SBML Model Report

Model name: “Demin2013 - PKPD behaviour - 5-Lipoxygenase inhibitors”

May 6, 2016

1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was created by the following two authors: Vijayalakshmi Chelliah[1] and Oleg Demin[2] at October fourth 2013 at 12:34 a. m. and last time modified at April 17th 2015 at 12:36 a. 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	16
species types	0	species	33
events	0	constraints	0
reactions	66	function definitions	0
global parameters	263	unit definitions	0
rules	101	initial assignments	0

Model Notes

Demin2013 - PKPD behaviour - 5-Lipoxygenaseinhibitors

This model is described in the article:Systems pharmacology models can be used to understand complex pharmacokinetic-pharmacodynamic behavior: an example using 5-lipoxygenase

[1]EMBL-EBI, viji@ebi.ac.uk
[2]Institute for Systems Biology SPb, Moscow, Russia, demin@insysbio.ru

inhibitors.Demin O, Karelina T, Svetlichniy D, Metelkin E, Speshilov G, Demin O Jr, Fairman D, van der Graaf PH, Agoram BM.CPT Pharmacometrics Syst Pharmacol 2013; 2: e74

Abstract:

Zileuton, a 5-lipoxygenase (5LO) inhibitor, displays complex pharmaokinetic (PK)-pharmacodynamic (PD) behavior. Available clinical data indicate a lack of dose-bronchodilatory response during initial treatment, with a dose response developing after ˜1-2 weeks. We developed a quantitative systems pharmacology (QSP) model to understand the mechanism behind this phenomenon. The model described the release, maturation, and trafficking of eosinophils into the airways, leukotriene synthesis by the 5LO enzyme, leukotriene signaling and bronchodilation, and the PK of zileuton. The model provided a plausible explanation for the two-phase bronchodilatory effect of zileuton-the short-term bronchodilation was due to leukotriene inhibition and the long-term bronchodilation was due to inflammatory cell infiltration blockade. The model also indicated that the theoretical maximum bronchodilation of both 5LO inhibition and leukotriene receptor blockade is likely similar. QSP modeling provided interesting insights into the effects of leukotriene modulation.CPT: Pharmacometrics & Systems Pharmacology (2013) 2, e74; doi:10.1038/psp.2013.49; advance online publication 11 September 2013.

This model is hosted on BioModels Database and identified by: BIOMD0000000490.

To cite BioModels Database, please use: BioModels Database: An enhanced, curated and annotated resource for published quantitative kinetic models.

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 Compartments

This model contains 16 compartments.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
Default		0000290	3	1	litre	☑	
Vd_LTC		0000290	3	9.47999954223633	l	☑	Default
Vd_LTD		0000290	3	9.47999954223633	l	☑	Default
Vd_LTE		0000290	3	9.47999954223633	l	☑	Default
V_B		0000290	3	2.80999994277954	l	☑	Default
V_AW		0000290	3	0.209999993443489	l	☑	Default
Vd_Hn		0000290	3	78100	l	☑	Default
Vd_IL5		0000290	3	10.1999998092651	l	☑	Default
V_BM		0000290	3	0.824999988079071	l	☑	Default
Vd_AW_LTC		0000290	3	1.53999996185303	l	☑	Default
Vd_AW_LTD		0000290	3	1.53999996185303	l	☑	Default
Vd_AW_LTE		0000290	3	1.53999996185303	l	☑	Default
Vd_AW_Hn		0000290	3	5640	l	☑	Default
Vd_ZF		0000290	3	9.44999980926514	l	☑	Default
Vd_AW_ZF		0000290	3	3.25999999046326	l	☑	Default
Vd_ML		0000290	3	10	l	☑	Default

3.1 Compartment Default

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

SBO:0000290 physical compartment

3.2 Compartment Vd_LTC

This is a three dimensional compartment with a constant size of 9.47999954223633 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.3 Compartment Vd_LTD

This is a three dimensional compartment with a constant size of 9.47999954223633 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.4 Compartment Vd_LTE

This is a three dimensional compartment with a constant size of 9.47999954223633 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.5 Compartment V_B

This is a three dimensional compartment with a constant size of 2.80999994277954 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.6 Compartment V_AW

This is a three dimensional compartment with a constant size of 0.209999993443489 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.7 Compartment Vd_Hn

This is a three dimensional compartment with a constant size of 78100 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.8 Compartment Vd_IL5

This is a three dimensional compartment with a constant size of 10.1999998092651 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.9 Compartment V_BM

