

# Osmium: helping PMR support the VPH requirements for identifiable and discoverable computational models

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Auckland Bioengineering Institute  
University of Auckland



AUCKLAND  
BIOENGINEERING  
INSTITUTE

‘95

**CellML Model Repository**

‘00

**Physiome Model Repository**

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**Physiome Model Repository (v2)**

‘10

**Osmium**

# **CellML model repository**

- Collection of demonstration, example, and testing CellML 1.0 models.
- Internal version control system.
- Static pages generated as part of cellml.org website.

Cellml.org - Model Repository × David

[http://www.cellml.org/examples/repository/index.html](http://web.archive.org/web/20060206233446/http://www.cellml.org/examples/repository/index.html)

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the CellML site  Search

**IUPS Physiome Project**

**Model Repository**

Search the Repository  
Signal Transduction  
Metabolic Pathway  
Cardiac Electrophys.  
Calcium Dynamics  
Immunology  
Cell Cycle  
Simplified Electrophys.  
Other Electrophys.  
Smooth Muscle  
Skeletal Muscle  
Mechanical  
Constitutive Law

**Model Downloads**

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## Model Repository

Author: David Nickerson (Bioengineering Institute, The University of Auckland)  
Author: Catherine Lloyd (Bioengineering Institute, The University of Auckland)

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[Mechanical Models and Constitutive Laws](#)

The models listed below all conform with the CellML 1.0 Specification. They are based on published mathematical models taken from various peer reviewed journals, from conference proceedings, and from text book defined metabolic pathways. We have remained true to the original publications and have not assumed any reaction kinetics or initial values if they were not included in the original publication. All sources of information have been referenced in the model documentation.

This part of the CellML website contains models which represent several types of cellular processes including models of electrophysiology, metabolism, signal transduction and mechanics. In order to facilitate the process of finding a particular model of interest, the models have been grouped into broad subject categories. However, since several of the models have overlapping topics and could be grouped under more than one subject heading, the models have also been labelled with keywords which enable finer repository searches to be carried out. Using the [repository search](#) facility, it is also possible to search for models based on other criteria, for example, those which are published by a particular author of interest.

The models listed below have been validated to a certain degree. Current validation processes include comparing the equations in the original paper with a PDF of the equations used in the CellML description (these PDFs are generated using the [MathML Renderer](#), a tool which extracts the MathML from the CellML and transforms it to LaTeX). The correctness of the CellML is also checked by using a ???? As tool development continues, both by the CellML team at the Bioengineering Institute and by international collaborators, we expect to be able to carry out the ultimate form of validation by running simulations and comparing these results with those of the original publication.

There is another model repository, for models which have been designed to test CellML processing software. These models are available at the [Tool Test Repository page](#).

### Signal Transduction Pathway Models

- [Wang, and Lipsius, Beta-Adrenergic Stimulation Induces Acetylcholine to Activate ATP-Sensitive K<sup>+</sup> Current in Atrial Myocytes, 1995.](#)
- [Kamp and Hell, cAMP/PKA Signalling Cascade Regulation of Cardiac L-type Calcium Channel Activity, 2000.](#)
- [Zhu, Endothelin-1-induced Cardiomyocyte Hypertrophy, 2000.](#)
- [Hefti et al., Fibroblast Growth Factor Signalling in Cardiac Myocyte Hypertrophy, 1997.](#)
- [Kodama, gp130-Signal Transducer and Activator of Transcription and Cardiac Hypertrophy, 2000.](#)
- [Ren et al., The Role of Insulin-like Growth Factor I as a Cardiac Hormone, 1999.](#)
- [Wang, The Mechanisms Underlying Beta-Adrenergic Enhancement of Acetylcholine-Induced ATP-Sensitive K<sup>+</sup> Current in Atrial Myocytes, 2002.](#)
- [Kamp and Hell, PLC/PKC Signalling Cascade Regulation of Cardiac L-type Calcium Channel Activity, 2000.](#)
- [Vojtek and Der, The Complexity of the Ras Signalling Pathway, 1998.](#)
- [Thomsen and Neubig, A G-Protein Activation Pathway, 1989.](#)
- [Starbuck et al., Epidermal Growth Factor Binding and Trafficking Dynamics in Fibroblasts, 1990.](#)
- [Goldbeter, A Minimal Cascade Model For The Mitotic Oscillator Involving Cyclin And cdc2 Kinase, 1991.](#)
- [Goldbeter, A Model for Circadian PER Oscillations in Drosophila, 1995.](#)
- [Huang and Ferrell, Ultrasensitivity in the MAPK Cascade, 1996.](#)
- [Spiro et al., Bacterial Chemotaxis, 1997.](#)

