bioxcelerate AI
A Division of Optima Partners Ltd

Life Science Innovation:

Discover Tomorrow's Drugs Today

DiscoveryX

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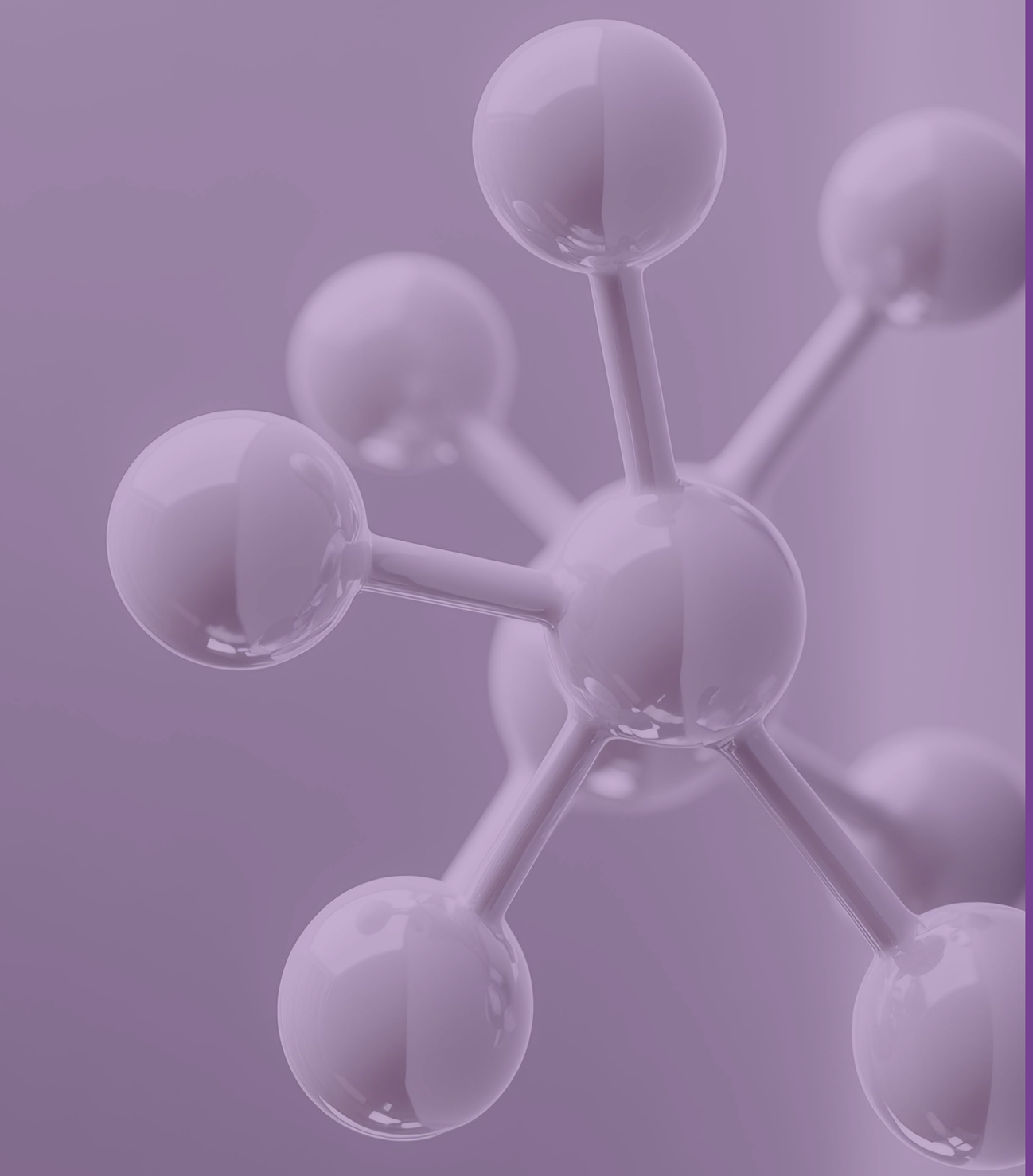

Introduction

At bioXcelerate AI, we specialise in transforming complex genetic, clinical, and real-world data into actionable insights for pharmaceutical and biotech companies. **DiscoveryX** is a cutting-edge genetics platform designed to accelerate research and development by integrating multi-omics data with advanced statistical methods, machine learning algorithms, and scalable cloud-based infrastructure.

By harnessing the latest advancements in translational genomics, precision medicine, and data engineering, **DiscoveryX** supports the entire drug discovery pipeline - from early target identification to patient stratification and biomarker discovery.

