

Resource Summary Report

Generated by PRECISE-TBI on Jul 31, 2026

MCell

RRID:SCR_007307

Type: Tool

Proper Citation

MCell (RRID:SCR_007307)

Resource Information

URL: <http://www.mcell.cnl.salk.edu/>

Proper Citation: MCell (RRID:SCR_007307)

Description: Software modeling tool for realistic simulation of cellular signaling in complex 3-D subcellular microenvironment in and around living cells. Program that uses spatially realistic 3D cellular models and specialized Monte Carlo algorithms to simulate movements and reactions of molecules within and between cells.

Synonyms: Monte Carlo simulator of cellular microphysiology

Resource Type: simulation software, software resource, software application

Keywords: Monte Carlo, simulator, cellular, microphysiology, living, cell, BRAIN Initiative

Funding: NIGMS P41 GM103712

Availability: Free, Available for download, Freely available

Resource Name: MCell

Resource ID: SCR_007307

Alternate IDs: nif-0000-00160

Alternate URLs: <https://github.com/mcellteam/mcell>

Record Creation Time: 20220129T080241+0000

Record Last Update: 20260731T042735+0000

Ratings and Alerts

No rating or validation information has been found for MCell.

No alerts have been found for MCell.

Data and Source Information

Source: [SciCrunch Registry](#)

Usage and Citation Metrics

We found 59 mentions in open access literature.

Listed below are recent publications. The full list is available at [PRECISE-TBI](#) .

Kapoor R, et al. (2025) Charting the nanotopography of inner hair cell synapses using MINFLUX nanoscopy. *Science advances*, 11(45), eady4344.

Becker M, et al. (2025) The Brownian dynamics simulator PyRID for reacting and interacting particles written in Python. *Cell reports methods*, 5(10), 101182.

Fong P, et al. (2025) In Silico identification and modelling of FDA-approved drugs targeting T-type calcium channels. *PloS one*, 20(8), e0327386.

Mesa MH, et al. (2025) Synaptic cleft geometry modulates NMDAR opening probability by tuning neurotransmitter residence time. *Biophysical journal*, 124(7), 1058.

Anderson MC, et al. (2025) Trans-synaptic molecular context of NMDA receptor nanodomains. *Nature communications*, 16(1), 7460.

Li X, et al. (2024) Dynamics of multicellular swirling on micropatterned substrates. *Proceedings of the National Academy of Sciences of the United States of America*, 121(26), e2400804121.

Green R, et al. (2024) Collective peroxide detoxification determines microbial mutation rate plasticity in *E. coli*. *PLoS biology*, 22(7), e3002711.

Held RG, et al. (2024) Nanoscale architecture of synaptic vesicles and scaffolding complexes revealed by cryo-electron tomography. *Proceedings of the National Academy of Sciences of the United States of America*, 121(27), e2403136121.

Grabner CP, et al. (2023) Mechanisms of simultaneous linear and nonlinear computations at the mammalian cone photoreceptor synapse. *Nature communications*, 14(1), 3486.

Nicholson C, et al. (2023) Sheet and void porous media models for brain interstitial space. *Journal of the Royal Society, Interface*, 20(205), 20230223.

Garcia GC, et al. (2023) Mitochondrial morphology governs ATP production rate. *The Journal of general physiology*, 155(9).

Garcia JW, et al. (2022) Multiscale modeling of presynaptic dynamics from molecular to mesoscale. *PLoS computational biology*, 18(5), e1010068.

Olesen JL, et al. (2022) Diffusion time dependence, power-law scaling, and exchange in gray matter. *NeuroImage*, 251, 118976.

Bell MK, et al. (2022) Dendritic spine morphology regulates calcium-dependent synaptic weight change. *The Journal of general physiology*, 154(8).

Ramos JRC, et al. (2022) Genome-scale modeling of Chinese hamster ovary cells by hybrid semi-parametric flux balance analysis. *Bioprocess and biosystems engineering*, 45(11), 1889.

McDougal RA, et al. (2022) Efficient Simulation of 3D Reaction-Diffusion in Models of Neurons and Networks. *Frontiers in neuroinformatics*, 16, 847108.

Eriksson O, et al. (2022) Combining hypothesis- and data-driven neuroscience modeling in FAIR workflows. *eLife*, 11.

Perez JE, et al. (2021) Transient cell stiffening triggered by magnetic nanoparticle exposure. *Journal of nanobiotechnology*, 19(1), 117.

Compans B, et al. (2021) NMDAR-dependent long-term depression is associated with increased short term plasticity through autophagy mediated loss of PSD-95. *Nature communications*, 12(1), 2849.

Friedhoff VN, et al. (2021) Stochastic reaction-diffusion modeling of calcium dynamics in 3D dendritic spines of Purkinje cells. *Biophysical journal*, 120(11), 2112.