# **CellML model repository**

- Collection of demonstration, example, and testing CellML 1.0 models.
- Internal version control system.
- Static pages generated as part of cellml.org website.
- Categorised using some kind of “ontology”

Cellml.org - Model Repository × David

← → ⌂ ⓘ web.archive.org/web/20060206233446/http://www.cellml.org/examples/repository/index.html#cardiac\_ep\_models

Cardiac Electrophysiological Models

Ventricular Myocytes

- [Beeler and Reuter, Ventricular Model, 1977.](#)
- [Drouhard and Roberge, Sodium Current Model in Ventricular Myocardial Cells, 1987.](#)
- [Luo and Rudy, Ventricular Model I, 1991.](#)
- [Luo and Rudy, Ventricular Model II \(dynamic\), 1994.](#)
- [Updated Luo-Rudy Ventricular Model.](#)
- [Jafri, Rice and Winslow, Ventricular Model, 1998.](#)
- [Noble et al., Ventricular Cell Model, 1998.](#)
- [Priebe and Beuckelmann, Electrophysiological Model of the Human Ventricular Myocyte, 1998.](#)
- [Winslow et al., Canine Ventricular Cell Model, 1999.](#)
- [Michailova and McCulloch, Modelling ATP and ADP Buffering,  \$\text{Ca}^{2+}\$  and  \$\text{Mg}^{2+}\$  Transport, and Ion Pump Regulation in Ventricular Myocytes, 2001.](#)
- [Pandit et al., Adult Rat Left Ventricular Myocyte Model, 2001.](#)
- [Puglisi and Bers, Rabbit Ventricular Myocyte Model, 2001.](#)
- [Bernus et al., A Computationally Efficient Electrophysiological Model of Human Ventricular Cells, 2002.](#)
- [Matsuoka et al., Modelling the Roles of Individual Current Systems in Ventricular Cells and in the SA Node, 2003.](#)
- [Seemann et al., Quantitative Reconstruction of Cardiac Electromechanics in Human Myocardium, 2003.](#)
- [Bondarenko et al., Modelling the Action Potential of Mouse Ventricular Myocytes, 2004.](#)
- [Iyer et al., A Computational Model of the Human Left-Ventricular Epicardial Myocyte, 2004.](#)  
\*NEW\*
- [Shannon et al., Modelling The Integrated Ca Dynamics Of The Ventricular Myocyte, 2004.](#)  
\*NEW\*
- [Ten Tusscher et al., A Model For Human Ventricular Tissue, 2004.](#)

Purkinje Fibres

- [Noble, Purkinje Fibre Model, 1962.](#)
- [McAllister, Noble, and Tsien, Purkinje Fibre Model, 1975.](#)
- [Di Francesco and Noble, Purkinje Fibre Model, 1985.](#)

