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Making immune complexity predictable, early enough to guide every decision.


The Problem

Drug development is slow and costly leaving life-saving therapies delayed and often out of reach.

> Current drug design is 1 drug : 1 target and for the average patient (who doesn't exist!), resulting in subpar treatment efficacies.

~$1-2.5B

New drug development costs, and takes ~12 years

$50B

in Pharma R&D generates only ~30 approved drugs per year

93%

of new drugs fail to progress to Phase 1 Clinical Trials

Immune-related diseases are complex, costly, and chronically underserved

Immune system is the body's second most complex "organ"- dynamic, evolving, and patient-specific.

Core Failure is lack of predictability and inability to model immune complexity early enough to guide target selection, biomarker strategy, patient selection, and treatment design

400+

immune-related conditions, from cancer to sepsis, touch majority of therapeutic areas.

$100B+

annual US burden for 50M patients - higher than diabetes.

40%

of patients fail first-line therapies, forcing costly trial-and-error care.

1 in 5

deaths worldwide are sepsis-related, driven by immune dysregulation

Regulatory guidance now demands explainable AI

FDA Clinical Decision Support guidance (2022) requires that clinicians be able to independently review the basis for software recommendations.

FDA Modernization Act 2.0 (2023) and NIH NAM policy (2025) establish mechanistic computer models as accepted scientific evidence.

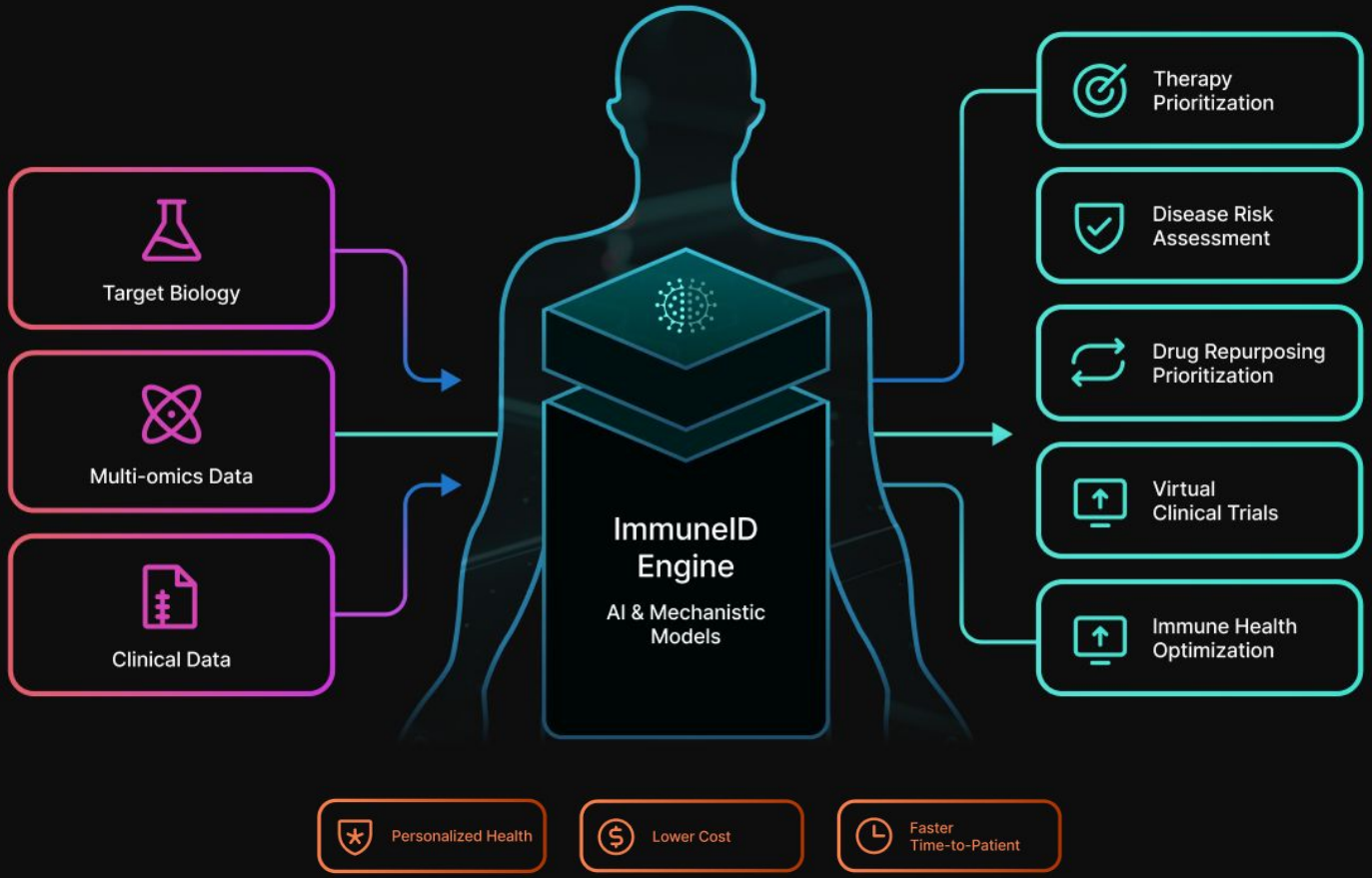
Black-box ML predictions are hard to audit, monitor, and defend in clinical settings. Mechanistic grounding makes every prediction traceable to biology.

