Empowering Biomedical Innovation through AI-Powered Pattern Discovery

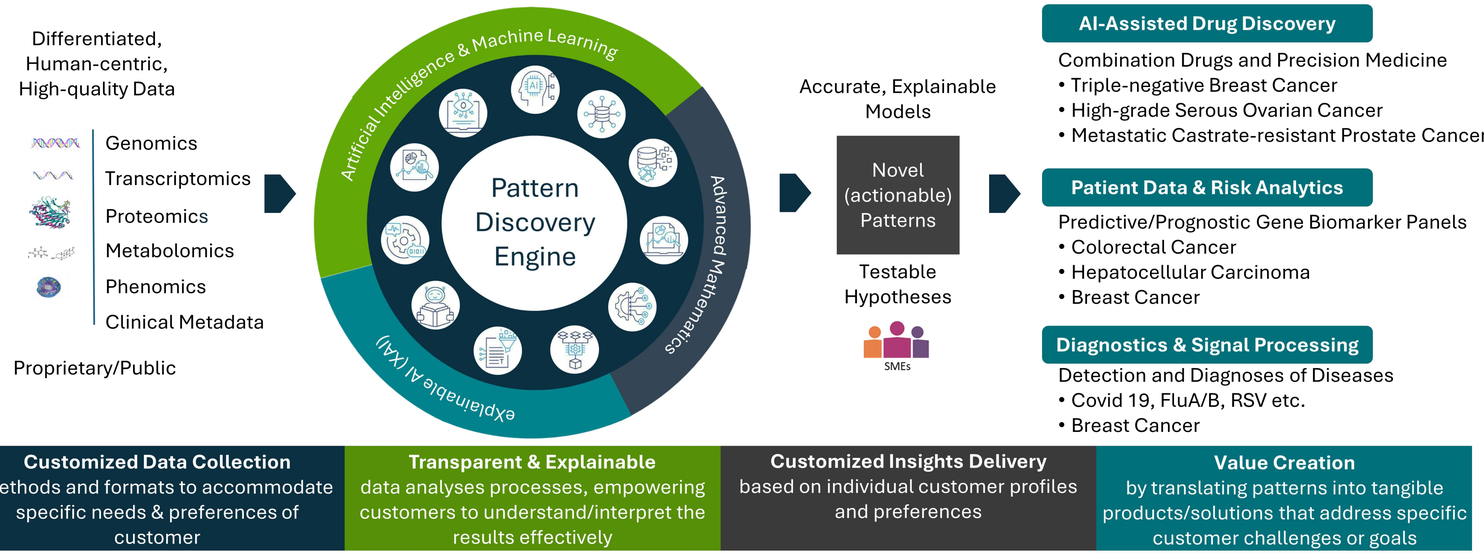
Nidhi Singh, Angelica Walker, Alejandro Wolf-Yadlin, Quinn Jackson, Ishan Mohanty, Mita Banik, Luca Pion-Tonachini, Serge Gart, Ken Kreutz-Delgado, James B. Brown, Matt Keener, Mark R. Anderson

PATTERN

Introduction

In biomedical research, analyzing complex high-dimensional datasets presents significant challenges. Conventional methods struggle to decipher biomedical data, obscuring key patterns and correlations vital for advancement and transformative discoveries. Great opportunity exists to revolutionize exploration by both streamlining and enhancing analysis that enables breakthroughs.

Our **Pattern Discovery Engine™** (PDE) revolutionizes analysis by seamlessly integrating advanced algorithms, human-centric data processing, and cognitive computing. It efficiently uncovers hidden patterns, enabling researchers to extract actionable insights and create new tests, discover new biomarkers, drug targets, and therapeutic approaches. The PDE offers a user-friendly interface for effortless navigation as well as API support for seamless integration with researchers' s existing applications, tools, and workflows.



Customized Data Collection	**Transparent & Explainable**	**Customized Insights Delivery**	**Value Creation**
methods and formats to accommodate specific needs & preferences of customer	data analyses processes, empowering customers to understand/interpret the results effectively	based on individual customer profiles and preferences	by translating patterns into tangible products/solutions that address specific customer challenges or goals

Collaborative Approach with **Continuous Improvement based on Customer Feedback** to meet changing customer needs and expectations over time.

Drug Discovery

Repurposing & Combination Drugs: High-Grade Serous Ovarian Cancer

PDE accelerates drug discovery at a faster, cheaper and lower failure rates, enabling a commercial pathway from discovery to clinical trials in 12-24 months.

