SBML Model Report

Model name: "Radosavljevic2009-_BioterroristAttack_PanicProtection"

August 8, 2012

1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was at March fifth 2012 at 2:05 p. m. and last time modified at March fifth 2012 at 2:13 p. m. 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	2
events	0	constraints	0
reactions	0	function definitions	0
global parameters	5	unit definitions	0
rules	2	initial assignments	0

Model Notes

This model is from the article:
Epidemics of panic during a bioterrorist attack–a mathematical model.
Radosavljevic V, Radunovic D, Belojevic G. Med Hypotheses2009 Sep;73(3):342-6 19423234,
Abstract:
A bioterrorist attacks usually cause epidemics of panic in a targeted population. We have presented epidemiologic aspect of this phenomenon as a three-component model–host, information on an attack and social network. We have proposed a mathematical model of panic and

counter-measures as the function of time in a population exposed to a bioterrorist attack. The model comprises ordinary differential equations and graphically presented combinations of the equations parameters. Clinically, we have presented a model through a sequence of psychic conditions and disorders initiated by an act of bioterrorism. This model might be helpful for an attacked community to timely and properly apply counter-measures and to minimize human mental suffering during a bioterrorist attack.

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 which are all predefined by SBML and not mentioned in the model.

2.1 Unit `substance`

Notes Mole is the predefined SBML unit for `substance`.

Definition mol

2.2 Unit `volume`

Notes Litre is the predefined SBML unit for `volume`.

Definition l

2.3 Unit `area`

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

Definition m^2

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`	compartment		3	1	litre	☑	

3.1 Compartment `compartment`

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

Name compartment

4 Species

This model contains two species. Section 7 provides further details and the derived rates of change of each species.

Table 3: Properties of each species.

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
S	panic_intensity	compartment	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
P	protection+prevention_intensity	compartment	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟

5 Parameters

This model contains five global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`alpha`	alpha		4.0		☑
`beta`	beta		3.8		☑
`gamma`	gamma		1.0		☑
`delta`	delta		1.0		☑
`C`	whole_population		10.0		☑

6 Rules

This is an overview of two rules.

6.1 Rule `S`

Rule `S` is a rate rule for species `S`:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{S} = \left(\mathrm{alpha} \cdot \left(1 - \frac{[\mathrm{S}]}{\mathrm{C}}\right) - \mathrm{beta} \cdot [\mathrm{P}]\right) \cdot [\mathrm{S}] \tag{1}$$

6.2 Rule `P`

Rule `P` is a rate rule for species `P`:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{P} = (\mathrm{gamma} + \mathrm{delta} \cdot [\mathrm{S}]) \cdot [\mathrm{P}] \tag{2}$$

7 Derived Rate Equations

When interpreted as an ordinary differential equation framework, this model implies the following set of equations for the rates of change of each species.

7.1 Species `S`

Name panic_intensity

Initial concentration $0.01\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

Involved in rule `S`

One rule which determines this species' quantity.

7.2 Species P

Name protection+prevention_intensity

Initial concentration $0.01\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

Involved in rule P

One rule which determines this species' quantity.

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