# Scarcoplasmic ion currents

## Time-dependent delayed rectifier potassium current (IK)[[1]](#footnote-20)

## Time-independent potassium current (IK1)[[2]](#footnote-23)

## Plateau potassium current (IKp)[[3]](#footnote-25)

## Fast Na current (INa)[[4]](#footnote-27)

## Sodium-calcium exchanger current (INaCa)[[5]](#footnote-29)

## Background calcium () and sodium currents ()[[6]](#footnote-31)

## Non-specific calcium-activated current (InsCa)[[7]](#footnote-33)

## Sodium-potassium ATPase current (INaK)[[8]](#footnote-35)

The dependence of Na+/K+ ATPase activity on ATP concentration, as well as the competitive inhibition by ADP.

## ODE for electrophyiology

## Functions

Nernst potential

Hill function

GHK current equation

## Parameters

| Symbol | Value | Units | Description |
| --- | --- | --- | --- |
|  |  |  | Maximal Na channel conductance |
|  |  |  | Maximal plateau K channel conductance |
|  |  |  | IK conductance |
|  |  |  | IK1 conductance |
|  |  |  | Na+ permeability ratio of K+ channel |
|  |  |  | NCX current |
|  |  |  | Dissociation constant of sodium for NCX |
|  |  |  | Dissociation constant of calcium for NCX |
|  |  |  | NCX saturation factor at negative potentials |
|  |  |  | Voltage dependence of NCX |
|  |  |  | Nonspecific channel current Na permeability |
|  |  |  | Nonspecific channel current K permeability |
|  |  |  | Ca2+ half-saturation constant for nonspecific current |
|  |  |  | Maximum background current Ca2+ conductance |
|  |  |  | Maximum background current Na+ conductance |

1. Cortassa S, Aon MA, O’Rourke B, et al. A computational model integrating electrophysiology, contraction, and mitochondrial bioenergetics in the ventricular myocyte. Biophys J. 2006;91(4):1564-89. [PMC1518641](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1518641/) [↑](#footnote-ref-20)
2. Cortassa S, Aon MA, O’Rourke B, et al. A computational model integrating electrophysiology, contraction, and mitochondrial bioenergetics in the ventricular myocyte. Biophys J. 2006;91(4):1564-89. [PMC1518641](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1518641/) [↑](#footnote-ref-23)
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6. Cortassa S, Aon MA, O’Rourke B, et al. A computational model integrating electrophysiology, contraction, and mitochondrial bioenergetics in the ventricular myocyte. Biophys J. 2006;91(4):1564-89. [PMC1518641](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1518641/) [↑](#footnote-ref-31)
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