Atrial Myocytes

- [Noble and Noble, Sinoatrial Node Model, 1984.](#)
- [Hilemann and Noble, Atrial Model, 1987.](#)
- [Demir et al., Sinoatrial Node Model, 1994.](#)
- [Dokos et al., Modelling the Ion Currents Underlying Sinoatrial Node Pacemaker Activity, 1996.](#)
- [Dokos et al., A Model of Sinoatrial Node Vagal Control, 1996.](#)
- [Courtemanche et al., Human Atrial Action Potential Model, 1998.](#)
- [Nygren et al., Human Atrial Cell Model, 1998.](#)
- [Demir et al., Sinoatrial Node Model, 1999.](#)
- [Ramirez et al., Canine Atrial Action Potential Model, 2000.](#)
- [Zhang et al., Sinoatrial Node Model, 2000.](#)
- [Boyett et al., Sinoatrial Node Model, 2001.](#)
- [Kneller et al., Canine Atrial Action Potential Model, 2002.](#)
- [Kurata et al., Improved Mathematical Model for the Primary Pacemaker Cell, 2002.](#)
- [Matsuoka et al., Modelling the Roles of Individual Current Systems in Ventricular Cells and in the SA Node, 2003.](#)
- [Lovell et al., A Gradient Model Of Cardiac Pacemaker Myocytes, 2004.](#)

Channels and Molecular Mechanisms

- [Ebihara and Johnson, Sodium Current Model in Cardiac Muscle, 1990.](#)

# **CellML model repository**

- Collection of demonstration, example, and testing CellML 1.0 models.
- Internal version control system.
- Static pages generated as part of cellml.org website.
- Categorised using some kind of “ontology”
- LaTeX documentation source + CellML XML files

Cellml.org - Jafri-Rice-Winslow × David

[http://www.cellml.org/examples/repository/JRW\\_model\\_1998\\_doc.html](http://web.archive.org/web/20060219044322/http://www.cellml.org/examples/repository/JRW_model_1998_doc.html)

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**IUPSS Physiome Project**

**Model Repository**

- Search the Repository
- Signal Transduction Pathway
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- Smooth Muscle
- Skeletal Muscle
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**Model Downloads**

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## Jafri-Rice-Winslow Ventricular Model 1998

Author: Catherine Lloyd (Bioengineering Institute, University of Auckland)

[PDF](#)

### Table of Contents

[Model Structure](#)  
[Download This Model](#)

### Model Structure

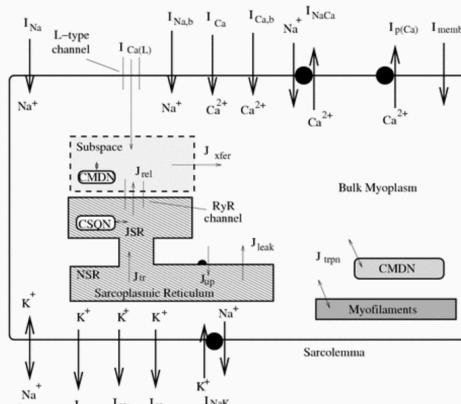
In 1998, M. Saleet Jafri, J. Jeremy Rice and Raimond L. Winslow published a model describing the ventricular action potential. By adding a more sophisticated model of calcium handling, this model builds upon the [Francesco-Noble](#) and the Luo-Rudy models (see the [Luo-Rudy I](#) and the [Luo-Rudy II](#) models with their accurate descriptions of membrane currents (see [Figure 1](#) below). Prior to this paper, membrane currents and calcium subsystems had only been considered separately.

The complete original paper reference is cited below:

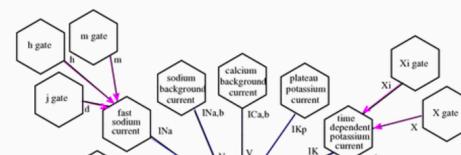
[Cardiac Calcium Dynamics: The Roles of Ryanodine Receptor Adaptation and Sarcoplasmic Reticulum Load](#), M. Saleet Jafri, J. Jeremy Rice and Raimond L. Winslow, 1998, *Biophysical Journal*, 74, 1149-1168. ([Full text](#) and [PDF](#) versions of the article are available for Journal Members on the Biophysical Journal website.) [PubMed ID: 9512016](#)

The raw CellML description of the Jafri-Rice-Winslow model can be downloaded in various formats as described in the section [Download This Model](#). For an example of a more complete documentation for an electrophysiological model, see [The Hodgkin-Huxley Squid Axon Model, 1952](#).