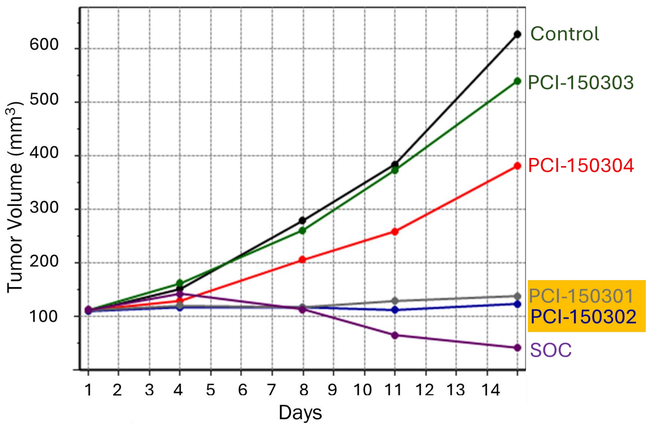
Aim: Identify synergistic combinations of small molecule targeted drugs tailored to combat Ovarian Cancer, promising to overcome the limitations of single-agent treatments, that offer improved efficacy, resistance prevention, reduced toxicity, and personalized care for patients.

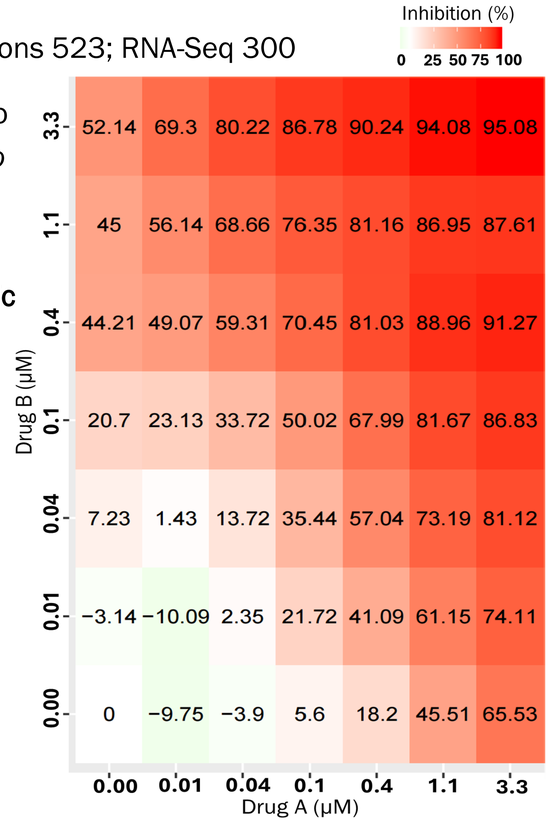
Data: Overall, 585 samples, ~24,000 genes; Mutations 523; RNA-Seq 300

Results: PDE identified gene associations, leading to ~30 potential synergistic drug combinations. *In vitro* cell viability assay unveiled five combinations with substantial synergy in inhibiting cancer cell growth.

Notably, **two combinations showed potent synergistic tumor growth inhibition** in animal studies.

Drug Combination	Synergy Score	Max. % Inhibition	Most Synergistic area
PCI-150301	**13.64**	**95.08**	**23.33**
PCI-150302	15.55	91.26	38.00
PCI-150303	14.26	97.17	24.72
PCI-150304	14.08	97.55	24.16
PCI-150305	15.80	80.99	31.06





Top left: The 5 synergistic drug combination candidates identified using PDE. The synergy scores were generated using Bliss model in the SynergyFinder web-based tool.
Top right: PCI-150301: Inhibitory dose response matrix. Redacted drugs represent proprietary Pattern™ content.
Left bottom: *In vivo* antiproliferative effect of combination drugs against OV-90 ovarian xenografts.

Biomarker Discovery

Investigative Analysis of Proteomic Tear Testing Technology: Breast Cancer

PDE enabled the upgrading of customer tests from screening to diagnostic level, facilitating the entry of their breast cancer technology into the market.

Aim: Develop highly-specific predictive models to reliably diagnose breast cancer status (positive or negative).

Data: Customers' proprietary assay (clinical/biochemical) data: 454 samples, 85 covariates; 349 healthy/ 105 diseased; Data split: 75% train/ 25% test

Results: Models developed by Pattern consistently outperform the client's existing models.

Performance Statistics.

	Accuracy	Sensitivity/ Recall	Specificity	Balanced Accuracy	Precision	F1 Score	AUC
Customer	79.10	48.30	88.00	68.15	53.80	50.90	72.70
Pattern	88.89	**80.95**	**92.16**	86.55	80.95	80.95	90.19

Models are **Explainable**

- Ranked list of factors impacting the outcome
- Human-readable equation
- Game-changer for SMEs and Researchers

Who we are

Mission & Vision: Solving the most pressing health & societal problems as the global leader in pattern discovery.
Team: Elite experts from diverse fields including mathematics, physics, computer science, high-performance computing, chemistry, bioinformatics, intellectual property, & corporate strategy.
Scientific Advisory Board: Global titans in computer science, systems biology, genomics and medicine, including Lee Hood, Craig J. Venter, George Church, Esther Dyson, and Ian Walker.
Collaborations: With top-tier cancer research institutes, world-leading oil/gas service companies, national laboratories, hospitals and Fortune 1000 companies.
Multidomain Impact: Numerous patents and publications across machine learning, signal analysis, drug discovery, biomarker development, genomics, and explainable AI.

LIFE SCIENCE WASHINGTON

For more information:
inquiry@patterncomputer.com