This is a three dimensional compartment with a constant size of 0.824999988079071 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.10 Compartment Vd_AW_LTC

This is a three dimensional compartment with a constant size of 1.53999996185303 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.11 Compartment Vd_AW_LTD

This is a three dimensional compartment with a constant size of 1.53999996185303 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.12 Compartment Vd_AW_LTE

This is a three dimensional compartment with a constant size of 1.53999996185303 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.13 Compartment Vd_AW_Hn

This is a three dimensional compartment with a constant size of 5640 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.14 Compartment Vd_ZF

This is a three dimensional compartment with a constant size of 9.44999980926514 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.15 Compartment Vd_AW_ZF

This is a three dimensional compartment with a constant size of 3.25999999046326 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.16 Compartment Vd_ML

This is a three dimensional compartment with a constant size of ten litre, which is surrounded by Default.

SBO:0000290 physical compartment

4 Species

This model contains 33 species. Section 8 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
AA_b	AA_b	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
HPETE_b	HPETE_b	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
HETE_b	HETE_b	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LTA4_b	LTA4_b	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LTC4_b	LTC4_b	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LTC4_b_out	LTC4_b_out	Vd_LTC	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LTD4_b	LTD4_b	Vd_LTD	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LTE4_b	LTE4_b	Vd_LTE	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
EO_b	EO_b	V_B	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
EO_i_b	EO_i_b	V_B	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
EO_a_b	EO_a_b	V_B	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
EO_i_aw	EO_i_aw	V_AW	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
EO_a_aw	EO_a_aw	V_AW	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
EO_aw	EO_aw	V_AW	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
Hn_b	Hn_b	Vd_Hn	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IL_b	IL_b	Vd_IL5	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IL_bm	IL_bm	V_BM	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
EO_bm	EO_bm	V_BM	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
AA_aw	AA_aw	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
HPETE_aw	HPETE_aw	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
HETE_aw	HETE_aw	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LTA4_aw	LTA4_aw	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
LTC4_aw	LTC4_aw	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LTC4_aw_out	LTC4_aw_out	Vd_AW_LTC	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LTD4_aw	LTD4_aw	Vd_AW_LTD	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LTE4_aw	LTE4_aw	Vd_AW_LTE	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
Hn_aw	Hn_aw	Vd_AW_Hn	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IL_aw	IL_aw	V_AW	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
ZF_intes	ZF_intes	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
ZF_blood	ZF_blood	Vd_ZF	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
ZF_airways	ZF_airways	Vd_AW_ZF	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
ML_intes	ML_intes	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
ML_blood	ML_blood	Vd_ML	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟

5 Parameters

This model contains 263 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Ca			1.000		⊟
Ca_FEV_ex			10000.000		⊟
Cao_FEV			10000.000		⊟
DOSE_ml			0.000		⊟
DOSE_zf			0.000		⊟
EC50_ML_FEV			500.000		⊟
EC50_act			0.750		⊟
EC50_migr			0.115		⊟
Et_LTCs			1.000		⊟
FLOa			1.500		⊟
F_ml			0.661		⊟
F_zf			0.082		⊟
GPx			1.600		⊟
GSH_aw			1000.000		⊟
GSH_b			5000.000		⊟
GS_pool_aw			10000.000		⊟
GS_pool_b			10000.000		⊟
HEDH5			0.500		⊟
J_AW_lymfl			0.001		⊟
J_BM_lymfl			$4.9 \cdot 10^{-4}$		⊟
K_AA			10.750		⊟
K_Ca2			14.367		⊟
K_Ca3			7116.527		⊟
K_Ca_FEV			150000.000		⊟
K_GSH			744.918		⊟
K_LTA			1.760		⊟
K_LTA_GSH			1696.600		⊟
K_LTC			0.195		⊟
K_PLA2_Ca			0.100		⊟
Kd12			0.007		⊟
Kd50			0.430		⊟
KdZ			20.000		⊟
Kd_Hn_FEV			6300000.000		⊟
Kd_IL_migr			50.000		⊟
Kd_LT			1000.000		⊟
Kd_LTE_migr			50000.000		⊟
Kd_LTR1_FEV			1000.000		⊟