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**Figure 1.** A schematic diagram describing the current flows across the cell membrane that are captured in the Jafri-Rice-Winslow model.



## Download This Model

The CellML description of this model is available in a number of formats. If you have your browser set up to view text files served with the "text/xml" MIME type, then you can have a look at the XML file [here](#). If not, you can save that file to disk by shift-clicking on the preceding link. A "pretty-printed" browsable HTML version of the XML file is available [here](#) — note that you cannot download and save this version for later viewing since it makes use of stylesheets for formatting. If you wish to save or print out the "pretty-printed" version of the XML, a PDF version is also available [here](#). A gzipped tarball (the Unix equivalent of a winzip file) including this documentation, the raw XML and the pretty-printed PDF version of the XML is available [here](#).

Here are those links again:

- [jafri\\_rice\\_winslow\\_model\\_1998.xml](#) — the raw XML.
- [jafri\\_rice\\_winslow\\_model\\_1998.html](#) — an HTML version for browsing online.
- [jafri\\_rice\\_winslow\\_model\\_1998.pdf](#) — a PDF version suitable for printing.
- [cellml\\_jafri\\_rice\\_winslow\\_model\\_1998.tar.gz](#) — a gzipped tarball with the XML and this documentation.
- [jafri\\_rice\\_winslow\\_model\\_1998\\_maths.pdf](#) — a PDF of the equations described in the model generated directly from the CellML description using the [MathML Renderer](#).

CellML Example - Jafri-Rice-Winslow Model 1998

David

[http://web.archive.org/web/20050325234054/http://www.cellml.org/examples/models/jafri\\_rice\\_winslow\\_model\\_1998.html](http://web.archive.org/web/20050325234054/http://www.cellml.org/examples/models/jafri_rice_winslow_model_1998.html)

<?xml version="1.0"?>

<!-- FILE : jafri\_rice\_winslow\_model\_1998.xml

CREATED : September 2001

LAST MODIFIED : 30th July 2003

AUTHOR : Catherine Lloyd  
 Department of Engineering Science  
 The University of Auckland

MODEL STATUS : This model conforms to the CellML 1.0 Specification released on 10th August 2001, and the CellML Metadata 1.0 Specification released on 16th January, 2002.

DESCRIPTION : This file contains a CellML description of the mammalian ventricular action potential based on the Jafri-Rice-Winslow model, 1998. This model is a development of the LR-II model. In particular, it makes an accurate model of the membrane currents and adds a more sophisticated model of calcium ion handling.

CHANGES:

- 19/10/2001 - CML - Removed document type definition as this is declared as optional according to the W3C recommendation.
- 24/10/2001 - CML - Made changes to some of the metadata, bringing them up to date with the most recent working draft (26th September) of the Metadata specification.
- 07/12/2001 - CML - Changed tau\_y\_calculation after checking mathml using the validator.
- 04/01/2002 - CML - Altered some of the connections.
- 21/01/2002 - AAC - Updated metadata to conform to the 16/1/02 CellML Metadata 1.0 Specification.
- 25/02/2002 - CML - Corrected several equations.
- 28/02/2002 - CML - Corrected several equations, variable units and their initial values.
- 06/05/2002 - CML - Added some initial values.
- 22/07/2002 - CML - Added more metadata.
- 09/04/2003 - AAC - Added publication date information.
- 04/06/2003 - CML - Fixed MathML in a few components.
- 30/07/2003 - CML - Altered a few equations.