2022
FDA Clinical Decision Support final guidance →

2023
FDA Modernization Act 2.0 (2023) enables non-animal data →

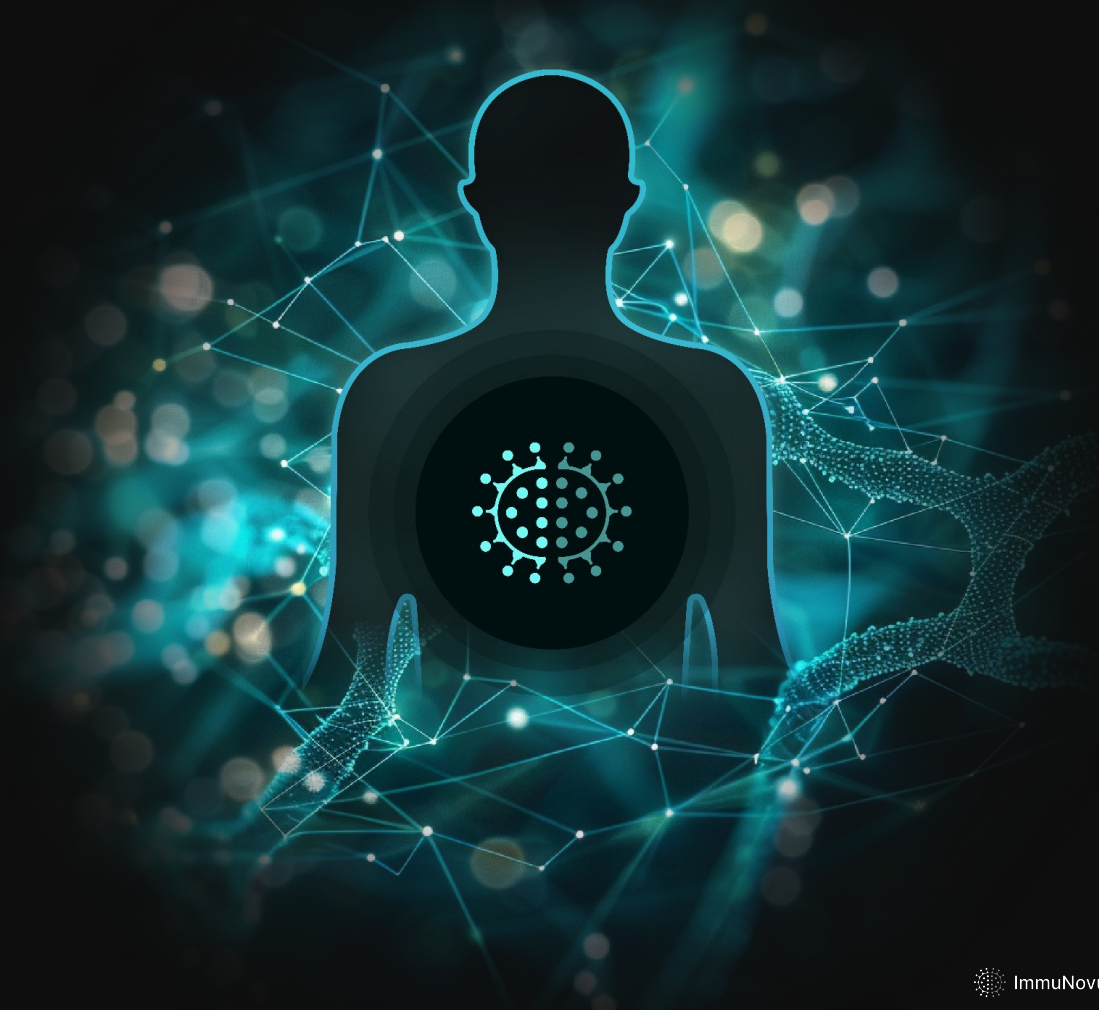
Our Solution

Our Solution: AI-Mechanistic Immune Digital Twin

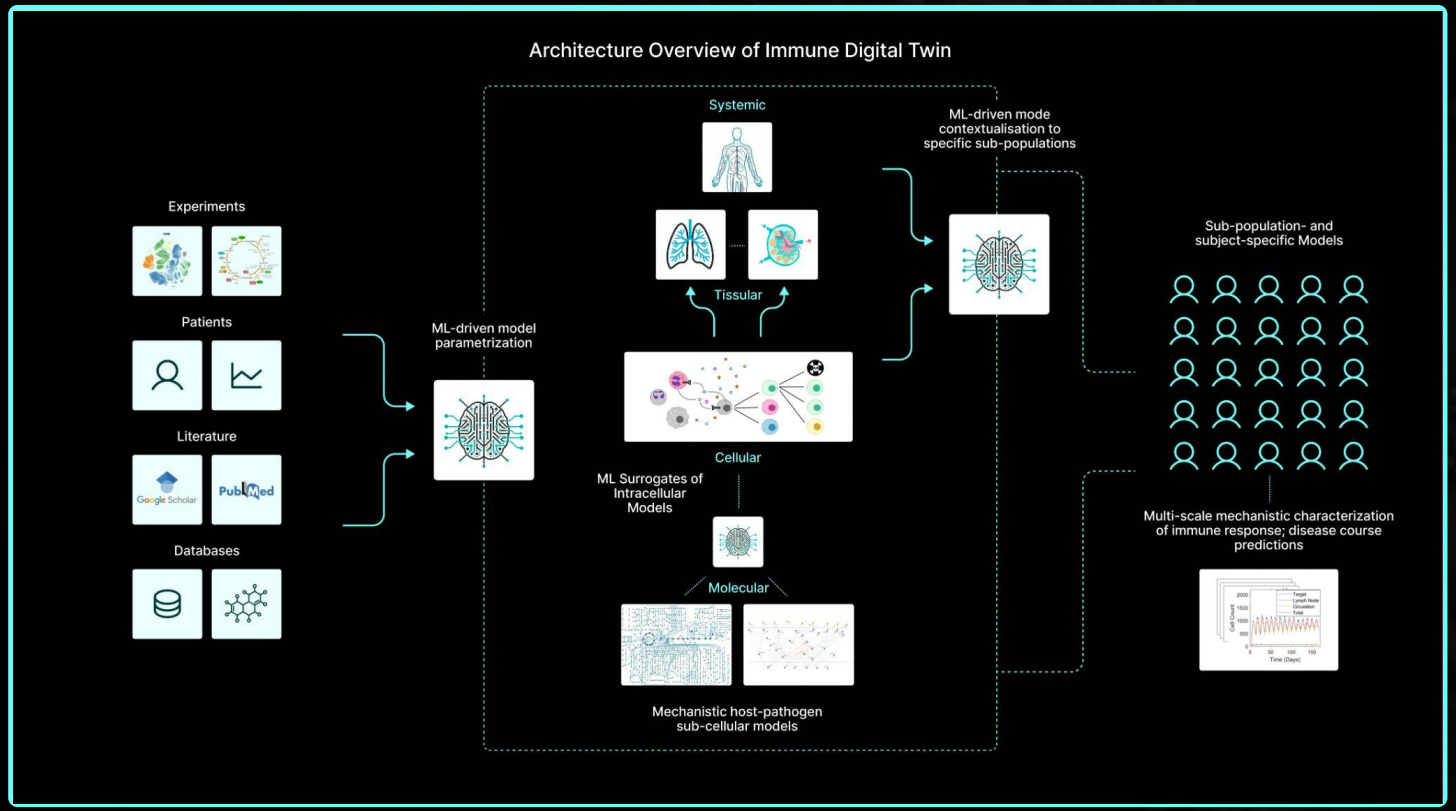


