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## Monte Carlo cell simulations

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## Abstract

The general Monte Carlo simulator of cellular microphysiology (MCell) on this site is a program that allows three-dimensional dynamic simulations of subcellular architecture and physiology

## Mirror site

A [MCell mirror site](#) is available.

## Content

The general Monte Carlo simulator of cellular microphysiology (MCell) on this site is a program that allows three-dimensional dynamic simulations of subcellular architecture and physiology. In addition to an introduction to the modeling of cellular physiology, details of probability and random-event-based methods and complex geometry generation are discussed. The MCell program can be downloaded after registration (free to academic users). The site provides a good introduction to researchers interested in using Monte Carlo Simulations (a random number based simulation method, with the physical process simulated directly by sampling a probability distribution function) to answer questions in cellular physiology and structure, as well as having much to offer for users of the MCell tool. There are links to other simulation tools such as [NEURON](#) and [GENESIS](#) and visualization tool sites such as [Open Visualization Data Explorer](#) and [POV-Ray](#). The minimal nature of the site and the clear introduction to the simulation of microphysiology are its most striking features.

## Navigation

Most parts of the site can be found easily and there are tutorials for its use. There are some ambiguous links, including example images. Once in any of the internal pages, there are no links to other pages, which makes moving around a bit tedious. Browsing is easy but customization is not possible. The site has a lot of large images, and on a low-bandwidth connection this might slow access down. Printing pages is not ideal, as text and images do not fit on standard pages, but text and images can be easily

downloaded. The response to feedback is excellent and useful answers were obtained within a working day.

## Reporter's comments

### Timeliness

There is no mention of when the site was last updated, but the new downloading facility for the program was added in October 2001.

### Best feature

Monte Carlo simulation methods are not widely represented in cell-simulation websites, so the good overview of modeling in cell biology and the relevance of the Monte Carlo approach is welcome.

### Worst feature

A lack of clear links on every page makes navigation difficult.

### Wish list

A hyperlink to each of the beta-test laboratories to see concrete results from applications of MCell would be desirable.

### Related websites

The [National Partnership for Advanced Computational Infrastructure \(NPACI\)](#) is an affiliate that supports efforts to parallelize (modify the program to do many calculations on different processors at the same time to speedup the program) the MCell tool. Related tools for modeling microphysiology are Virtual Cell at the [National Resource for Cell Analysis and Modeling](#), [StochSim](#) for stochastic kinetics,

[Nanosimulation of the cytoskeleton](#) for simulation of the cytoskeleton, and bio-medical data visualization tools such as [Amira](#).

## Table of links

[MCell](#)

[MCell mirror site](#)

[NEURON](#)

[GENESIS](#)

[Open Visualization Data Explorer](#)

[POV-Ray](#)

[National Partnership for Advanced Computational Infrastructure \(NPACI\)](#)

[National Resource for Cell Analysis and Modeling](#)

[StochSim](#)

[Nanosimulation of the cytoskeleton](#)

[Amira](#)

## References

1. [MCell](#).