-->

```
<model
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  cmeta:id="jafri_rice_winslow_model_1998"
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  xmlns:cellml="http://www.cellml.org/cellml/1.0#"
  xmlns:cmeta="http://www.cellml.org/metadata/1.0#">
  <rdf:RDF
    xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
    xmlns:cmeta="http://www.cellml.org/metadata/1.0#"
    xmlns:bqss="http://www.cellml.org/bqs/1.0#"
    xmlns:dc="http://purl.org/dc/elements/1.1/"
    xmlns:dcterms="http://purl.org/dc/terms/"
    xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#">
    <!--
      The following RDF block contains metadata that applies to this document.
    -->
```

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**CellML Model Repository**

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**Physiome Model Repository**

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**Physiome Model Repository (v2)**

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**Osmium**

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# **Physiome Model Repository**

- Introduced Zope server with Plone CMS.
- LaTeX documentation migrated to “tmpDoc” inside the CellML documents.
- Extended Plone with CellML specific features to provide similar functionality as the CellML model repository.

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**CellML Model Repository**

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**Physiome Model Repository**

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**Osmium**

# PMR2

- Facilitated model exchange directly between modellers, without reliance on a central repository.
- Detailed revision history for each model.
- User access workflows to control privacy when required.
- Embedded workspaces to enable model reuse and promote modular model development.
- File format agnostic.
- Distributable, installable...
- <https://github.com/pmr2>
- <https://models.physiomeproject.org>

Physiome Repository — Physiome Project

David

https://models.physiomeproject.org/welcome



Models Home Exposures Documentation

You are here: Home / Physiome Repository

## Physiome Repository

### Main model listing

The list of processed model exposures (formats: 100 per page | full list), which are models that have documentation pages generated from the metadata they contain. Alternatively, you may start browsing via the categories that are listed below:

*Please note:* Comments about the functional status or curation status of the models within this repository are the opinions of the CellML Model Repository curators. We do our best to accurately represent these models, but please contact us if you have a query or issue with comments made on this site.

### CellML models by category

- Calcium Dynamics
- Cardiovascular Circulation
- Cell Cycle
- Cell Migration
- Circadian Rhythms
- Electrophysiology
- Endocrine
- Excitation-Contraction Coupling
- Gene Regulation
- Hepatology
- Immunology
- Ion Transport
- Mechanical Constitutive Laws
- Metabolism
- Myofilament Mechanics
- Neurobiology
- pH Regulation
- PKPD
- Protein Modules
- Signal Transduction
- Synthetic Biology

### FieldML models

### Searching

Searching of models can be done anywhere on the site using the search box on the upper right hand corner. Alternative try the Ontology based search engine.

Search Site

Log in

---

### Navigation

### Physiome Repository

Site Map | Accessibility | Contact

# Workspaces

- Each (model | study | assay) stored in a workspace
  - users can create themselves
  - can store any kind of data
  - is a DVCS (Git or Mercurial)
  - full history is available
  - users control access
- DVCS enhances collaboration.
- Support for modularity and reuse via embedded workspaces
  - relative references facilitate sharing and archiving

A review of cardiac cellular ele

<https://models.physiomeproject.org/workspace/a1/@@shortlog>

David

Search Site

Models Home My Workspaces Exposures Documentation David Nickerson

You are here: Home / Workspaces / A review of cardiac cellular electrophysiology models

View Edit History Files Fork Synchronize Exposure Rollover RDF Indexing Sharing Layout

## Shortlog

| Date       | Author          | Log   | Options             | Exposure |
|------------|-----------------|---|---------------------|----------|
| 2011-06-21 | David Nickerson | adding a standalone version of the SED-ML document for this example, updating to pass validation using Frank's new web tools  | [files] [tgz] [zip] |          |
| 2010-07-06 | David Nickerson | correcting errors found with newer versions of the CellML API: e-notation; namespace; and an initial value is required for state variables. The initial value on x1 fixes the problem reported on tracker item 2521 | [files] [tgz] [zip] |          |
| 2010-07-06 | David Nickerson | removing duplicated connection picked up while working on tracker item 2521   | [files] [tgz] [zip] |          |
| 2010-05-04 | David Nickerson | finishing off initial draft SED-ML version of graphing and simulation description. Still doesn't validate in libsedml but looking into this with Frank Bergmann   | [files] [tgz] [zip] |          |
| 2010-05-04 | David Nickerson | adding initial version of SED-ML L1V1 file reproducing what is in graphs/BR-INa-variants.xml  | [files] [tgz] [zip] |          |
| 2010-05-04 | David Nickerson | adding V to the top level model in order to test out SED-ML L1V1 since need to be able to address variables using xpath   | [files] [tgz] [zip] |          |
| 2009-07-16 | David Nickerson | typos   | [files] [tgz] [zip] |          |

