Rapid Identification of Novel Lung Cancer Drugs through an Integrated Drug Discovery Approach

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1-10

Overview

Founded in 2009, Intelligent OMICS is a UK-based Artificial Intelligence (AI) drug discovery company that identifies novel drug targets by analyzing healthcare data using it's patented integrated machine learning approach. Their platform's key strength is the ability to analyze a broad range of biomolecular data, translating it into clinically relevant actionable insights. AI enables Intelligent OMICS to create and patent new drugs

The Intelligent OMICS technology has been developed and tested over 16 years of research, led by one of the world's leading experts in artificial intelligence and machine learning. Intelligent OMICS have developed several core algorithms (namely, Distiller, Driver and Pathway Miner) for mining complex omics datasets and identifying both disease biomarkers as well as novel targets in several disease areas.

Unlike many other AI solutions, the Intelligent OMICS solution does not generate a black box where the features are not explainable. The strength of their approach is the fact that it can identify the features that drive the biology being studied using the principles of explainable AI.

Goals & Obstacles

Intelligent OMICS used it's AI-based drug discovery platform to analyze lung cancer datasets including human transcriptomic data from approximately 2,000 patients. They identified novel molecular drivers of the KRAS pathway for non-small cell lung cancer - which accounts for ca. 80% of all lung cancer cases. Working alongside the Medicines Discovery Catapult (MDC), the team identified a subset of 17 priority targets.

The next step of the process was to validate these *in silico* derived targets in the wet lab. Intelligent OMICS sought to generate these target validation data without setting up their own laboratory infrastructure, opting for a more flexible OpEx as opposed to CapEx approach.

Intelligent OMICS partnered with Arctoris to gain access to their robotic platform, Ulysses, and the company's experienced drug discovery team. Their objective was to conduct target validation studies (all the way from sourcing of materials to assay setup, execution, QC, and report generation) with maximum efficiency and speed.

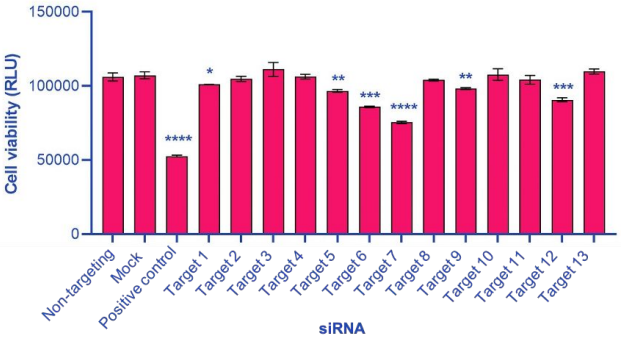
"Arctoris' automated lab and scientific expertise led us to validate our AI-derived *in silico* targets in robust industry-standard assays in an extremely time-efficient manner. Our partnership with Arctoris was fuelled by in-depth scientific discussions, and led to highly significant results for advancing our novel biomarkers and drug targets to the next stage of the drug discovery process."

- Prof Graham Ball, Intelligent OMICS, CSO

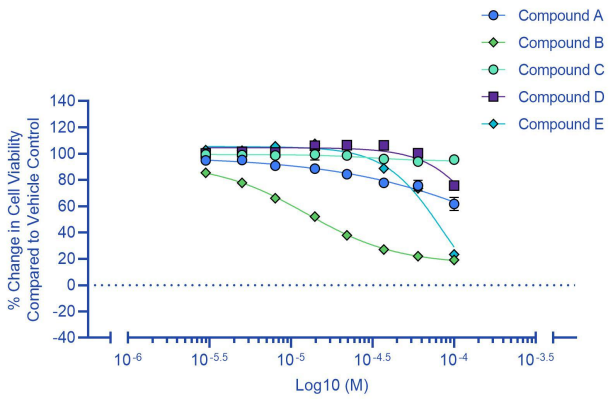
Action & Results

A series of *in vitro* studies were designed and executed to validate the potential of the 17 biological targets in relevant cancer cell lines by measuring the impact of siRNA knockdown on cell viability and protein depletion. 10 biological targets yielded a significant reduction in cancer cell viability for either KRAS mutant or KRAS wild type cells.

Data generated by Arctoris also provided important feedback to enable prioritization of targets for drug matching. Intelligent OMICS & MDC next selected a small compound screen of novel drug candidates including small molecules and monoclonal drugs for further *in vitro* validation by Arctoris. Following the results from this study, 6 potential drugs are now moving into patent protection.



(Top) Targeted siRNA screen. Biological targets were depleted using siRNA in a lung cancer cell line, monitoring cell viability.



(Bottom) Compound screen. Lung cancer cell lines were treated with a concentration range of each compound, measuring cell viability and calculating percentage change compared to control.

Value

The partnership with Arctoris enabled Intelligent OMICS to rapidly validate their AI-derived targets in robust pharma-grade assays within 6 weeks, despite the COVID-19 pandemic. The partnership clearly demonstrates the unique advantages of an integrated approach where machine learning, novel disease biology and robotics combined lead to the discovery of new drugs in expedited time frames.

Since the completion of the target validation phase, Intelligent OMICS have started applying their AI-platform in other cancers, diabetes and autoimmune diseases. Future collaborations with Arctoris will include validation of a series of newly identified biomarkers for these indications.