Engine into its drug discovery and manufacturing cell line development capabilities and expects to realize near-term synergies using AI deep learning to better predict relevant variants and cell line characteristics for each new project. AbSci's vision is to make in silico biologic drug discovery and cell line development a reality. This will enable next-generation therapies to make it to market at unprecedented speeds.

"This acquisition represents the perfect synergy of groundbreaking synthetic biology and cutting-edge deep learning AI to create in silico predictive protein drug design and cell line development capabilities with the potential to completely change the paradigm of biopharmaceutical discovery and development," says Sean McClain, founder and CEO of AbSci.

The Denovium Engine is a multidimensional deep learning model built to interpret, categorize, predict, and evolve function and behavior of proteins. The platform incorporates far more than sequence and structure relationships, having been trained on functional data from more than 100 million proteins and across over 700,000 descriptive parameters. AbSci intends to further train the Denovium Engine on its proprietary internally generated multidimensional protein characterization datasets that include elements of protein functionality, expression, and manufacturability.

Jameel Clinic Teams Up With Sanofi ON AI AND ML

Abdul Latif Jameel Clinic for Machine Learning in Health at MIT has entered into a long-term strategic collaboration with Sanofi. The Jameel Clinic and Sanofi pharmaceutical research teams plan to collaborate on the development and application of AI and machine learning capabilities for drug discovery and development.

This partnership is the steppingstone toward larger collaborations. The partners intend to expand the scope of the project to other teams within the company to achieve even better results. The collaboration provides Sanofi with access to more than 50 principal investigators and researchers across MIT to work on multiple projects focused on the development of machine learning models and algorithms across a range of research areas. These areas include biologics and small molecule drug design, precision medicine (immunology and inflammation), and oncology treatments.



IGNITE

2021 PharmaVOICE 100 Celebration

VIRTUAL EVENT

SEPTEMBER 9, 2021

SCHEDULE OF EVENTS

► Fireside Chat Panels

Casual conversations with PharmaVOICE 100s whose passions are ignited by purpose and blazing new frontiers

- 9-10am ET - Sparks of Leadership
- 11-12pm ET - Sparks of Creative
- 1-2pm ET - Sparks of Innovation

► Igniting Change: The Red Jacket Panel

An in-depth conversation with our 2021 Red Jackets who shine their light on a transforming industry

- 3-4pm - A Panel of Red Jackets

► Light it Up Happy Hour

Meet the PharmaVOICE 100s during a fun-filled hour of trivia and prizes

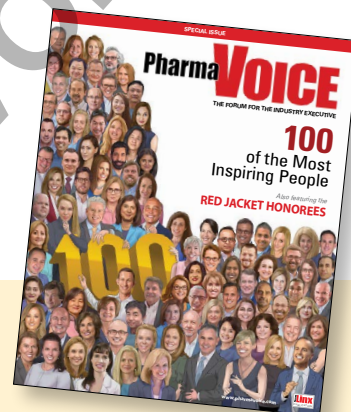
- 4:30pm - Happy Hour with the PV100

(tentative schedule)



Join us as the PharmaVOICE 100 share how they spark inspiration, ignite change, and blaze new trails.

Celebrate their personal stories of success and learn what fuels their passion for the industry.



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woman of the year

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