a1 (Mercurial)

View Commit Update Revert Shelf Add Remove Add/Remove Pull Push Branch Merge Tag Show in Finder Hg Flow Terminal Settings

**FILE STATUS**

Working Copy 1

**BRANCHES**

default

**BOOKMARKS**

**TAGS**

**REMOTES**

default

**SHELFED**

**SUBREPOSITORIES**

All Branches Graph Description Uncommitted changes

tip default adding a standalone version of the SED-ML document for this example,... 93 David Nickerson <... 21/06/2011, 04:56  
correcting errors found with newer versions of the CellML API: e-notation; namespace; an... 92 David Nickerson <... 06/07/2010, 05:55  
removing duplicated connection picked up while working on tracker item 2521 91 David Nickerson <... 06/07/2010, 05:53  
finishing off initial draft SED-ML version of graphing and simulation description. Still does... 90 David Nickerson <... 04/05/2010, 06:04  
adding initial version of SED-ML L1V1 file reproducing what is in graphs/BR-INa-variants.xml 89 David Nickerson <... 04/05/2010, 01:37  
adding V to the top level model in order to test out SED-ML L1V1 since need to be able to... 88 David Nickerson <... 04/05/2010, 01:35

Sorted by path Search

**sed-ml/BR-INa-variants-standalone.xml**

File contents Reverse hunk

```

1 1 <?xml version="1.0" encoding="utf-8"?>
2 2
3 - <sedML xmlns="http://www.biomodels.net/sed-ml">
3 + <sedML xmlns="http://www.biomodels.net/sed-ml" level="1" version="1">
4 4   <listOfSimulations>
5 5     <uniformTimeCourse id="simulation"
6 6       algorithm="KISA0:0000019"
7 7         initialTime="0"
8 8         outputStartTime="0"
9 9         outputEndTime="1500"
10 10        -> numberOfPoints="1500" />
11 11        +> numberOfPoints="1500" />
12 12        +> algorithm kisaoID="KISA0:0000019" />
13 13      +> </uniformTimeCourse>
14 14
15 15
16 16
17 17     <!--
18 18       FIXE: need to reference IVOI - can't go here though...
19 19       -->
20 20   </listOfSimulations>
<listOfModels>
  <model id="BR">
    -> type="CellML"
    -> source="..../models/1977_beeler/experiments/periodic_stimul"
    +> language="urn:sedml:language:cellml"
    +> source="http://models.cellml.org/workspace/a1/@rawfile/7
      <model id="BRE1" />

```

Revision: 93  
Changeset:  
fdb3693c38ff7d21160566a685f6ed31d4b115fc  
[fd3693c38ff]  
Parents: 92  
Author: David Nickerson <nickerso@users.sourceforge.net>  
Date: 21 June 2011 at 04:56:12 GMT+1  
Labels: tip

adding a standalone version of the SED-ML document for this example, updating to pass validation using Frank's new web tools

default Clean 1 Not Tracked Fetching Atlassian

# **Exposures**

- Presentation view of a workspace.
- Plugins for various types of data.
- Indexing of metadata.