ImmuneID is Mechanistic

Under the hood, turning complex biochemistry and biology of the immune system into sophisticated predictive mathematical model.



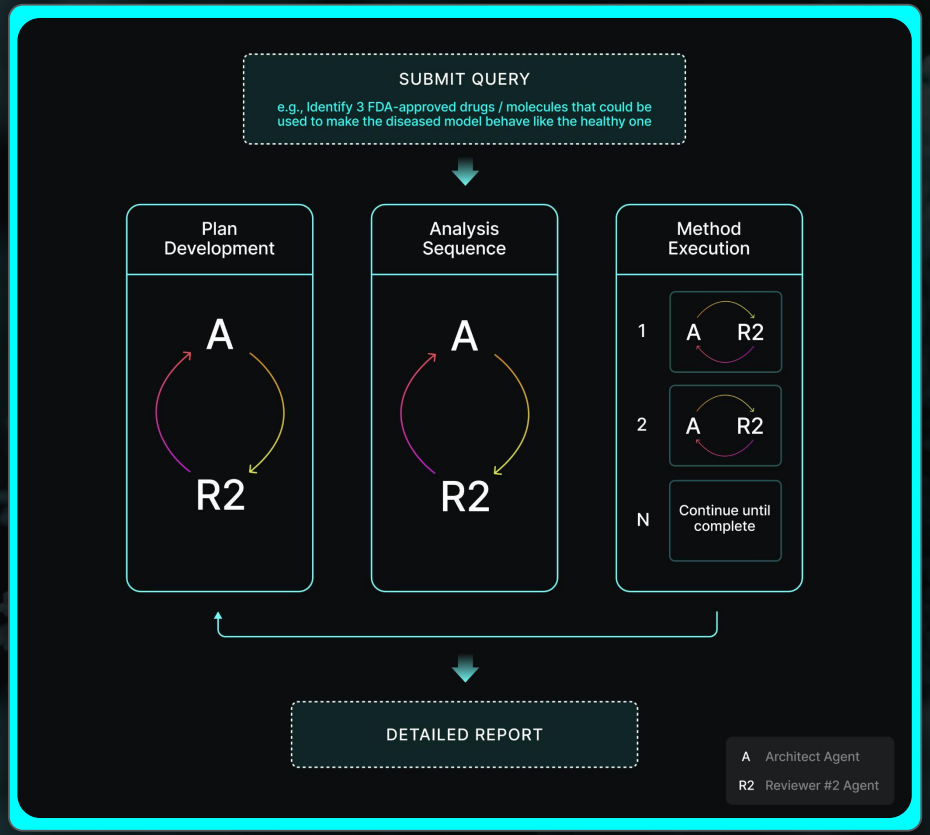
ImmuneID is Multi-scale



Why this matters:

