

SBML Model Report

Model name:
“Guyton1972_PulmonaryFluidDynamics”



May 6, 2016

1 General Overview

This is a document in SBML Level 2 Version 3 format. Table 1 provides an overview of the quantities of all components of this model.

Table 1: Number of components in this model, which are described in the following sections.

Element	Quantity	Element	Quantity
compartment types	0	compartments	1
species types	0	species	0
events	0	constraints	0
reactions	0	function definitions	0
global parameters	24	unit definitions	1
rules	16	initial assignments	0

Model Notes

This a model from the article:

Circulation: overall regulation.

Guyton AC, Coleman TG, Granger HJ. Annu Rev Physiol 1972;34:13-46 [4334846](#) ,

Abstract:

No abstract available

This model was taken from the [CellML repository](#) and automatically converted to SBML.

The original model was: [Guyton AC, Coleman TG, Granger HJ. \(2008\) - version02](#)

The original CellML model was created by:

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To cite BioModels Database, please use: [Li C, Donizelli M, Rodriguez N, Dharuri H, Endler L, Chelliah V, Li L, He E, Henry A, Stefan MI, Snoep JL, Hucka M, Le Novre N, Laibe C \(2010\) BioModels Database: An enhanced, curated and annotated resource for published quantitative kinetic models. BMC Syst Biol., 4:92.](#)

2 Unit Definitions

This is an overview of five unit definitions of which four are predefined by SBML and not mentioned in the model.

2.1 Unit substance

Name normalised

Definition dimensionless

2.2 Unit volume

Notes Litre is the predefined SBML unit for volume.

Definition 1

2.3 Unit area

Notes Square metre is the predefined SBML unit for area since SBML Level 2 Version 1.

Definition m²

2.4 Unit length

Notes Metre is the predefined SBML unit for length since SBML Level 2 Version 1.

Definition m

2.5 Unit time

Notes Second is the predefined SBML unit for time.

Definition s

3 Compartment

This model contains one compartment.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
Compartment			3	1	litre	<input checked="" type="checkbox"/>	

3.1 Compartment [Compartment](#)

This is a three dimensional compartment with a constant size of one litre.

4 Parameters

This model contains 24 global parameters.

Table 3: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
PPC	PPC		29.994	dimensionless	<input checked="" type="checkbox"/>
PPA	PPA		15.638	dimensionless	<input checked="" type="checkbox"/>
PLA	PLA		2.000	dimensionless	<input checked="" type="checkbox"/>
CPP	CPP		71.972	dimensionless	<input checked="" type="checkbox"/>
RPV	RPV		1.557	dimensionless	<input checked="" type="checkbox"/>
RPA	RPA		1.568	dimensionless	<input checked="" type="checkbox"/>
PCP	PCP		0.000	dimensionless	<input type="checkbox"/>
PFI	PFI		0.000	dimensionless	<input type="checkbox"/>
DFP	DFP		0.000	dimensionless	<input type="checkbox"/>
VPF	VPF		0.000	dimensionless	<input type="checkbox"/>

Id	Name	SBO	Value	Unit	Constant
DFZ	DFZ		0.000	dimensionless	<input type="checkbox"/>
VPF1	VPF1		0.012	dimensionless	<input type="checkbox"/>
PPI	PPI		0.000	dimensionless	<input type="checkbox"/>
PPD	PPD		0.000	dimensionless	<input type="checkbox"/>
CPN	CPN		0.000	dimensionless	<input type="checkbox"/>
PPZ	PPZ		0.000	dimensionless	<input type="checkbox"/>
PPR1	PPR1		0.420	dimensionless	<input type="checkbox"/>
PPR	PPR		0.000	dimensionless	<input type="checkbox"/>
POS	POS		0.000	dimensionless	<input type="checkbox"/>
PPN	PPN		0.000	dimensionless	<input type="checkbox"/>
PLF	PLF		0.000	dimensionless	<input type="checkbox"/>
PPO	PPO		0.000	dimensionless	<input type="checkbox"/>
CPF	CPF		$3 \cdot 10^{-4}$	dimensionless	<input checked="" type="checkbox"/>
tu	time_unit		1.000	s	<input checked="" type="checkbox"/>

5 Rules

This is an overview of 16 rules.

5.1 Rule VPF1

Rule VPF1 is a rate rule for parameter VPF1:

$$\frac{d}{dt}VPF1 = \frac{DFP}{tu} \quad (1)$$

Derived unit s^{-1}

5.2 Rule PPR1

Rule PPR1 is a rate rule for parameter PPR1:

$$\frac{d}{dt}PPR1 = \frac{PPD}{tu} \quad (2)$$

Derived unit s^{-1}

5.3 Rule PCP

Rule PCP is an assignment rule for parameter PCP:

$$PCP = \frac{(PPA - PLA) \cdot RPV}{RPV + RPA} + PLA \quad (3)$$

Derived unit dimensionless

5.4 Rule PFI

Rule PFI is an assignment rule for parameter PFI:

$$\text{PFI} = (\text{PCP} - \text{PPI} + \text{POS} - \text{PPC}) \cdot \text{CPF} \quad (4)$$

Derived unit dimensionless

5.5 Rule DFZ

Rule DFZ is an assignment rule for parameter DFZ:

$$\text{DFZ} = \text{PFI} - \text{PLF} \quad (5)$$

Derived unit dimensionless

5.6 Rule DFP

Rule DFP is an assignment rule for parameter DFP:

$$\text{DFP} = \text{DFZ} \quad (6)$$

Derived unit dimensionless

5.7 Rule VPF

Rule VPF is an assignment rule for parameter VPF:

$$\text{VPF} = \begin{cases} 0.0010 & \text{if } \text{VPF1} < 0.0010 \\ \text{VPF1} & \text{otherwise} \end{cases} \quad (7)$$

5.8 Rule PPI

Rule PPI is an assignment rule for parameter PPI:

$$\text{PPI} = 2 - \frac{0.15}{\text{VPF}} \quad (8)$$

5.9 Rule PPZ

Rule PPZ is an assignment rule for parameter PPZ:

$$\text{PPZ} = \text{PPN} - \text{PPO} \quad (9)$$

Derived unit dimensionless

5.10 Rule PPD

Rule PPD is an assignment rule for parameter PPD:

$$\text{PPD} = \text{PPZ} \quad (10)$$

Derived unit dimensionless

5.11 Rule PPR

Rule PPR is an assignment rule for parameter PPR:

$$\text{PPR} = \begin{cases} 0.025 & \text{if } \text{PPR1} < 0.025 \\ \text{PPR1} & \text{otherwise} \end{cases} \quad (11)$$

5.12 Rule CPN

Rule CPN is an assignment rule for parameter CPN:

$$\text{CPN} = \frac{\text{PPR}}{\text{VPF}} \quad (12)$$

Derived unit dimensionless

5.13 Rule POS

Rule POS is an assignment rule for parameter POS:

$$\text{POS} = \text{CPN} \cdot 0.4 \quad (13)$$

5.14 Rule PPN

Rule PPN is an assignment rule for parameter PPN:

$$\text{PPN} = (\text{CPP} - \text{CPN}) \cdot 2.25 \cdot 10^{-4} \quad (14)$$

5.15 Rule PLF

Rule PLF is an assignment rule for parameter PLF:

$$\text{PLF} = (\text{PPI} + 11) \cdot 3 \cdot 10^{-4} \quad (15)$$

5.16 Rule PPO

Rule PPO is an assignment rule for parameter PPO:

$$\text{PPO} = \text{PLF} \cdot \text{CPN} \quad (16)$$

Derived unit dimensionless

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