Control of the pacemaker activity of the sinoatrial node by intracellular Ca<sup>2+</sup>. Experiments and modelling

by Catherine Lloyd — last modified Jul 15, 2013 02:24 AM — History

## Control of the pacemaker activity of the sinoatrial node by intracellular Ca<sup>2+</sup>. Experiments and modelling

### Model Status

This model is valid CellML. However the model will not run in either OpenCell or COR and the model requires further curation.

### Model Structure

**ABSTRACT:** The possible effects of intracellular Ca<sup>2+</sup> on the pacemaker of the heart, the sinoatrial node, are reviewed. In mammalian sinoatrial node, reduction or abolition of the intracellular Ca<sup>2+</sup> transient by ryanodine, sarcoplasmic reticulum Ca<sup>2+</sup> pump block or 1,2-bis(2-aminophenoxy)ethane-N, N, N', N'-tetraacetic acid (BAPTA) reduces the spontaneous rate by 21–32%, whereas in amphibian sinus venosus it abolishes spontaneous activity. In rabbit sinoatrial node, ryanodine/BAPTA reduces the T-type Ca<sup>2+</sup> current ( $I_{Ca,T}$ ), perhaps slows inactivation of the L-type Ca<sup>2+</sup> current ( $I_{Ca,L}$ ), reduces the inward Na<sup>+</sup>-Ca<sup>2+</sup> exchange current ( $I_{NaCa}$ ), and reduces the rapid and slow delayed rectifier K<sup>+</sup> currents ( $I_{K,r}$  and  $I_{K,s}$ , respectively). Other evidence shows that a reduction of intracellular Ca<sup>2+</sup> inhibits the hyperpolarization-activated current ( $I_f$ ). These putative intracellular Ca<sup>2+</sup>-dependent changes in ionic currents have been incorporated into different models of rabbit sinoatrial node action potentials. In the models, block of the Ca<sup>2+</sup> transient reduced the spontaneous rate by 24 and 26% in the central and peripheral models of Zhang and others, 13% in the OxoSoft model (Noble et al.), 9% in the model of Wilders and others, and 41% in the model of Demir and others. In all models, the reduction in rate was not primarily the result of the decrease in  $I_{NaCa}$ , but instead the combination of all changes in ionic currents.

The original paper reference is cited below:

Control of the pacemaker activity of the sinoatrial node by intracellular Ca<sup>2+</sup>. Experiments and modelling, M.R. Boyett, H. Zhang, A. Garry and A.V. Holden, 2001, *Phil. Trans. R. Soc. Lond. A.*, 359, 1091-1110. (note there is no PubMed ID for this publication).

A schematic diagram describing the current flows across the cell membrane that are captured in the Boyett *et al* 2001 model of the action potentials in the peripheral cells of the SA node.

**Source**  
Derived from workspace Boyett, Zhang, Garry, Holden, 2001 at changeset 59fbbebd0c49.

**Collaboration**  
To begin collaborating on this work, please use your git client and issue this command:  
`git clone https://models.physio`

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Model Metadata  
Model Curation  
Mathematics  
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**Navigation**  
**Control of the pacemaker activity of the sinoatrial node by intracellular Ca<sup>2+</sup>. Experiments and modelling**

Aorta-Brown-Shi-et-al-2012.rdf

View Wizard

by Dougal Cowan — last modified Jul 15, 2013 01:32 AM — [History](#)

## Description

Original data made available with permission of original authors. FieldML v0.4 and 0.5 representation created by Auckland Bioengineering Institute.