- Explainable
- Regulator-trusted
- Ground-truth

ImmuneID is Agentic



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ImmuneID is Agentic

Significantly Disrupted Pathways

Citric Acid Cycle (13-fold increase in RA model)

- "Targeting succinate-related pathways offers promising therapeutic avenues for [RA]"[1]
- "... immune cells of patients with rheumatoid arthritis (RA) lead to a disruption of the citric acid cycle."[2]

Fatty Acid Synthesis (16-fold decrease in RA model)

- "RA is characterised by abnormal lipid metabolism"[3]
- "Plasma lipid changes in RA patients are often detected in clinical tests"[4]

Drug Target: Aconitate Hydratase

Therapy

Acetylsalicylic acid (Aspirin) has been shown to inhibit Aconitase[5,6]

Known anti-inflammatory effect[8]

Therapy

Acetylcysteine has been shown to indirectly inhibit Aconitase[7]

[1] Huang, 2024, Front Immunol.
[2] Straub, 2023, Z Rheumatol.
[3] Mustonen, 2021, Curr Rheumatol Rep.
[4] Lei, 2023, Front. Immunol.
[5] Raza, 2012, PLoS One.
[6] Alfonso, 2014, Br J Cancer.
[7] Lushchak, 2013, Redox Rep.
[8] Amann, 2002, Eur J Pharmacol.

ImmuneID is Agentic

Why this matters? Potential for

Autonomous agents that can operate over the mechanistic digital twin to speed up end-to-end drug discovery pipelines

Easily ingesting companies' own data and spin out agent frameworks with the digital twin locally

Development of self-growing and self-improving mechanistic digital twin

Development of the first-ever foundational model of the immune system with minimal risk of hallucinations (because it can self-assess its response by initiating simulations of the mechanistic model)

ImmuneID vs Others

World's Most Advanced Computer Model of the Human Immune System

ImmuneID

Model as a Platform (MaaP) → maximum scalability through modularity, self-improvements, extensibility to any disease.

AI-Mechanistic integration → explainable AI

Others

Fit-For-Purpose Models – Not scalable, not reusable.

AI only → Lacks mechanistic causality; this is critical for drug development.

Mechanistic only – Single use, fit-for-purpose models – see above, limited predictive capability.

Other key ImmuneID features

- Detailed 35 adaptive and innate immune cell models
- Personalization
- Patent ID 9405863
- Web-based SaaS
- Collaborative features
- Dockerized and deployable in private clouds

Use Cases & Validation

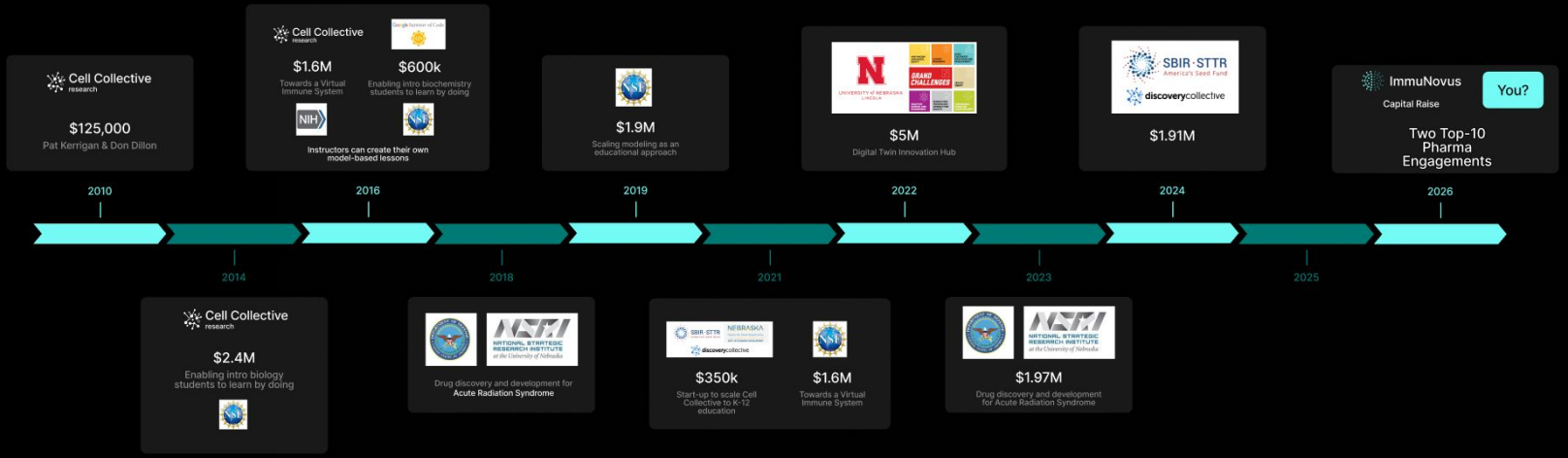
De-Risked Foundation

Proprietary, extensive technology developed and tested with $18M non-dilutive funding

Assessed, externally reviewed, and sequentially funded by major science agencies, including NIH and NSF

Recruited externally to be part of a $25M contract with DoD to develop drugs for Acute Radiation Syndrome