Id	Name	SBO	Value	Unit	Constant
Kd_LTR2_FEV			10000.000		⊟
Kd_LT_2			10000.000		⊟
Kd_gpx_GSSG			0.072		⊟
Kd_gpx_HETE5			6.043		⊟
Kd_hedh_HETE5			0.332		⊟
Kd_hedh_NADP			2.896		⊟
Kd_hedh_NADPH			2.686		⊟
Kd_hedh_oxoETE5			1.667		⊟
Ke_ox			100.000		⊟
Ke_red			$5.761955 \cdot 10^{-7}$		⊟
Ki_AA			551.875		⊟
Ki_HETE			0.541		⊟
Ki_ML_EOa			500.000		⊟
Km_1			2.000		⊟
Km_CoA_AA			0.005		⊟
Km_PLA2_APC			20.000		⊟
Km_gpx_GSH			600.000		⊟
Km_gpx_HPETE5			5.974		⊟
Kp_Hn_AW			3950.000		⊟
Kp_LTC_AW			0.220		⊟
Kp_LTD_AW			0.220		⊟
Kp_LTE_AW			0.220		⊟
Kp_ZF_AW			0.204		⊟
Kp_ZF_IW			0.631		⊟
LOH_aw			0.000		⊟
LOH_b			0.000		⊟
LOOH_aw			20.000		⊟
LOOH_b			1.000		⊟
MAX_FEV			4.940		⊟
ML_airways			0.000		⊟
ML_ex			0.000		⊟
M_Hn			111.200		⊟
M_IL5			45000.000		⊟
M_LTC			625.800		⊟
M_LTD			496.700		⊟
M_LTE			439.600		⊟
M_ML			586.180		⊟
M_ZF			236.000		⊟

Id	Name	SBO	Value	Unit	Constant
NADP_aw			2900.000		⊟
NADP_b			2000.000		⊟
NP_pool_aw			3000.000		⊟
NP_pool_b			3000.000		⊟
N_A_pmole			$6.02 \cdot 10^{11}$		⊟
OL_b_ex			0.000		⊟
PL			110.000		⊟
Q_AW_blf			5.230		⊟
R1_portion_EOa			0.390		⊟
R1_portion_FEV			0.016		⊟
R2_portion_FEV			0.037		⊟
R_FEV			3.007		⊟
R_Hn_AW			5130.000		⊟
R_Hn_B			141.000		⊟
R_LTC_AW			1.400		⊟
R_LTC_B			0.538		⊟
R_LTD_AW			1.400		⊟
R_LTD_B			0.538		⊟
R_LTE_AW			1.400		⊟
R_LTE_B			0.538		⊟
R_ZF_AW			2.960		⊟
R_ZF_B			0.533		⊟
R_in_relax_FEV			2.073		⊟
T			1440.000		⊟
TSN_0			15.500		⊟
V_CoA			350.000		⊟
Vmax_PLA2			450.000		⊟
a			1.000		⊟
al			1.000		⊟
ca			10.000		⊟
diam_EO			$1.2 \cdot 10^{-4}$		⊟
fup_Hn			0.770		⊟
fup_LT			0.160		⊟
fup_ML			0.004		⊟
fup_ZF			0.069		⊟
h_act			3.000		⊟
h_matur			1.000		⊟
h_migr			3.000		⊟

Id	Name	SBO	Value	Unit	Constant
k1			10^{-6}		⊟
k1_min			$1.6 \cdot 10^{-7}$		⊟
k3			34.000		⊟
k_3			263640.000		⊟
k_EO_a_d			$1.5 \cdot 10^{-4}$		⊟
k_EO_d			$3 \cdot 10^{-4}$		⊟
k_EO_m			10.000		⊟
k_EO_t_baw			0.040		⊟
k_EO_t_bmb			0.020		⊟
k_Hn_d			0.033		⊟
k_Hn_p			$1.8 \cdot 10^{10}$		⊟
k_IL_d			0.005		⊟
k_IL_p			16.000		⊟
k_IL_t_awb			0.050		⊟
k_IL_t_bbm			0.001		⊟
k_LTCs_back			1003.709		⊟
k_LTCs_fow			1068016.000		⊟
k_abs_ml			0.012		⊟
k_abs_zf			0.018		⊟
k_acet			0.003		⊟
k_dp			0.067		⊟
k_elim_ml			0.002		⊟
k_elim_zf			0.004		⊟
k_fev_eff			3000000.000		⊟
k_ggt			0.100		⊟
k_gpx_cat			0.488		⊟
k_hedh_1			88.338		⊟
k_hedh_2			1724.404		⊟
k_hedh_3			31.497		⊟
k_hedh_4			8.078		⊟
k_lo			4642.680		⊟
k_lta_syn			54420.000		⊟
k_ltc_ltd_el			0.100		⊟
k_lte_el			0.040		⊟
k_ox			$2.658 \cdot 10^{-4}$		⊟
k_ox2			67.200		⊟
k_red			$2.538 \cdot 10^{-4}$		⊟
k_red2			$4.428 \cdot 10^{-5}$		⊟
ka			500.000		⊟
ki			25000.000		⊟
kia			0.001		⊟
n_FEV			1.000		⊟

