

Virtual Cell (VCell-Neuro) – A Virtual Cell Platform for CNS Research

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Technology

Virtual Cell (VCell-Neuro), a software platform that lets CNS labs plan experiments on a computer first. In neuroscience, primary and patient-derived cells are scarce, which makes trial-and-error costly. Today, experiment choice can feel like a blind box because cross-lab data rarely align and batch effects cloud readouts. VCell aggregates multi-omics, standardizes it to a common ontology, and builds a compact representation of each cell state. It then estimates state-transition dynamics under defined perturbations—gene edits, compounds, dose, and exposure time—and outputs simulated trajectories with effect sizes and uncertainty, returning a ranked next-step plan so limited wet-lab runs focus on the most promising options. A lightweight Web3 layer enables access to a broader set of data sources while keeping data secure. Phase 1 uses public and research datasets. With approvals, later phases can include patient-derived cells for individualized forecasts.

Stage of Development

- Year 1:** ship VCell-Neuro v1.0 with Studio Lite and Data Prep Toolkit, post a method note or preprint.
- Years 2–3:** add assays and sources, release API and batch runs, run cross-lab benchmarks, open a repository.
- Years 3–4:** release v2.0 (RUO), with approvals, enable patient-derived inputs via compute-to-data; output individualized forecasts and priorities for degeneration, inflammation control, and CNS-tumor drug-target screening.

Key Advantages

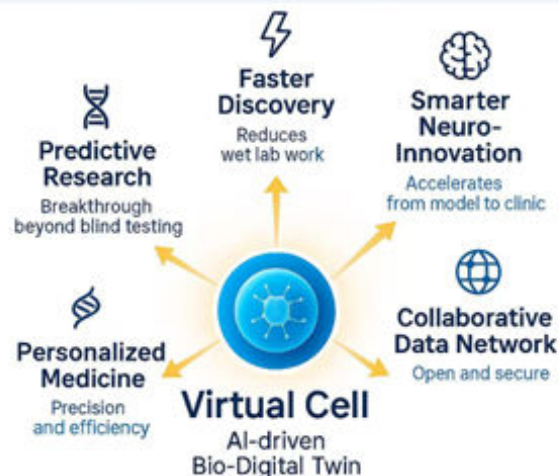
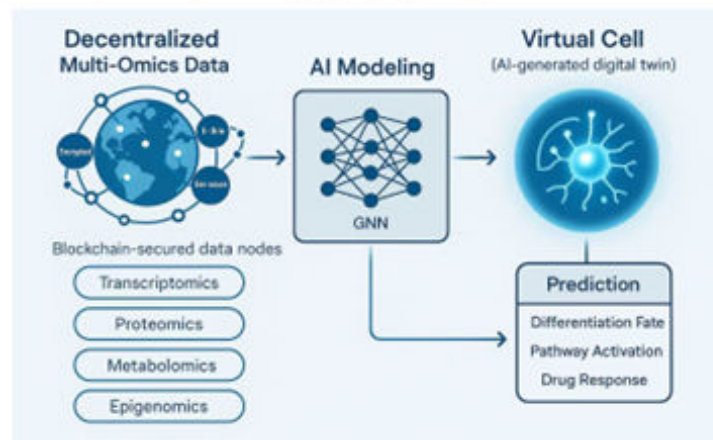
- Higher hit rate** ranks next experiments by effect size and uncertainty
- Faster cycles** end-to-end flow cuts low-yield runs and turnaround time
- Better comparability** ontology mapping + batch correction align cross-lab data
- Safer, broader data use** compute-to-data with a lightweight Web3 layer
- Reproducible and auditable** versioned runs with full provenance
- Scalable** add assays/modalities; API and batch execution

Opportunities

- The first virtual cell** builds in the Greater Bay Area
- Industry Co-Creation:** API for AI-drug / cell-therapy teams; in-silico companion to pipelines.
- Sponsors & Cloud Credits:** scale compute and the BioBounties pool for scarce datasets.

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Intellectual Property

- CN Patent No. CN201910727072.9A
- CN Patent No. CN201811082071.5A



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