Non-dilutive RD Funding history:



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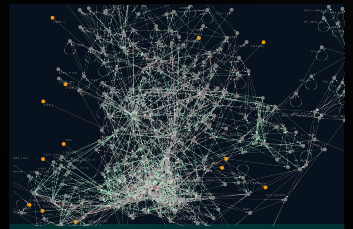
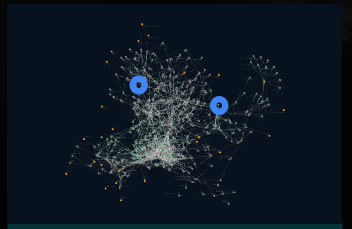
ImmuneID is already working to advance disease treatment options

Respiratory Infection Example:



Build a computer model of influenza infecting lung cells

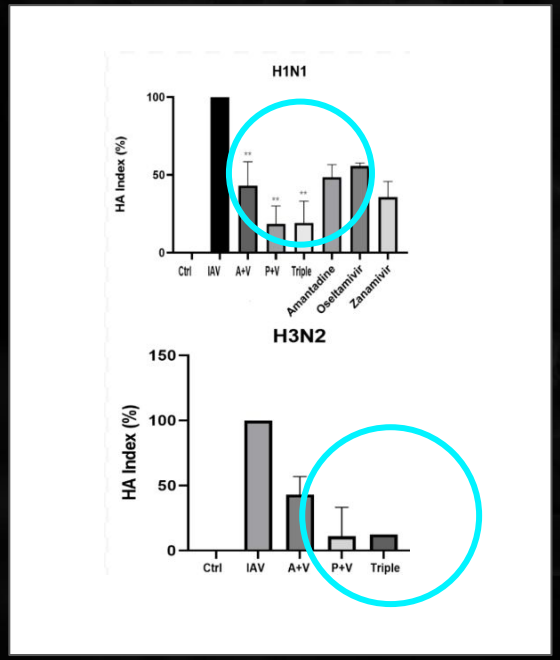


Simulate millions of potential treatment configurations (can't do this in the lab -- too expensive and time consuming)

Data analysis to identify, assess, and rank potential targets and compounds that lead to best outcomes (least virus)

Experimental validation of model predictions

ImmuneID is already working to advance disease treatment options.



Our models identified more effective treatments for respiratory infections.

Current Influenza Vaccines and Treatments are not reliably effective due to seasonal mutations.

Our identified treatment is independent of the viral strain, making it consistently effective *in vitro*.

In vitro success enabled (ongoing) small animal testing

We can repeat this process for most infections and immune-related diseases. Our AI-enabled technology will automate this process.

ImmuneID is already working to advance disease treatment options.

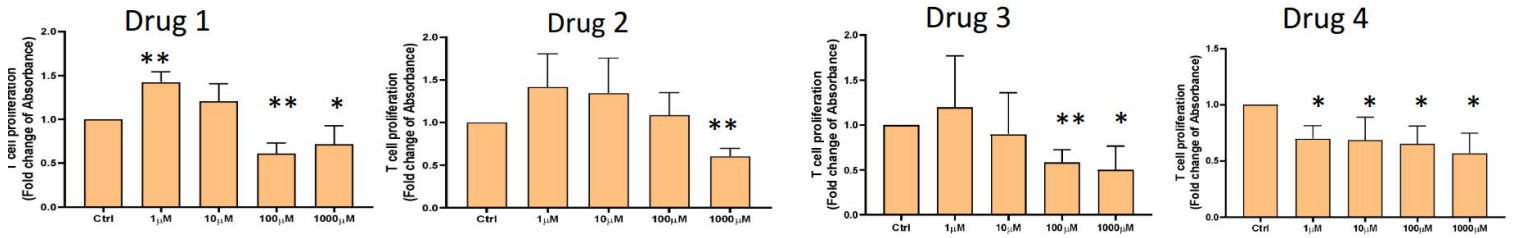
We have also used our models to identify repurposing opportunities for existing drugs.
Below are our model-identified existing drugs to be used for new clinical indications - several autoimmune disorders. We also experimentally validated the model outputs.)

Disease	Entrez ID	Gene Symbol	Gene description	Aggregate Z-score	Literature evidences relevant to CD4+ T cells and autoimmune diseases	ChEMBL [92]IDs*
RA	4047	LSS	Lanosterol synthase	-3.35	Inhibition of lanosterol synthase (LSS) might decrease the endogenous cholesterol that may lead to impact cell division. [93]	CHEMBL3593
	18	ABAT	4-aminobutyrate aminotransferase	-3.20	GABA downregulate inflammatory response in a mouse model of RA; [24] Inhibition of ABAT might increase GABA. [16]	CHEMBL2044
	10135	NAMPT	Nicotinamide phosphoribosyltransferase	-3.11	Nampt inhibition reduces demyelination and disability in EAE [97]), Lack of NAMPT expression affect T cell development. [94]	CHEMBL1744525
	2224	FDPS	Farnesyl pyrophosphate synthase	-2.98	Inhibition of FDPS inhibit T cell cytokine production. [95]	CHEMBL1782
MS	2936	GSR	Glutathione reductase	-1.59	Inhibition of GSH de novo synthesis reduce the pathological progression of EAE. [26]	DB0262
	3156	HMGCR	3-hydroxy-3-methylglutaryl-coenzyme A reductase	-1.58	Potential target for autoimmune diseases. [101]	CHEMBL402
	2222	FDFT1	Farnesyl-diphosphate farnesyltransferase	-1.55	No support	CHEMBL3338
	1719	DHFR	Dihydrofolate reductase	-1.52	Low dose Methotrexate (inhibitor of DHFR) found effective for MS, RA, and Crohn's disease. [27]	CHEMBL202
PBC	10135	NAMPT	Nicotinamide phosphoribosyltransferase	-6.10	Nampt inhibition reduces demyelination and disability in EAE [97]. Lack of NAMPT expression affect T cell development. [94]	CHEMBL1744525