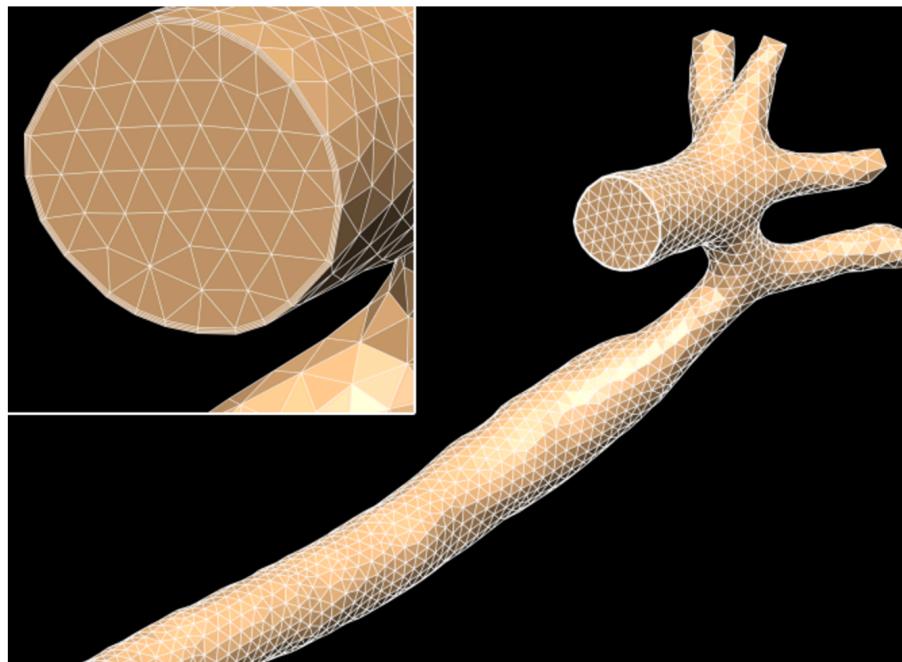
This is a aortic coarctation model with four vessel branches in the aortic arch: namely the right subclavian artery, right common carotid artery, left common carotid artery and the left subclavian artery. The coarctation index (area ratio of the narrowest section to the normal section of the vessel) is 0.41. Clinical measurement gave a systolic peak to peak pressure gradient of 20.86mmHg, while the CFD simulation predicted a gradient of 24.04mmHg, which agreed well with the clinical data.

The model here is a coarse mesh for demonstration purposes. The CFD calculations described in an upcoming publication use a much denser mesh with 375695 nodes, 555027 tetrahedral elements, and 543720 prism elements. The usefulness of this type of model is described in the citation below.

Accuracy vs. Computational Time: Translating Aortic Simulations to the Clinic. Brown A.G., Shi Y., Marzo A., Staicu C., Valverde I., Beerbaum P., Lawford P., Hose D.R. *Journal of Biomechanics*, 45(3), pp516-523, 2012 PubMed ID: 22189248

The model can be viewed using cmgui. In order to do this, you should clone the workspace, then load and run the view.cogui file as a cmgui com file.

The files can be downloaded individually from the workspace.



**Source**  
Derived from workspace Workflows for analysis of valvular and aortic disease at changeset 665570408de0.

**Collaboration**  
To begin collaborating on this work, please use your git client and issue this command:

```
git clone https://models.physio
```

**Downloads**

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**Views Available**

Documentation  
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Model Curation  
Source View  
Zinc Viewer  
Cite this model

**Tools**  
Compare...

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**Navigation**  
[Aorta-Brown-Shi-et-al-2012.rdf](#)

‘95

**CellML Model Repository**

‘00

**Physiome Model Repository**

‘05

**Physiome Model Repository (v2)**

‘10

**Osmium**

# Osmium

- <http://osmium.readthedocs.io/>
- RepoDono
  - core component
  - refactoring PMR2
  - remove distinction between workspaces and exposures (dynamic exposures)
- calmjs
  - Python framework for building toolchains and utilities for working with the JavaScript/Node.js ecosystem from within a Python environment.
- more to come...

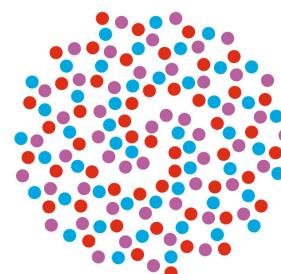


# Acknowledgements



The Virtual Physiological  
Rat Project

[www.virtualrat.org](http://www.virtualrat.org)



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