Contents Overview

The Challenges

We Solve

Pharmaceutical R&D teams face several barriers when working with genetic data:

Complexity of Multi-Omics Data

Extracting meaningful insights from vast genomic and clinical datasets is challenging, particularly in the context of genome-wide association studies (GWAS), fine-mapping, and causal inference, where data quality, structure, and scale often limit accessibility and interpretability of results.

High Drug Failure Rates

With over 90% of drugs failing during clinical development, human genetic evidence can significantly improve success rates. Studies have found that genetically validated targets are about twice as likely to succeed. We help R&D teams leverage genetic data to accurately identify and prioritise reliable drug targets, reducing the risk of failure in later stages.

Limited Collaboration Across Teams

Platforms are often designed to serve a specific group of scientists. This rigid design fails to adapt to the needs of multidisciplinary teams, creating silos between bioinformaticians, clinicians, wet-lab scientists and decision makers.

Computational Bottlenecks

Computational tools, offered via traditional platforms, often struggle with complexity of algorithms and the sheer volume of data, leading to inefficiencies and delays in the drug discovery process.

Reproducibility & Repeatability

Many workflows lack capabilities to ensure reproducibility of results and repeatability of analysis. This makes it difficult to validate analyses, weakens confidence in results, and slows down research progress.

Slow & Manual Data Integration

Manually ingesting, harmonising and pre-processing large datasets prolongs time to insight and increases complexity, limiting usability and delaying actionable findings.

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DiscoveryX
Our Solution

DiscoveryX is built as a client-housed, scalable platform that prioritises long-term sustainability and scientific excellence. Designed to directly enhance R&D return on investment, our tools are tailored to address questions that matter most to drug discovery. Every component is FAIR-aligned, reproducible, and modular which maximises adaptability to evolving research needs. With a future-proof architecture, **DiscoveryX** is engineered for seamless expansion in pace with scientific innovation.

DiscoveryX enables researchers to rapidly explore, analyse, and interpret vast multi-omics datasets most efficiently. The platform integrates genomic, multi-tissue transcriptomic, proteomic, and clinical data, ensuring pharmaceutical R&D teams can generate and test hypotheses, validate targets, and drive new therapeutic discoveries with confidence.

With its cloud-native infrastructure, machine learning-driven insights, and modular design, **DiscoveryX** provides a flexible, scalable solution that adapts to evolving research needs.

Differentiating
Capabilities

Scalable & Secure Data Infrastructure

With computational scalability in mind, **DiscoveryX** was built to operate in both cloud-based and on-premises high-performance computing environments. It prioritises data governance, version control, and compliance, ensuring research outputs remain reproducible and reliable.

FAIR Data Management

Following FAIR (Findable, Accessible, Interoperable, Reusable) principles, **DiscoveryX** ensures datasets are structured for long-term usability, enabling seamless integration with external research tools and accelerates seamless cross-functional collaboration.

Advanced Machine Learning Methodologies & Causal Inference

DiscoveryX incorporates genome-wide association studies (GWAS) and vast amounts of molecular studies (xQTL), leveraging advanced statistical methods and machine learning to perform robust, rapid, and reliable fine-mapping, colocalisation Mendelian randomisation, analyses.

These methodologies help establish causal links between genetic variants, proteins, and diseases, supporting evidence-based drug discovery and ultimately de-risking and closing the gap between early discovery and the patient bedside. Additionally, **DiscoveryX** offers seamless access to bioXcelerate's state-of-the-art products such as PleioGraph,SwitchStep, and ImpMap to accelerate large-scale generation of pleiotropy maps.

Reproducible, Repeatable, and Replicable Insights

DiscoveryX is designed to ensure the highest standards of scientific integrity by delivering insights that are reproducible, repeatable, and replicable. Through rigorous version control, transparent analytical pipelines, and validated methodologies, **DiscoveryX** enables scientist to consistently reproduce their findings and insights across computational environments.

How DiscoveryX Works

DiscoveryX provides an end-to-end research experience, from data ingestion to advanced analytics and visualisation

Data Ingestion & Harmonisation: Automates the integration of large-scale genetic, clinical, and multi-omic datasets, applying rigorous quality control.

Scalable Computing & High-Throughput Analysis: Supports GWAS, causal inference, and machine learning-powered biomarker discovery within a cloud-agnostic infrastructure.

Interactive Exploration & Decision Support: User-friendly dashboards and search tools allow researchers to effortlessly navigate datasets, conduct complex queries, and visualise results.

Continuous Integration & Optimisation:
DiscoveryX is designed to support and ensure ongoing scalability and performance improvements.
The platform is flexible and can be tailored to users' research needs, including integration of specific data sources or development of custom modules like meta-analysis.

Augmented Insights from External Resources: The flexible design of **DiscoveryX** enables seamless integration of results with off-platform data resources including clinical trials databases, functional annotations and open-source genetic colocalisation results, maximising the value of generated insights.

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