Integrative computational approach identifies drug targets in CD4⁺ T-cell-mediated immune disorders

Bhanwar Lal Puniya, Rada Amin, Bailee Lichter, Robert Moore, Alex Ciurej, Sydney J. Bennett, Ab Rauf Shah, Matteo Barberis ✉ & Tomáš Helikar ✉

npj Systems Biology and Applications **7**, Article number: 4 (2021) | Cite this article



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Go To Market Strategy & Technical Roadmap

Now is the time

MEDTECH

Digital twin developer Unlearn sees double with 2nd $50M venture capital round

By **Andrea Park** · Feb 9, 2024 10:14am

digital twin | Artificial intelligence | venture capital (VC) | clinical trials

Forbes

INNOVATION > AI

The Future Of Drug Trials Might Be Virtual AI Patients

By Tor Constantino, MBA. Contributor. ⊙ Tor Constantino is an ex-reporter, t... Follow Author

Published Jun 03, 2025, 08:00am EDT, Updated Jun 03, 2025, 10:36am EDT

WSJ PRO

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EXCLUSIVE NEW MONEY

OpenRouter, a Marketplace for AI Models, Raises $40 Million

The startup, now valued at about $500 million, directs artificial-intelligence prompts to various large language models based on cost, speed and other factors

By Yuliya Chernova

June 25, 2025 5:30 am ET · WSJ PRO

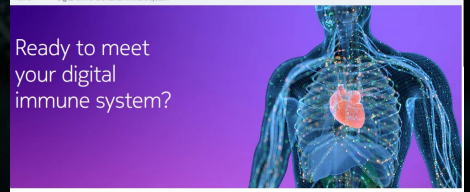
Immunai signs $18M collaboration with AstraZeneca to make cancer drug trials more efficient

The collaboration will focus on clinical decision-making, including dose selection, elucidating mechanisms of action, patient responder vs. non-responder analysis, and biomarker identification, by leveraging the Israeli biotech unicorn's AI model of the immune system.

Sophie Shulman 16:43, 26.09.24

NOKIA

Home > Digital twin of the human immune system

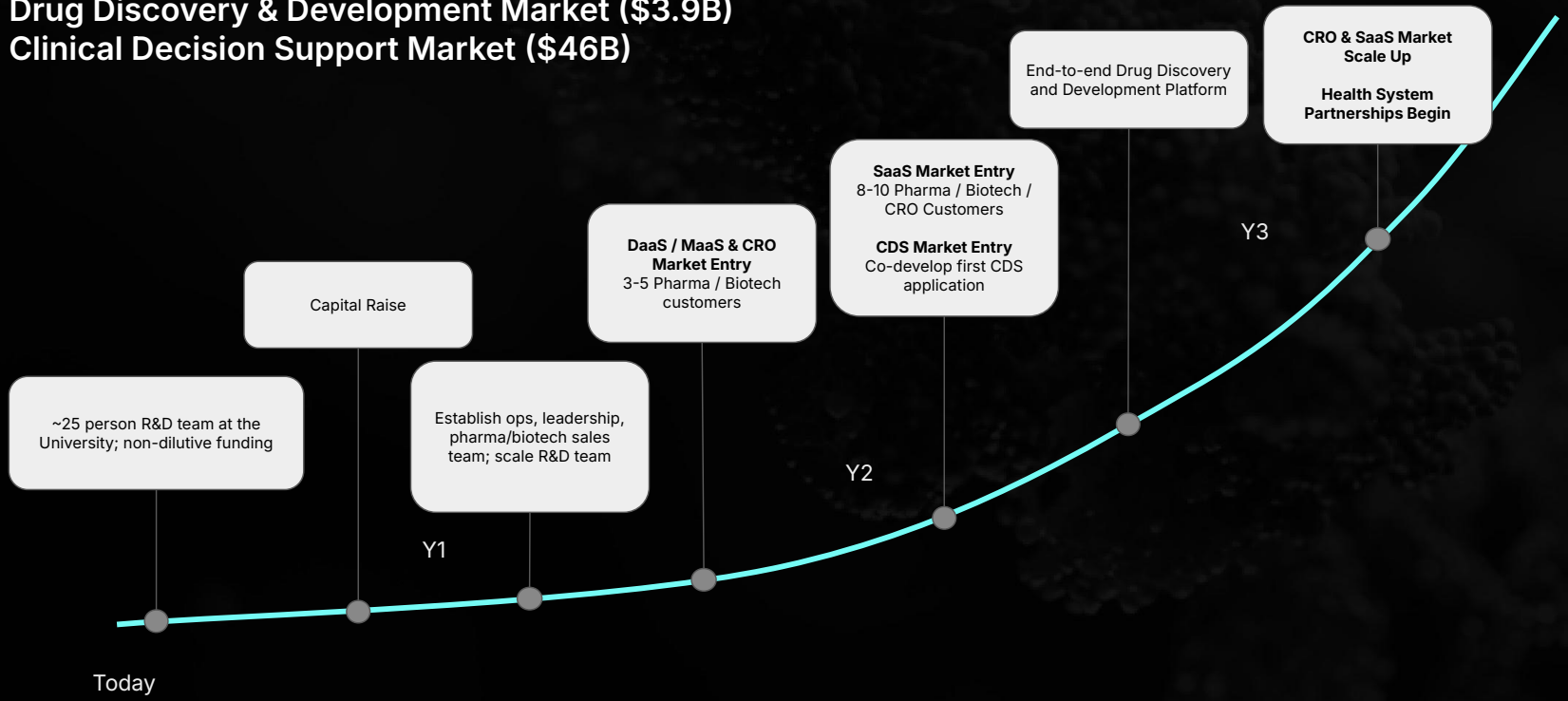


The first digital twin of the human immune system highlights the vast societal opportunities in physical-digital fusion. This project in the making could make us safer, healthier and better prepared for the next health crisis. Discover the exponential potential of true immunity modeling.

This is us. Read here

Go to Market Strategy

Drug Discovery & Development Market ($3.9B)
Clinical Decision Support Market ($46B)



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Four Product Lines, One Flywheel

Customers enter through MaaS or Dass, expand through CRO services, and convert to SaaS as the platform matures.

MAAS

Model-as-a-Service

Model licensing and application for specific compounds, indications, or research questions

EXAMPLES

- Top-Ten Pharma POC
- Top-Ten Pharma label expansion
- Top-Ten Pharma MoA
- InSilico Trials channel

Today's primary focus

DAAS

Data-as-a-Service

Pre-computed insights from existing immune system models, delivered as subscription dashboards.

EXAMPLES

- Target-Inhibition Atlas (TIA)
- Disease Severity Markers
- Drug Repurposing Atlas

Low-friction entry; recurring revenue

CRO

Custom Engagements

Client-specific modeling work that contextualizes our models to their data, disease, and asset MoA.

EXAMPLES

- Disease contextualization and indication prioritization
- Patient stratification
- MoA of responders vs non-responders

Deeper relationships

SAAS

Immune Digital Twin Platform

Full multi-scale platform with AI agents - the long-term core technology product.

EXAMPLES

- End-to-end virtual patient stratification across MoA, response, and adverse events.
- Adaptive trial design with mechanistic feedback
- Cross-indication translation

Recurring high margin platform

Pricing & Unit Economics

Three subscription tiers anchored on customer value.

Tier 1 — Evaluate — $150K / yr

Single cell-type dataset · 2 seats · annual

Tier 2 — Research — $400K / yr

3 cell-type datasets · 1 indication · 10 seats · email support

Tier 3 — Enterprise — $750K / yr

Unlimited cell types & indications · API access · multi-team

CUSTOMER ROI — TIER 2

Single-indication subscription

13×

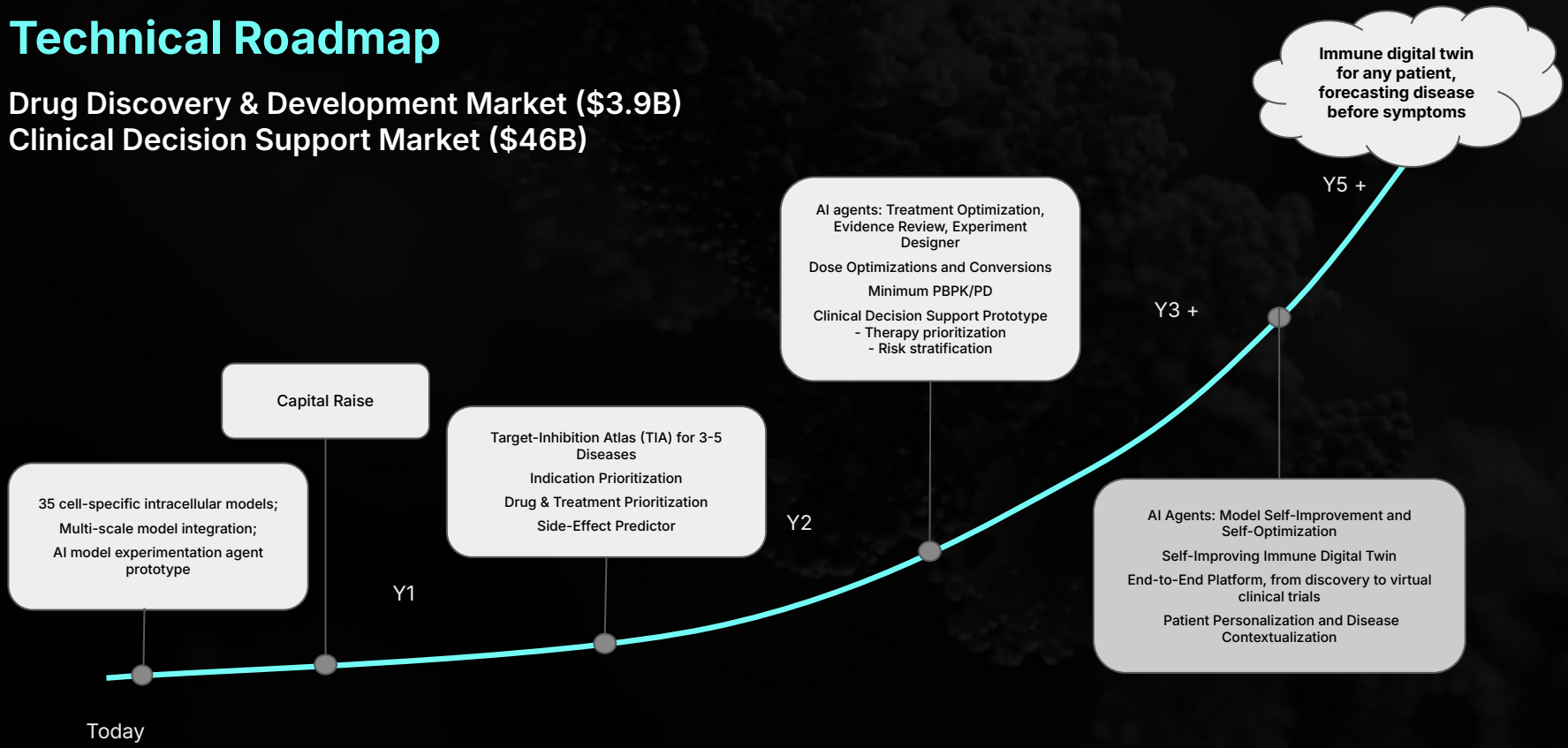
customer return

Subscription cost	$400K
Equivalent CRO cost displaced	$1.0M
Time-to-answer savings (10 mo)	$5.0M
Total customer value	**$5.65M**

All tiers: 4% annual escalator · 10% multi-year discount (2+ yr) · 50% multi-year conversion target

Technical Roadmap

Drug Discovery & Development Market ($3.9B)
Clinical Decision Support Market ($46B)



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Phased Multi Market Strategy

	CURRENT FOCUS	PARALLEL CLINICAL	EXPANSION
	Drug Discovery & Development	**Personalized Medicine**	**Personalized Immune Wellness & Disease Management**
	Market Size: $3.9B **Customers:** Pharma / Biotech	**Market Size:** $46B by 2032 **Customers:** Clinicians, Hospitals	**Market Size:** $48B by 2028 **Customers:** General Public & Chronic Disease Patients
	End-to-end SaaS to de-risk new treatments and accelerate development. 2,400 pharma and biotech companies in the US, and 20,000+ globally.	Personal immune digital twin for personalized, predictive, precision medicine. Market includes hospitals, private practices, EHR providers.	Personal immune digital twin for (non-clinical) health optimization. Early adopters include bio-hackers, quantified-self, wellness enthusiasts.
MVP	Indication prioritization Risk biomarkers	Clinical Decision Support *Parallel dev beginning in Year 1 through strategic partnerships (e.g., Cleveland Clinic), leveraging existing mechanistic infrastructure.*	Improving Immune Age

Current Engagements Supporting Drug Development

Drug Discovery & Development Partner

- Top-5 Pharma Co
- Risk biomarker identification for an infectious disease
- Expands our model application and potential
- *Status*: PoC wrapping up; awaiting feedback

Drug Discovery & Development Partner

- Top-10 Pharma Co
- Multiple projects
- Indication Prioritization for existing labels
- Mechanism of action for responders vs non-responders
- *Status:* Term negotiations

Channel Partner

- Software platform licenses our model assets to serve pharma clients.

Channel Partner

- 5 joint offerings conceptualized across target prioritization, MoA, biomarkers, dual-combination, and predictive immunotox.
- Joint pilots being scoped

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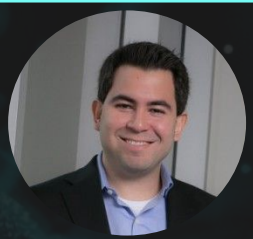
TEAM

Tomáš Helikar, Ph.D.

CEO & Founder

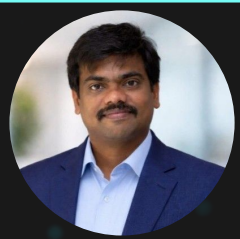
15+ years of experience in multi-scale computational modeling, biomedical research, and enterprise software development; Ph.D. in computational biology.



Leandro Castro

CTO

Co-founder of MultiMechanics (simulation software, acquired by Siemens 2019). Scaled enterprise modeling platforms.



Prakash Packrisamy

Translational Lead

Prior CRO experience working with most major pharma companies. Translates models into pharma-ready use cases.

R&D TEAM

~25 person team spanning immune modeling, software engineering, AI, translational science, UX, and product.

Advisors

Dr. Jivan Achreja - senior healthcare and life sciences operating experience.

Sandeep Konam - Co-founder and CTO of Abridge; Founder of AmbitOS. Health tech expert.

Tomas Helikar

CEO & Cofounder

Tomas@immunovus.com

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