Id	Name	SBO	Value	Unit	Constant
naEO_LTCsyn			0.000		⊟
npi			3.140		⊟
oral			1.000		⊟
oxoETE_aw			0.000		⊟
oxoETE_b			0.000		⊟
portion_migr			0.300		⊟
zf_inh			0.000		⊟
ft_zf			0.000		⊟
ft_ml			0.000		⊟
ZF_blood-_conc			0.000		⊟
ZF_airways-_conc			0.000		⊟
ML_blood-_conc			0.000		⊟
ML_airways-_conc			0.000		⊟
w_EO			0.000		⊟
V_CB			0.000		⊟
V_aCB			0.000		⊟
V_LTC_CB			0.000		⊟
V_CAW			0.000		⊟
V_aCAW			0.000		⊟
V_LTC_CAW			0.000		⊟
GSSG_b			0.000		⊟
NADPH_b			0.000		⊟
PLA2_D			0.000		⊟
PLA2_Ca			0.000		⊟
Ki_AA_AA			0.000		⊟
K_AA_HETE			0.000		⊟
Ki_HPETE_AA			0.000		⊟
OOH_b			0.000		⊟
OH_b			0.000		⊟
r1			0.000		⊟
r2			0.000		⊟
REDOX_b			0.000		⊟
RELFLO5_b			0.000		⊟
DFLOa_b			0.000		⊟
FLO3_b			0.000		⊟
FLO2_b			0.000		⊟
FLO3t_b			0.000		⊟
FLO2t_b			0.000		⊟

Id	Name	SBO	Value	Unit	Constant
FLO5HP_b			0.000		⊟
C_b			0.000		⊟
A_b			0.000		⊟
B_b			0.000		⊟
delta_LTCs_b			0.000		⊟
nom_LTCs_b			0.000		⊟
den_LTCs_b			0.000		⊟
C_hedh_b			0.000		⊟
A_hedh_b			0.000		⊟
B_hedh_b			0.000		⊟
GSSG_aw			0.000		⊟
NADPH_aw			0.000		⊟
OOH_aw			0.000		⊟
OH_aw			0.000		⊟
REDOX_aw			0.000		⊟
RELFLO5_aw			0.000		⊟
DFLOa_aw			0.000		⊟
FLO3_aw			0.000		⊟
FLO2_aw			0.000		⊟
FLO3t_aw			0.000		⊟
FLO2t_aw			0.000		⊟
FLO5HP_aw			0.000		⊟
C_aw			0.000		⊟
A_aw			0.000		⊟
B_aw			0.000		⊟
delta_LTCs-_aw			0.000		⊟
nom_LTCs_aw			0.000		⊟
den_LTCs_aw			0.000		⊟
C_hedh_aw			0.000		⊟
A_hedh_aw			0.000		⊟
B_hedh_aw			0.000		⊟
OL_b			0.000		⊟
OL_aw			0.000		⊟
Rec_occup-_migr			0.000		⊟
Ca_FEV			0.000		⊟
r_out_FEV			0.000		⊟
r_in_FEV			0.000		⊟
FEV1			0.000		⊟
TSN			0.000		⊟
TSN_Hn			0.000		⊟

Id	Name	SBO	Value	Unit	Constant
FEV1_percent			0.000		⊟
time_hour			0.000		⊟
time_day			0.000		⊟
N_EO_bm			0.000		⊟
N_EO_b			0.000		⊟
N_EO_i_b			0.000		⊟
N_EO_a_b			0.000		⊟
EO_b_tot			0.000		⊟
N_EO_b_tot			0.000		⊟
N_EO_aw			0.000		⊟
N_EO_i_aw			0.000		⊟
N_EO_a_aw			0.000		⊟
EO_aw_tot			0.000		⊟
N_EO_aw_tot			0.000		⊟
EO_b_tot_per_ss			0.000		⊟
N_EO_aw_tot_perc			0.000		⊟
N_EO_b_tot_perc			0.000		⊟
N_EO			0.000		⊟
N_EO_a			0.000		⊟
LTC4_b_pM			0.000		⊟
LTs_aw_pg			0.000		⊟
LTD4_b_free			0.000		⊟
ML_uM			0.000		⊟
LTD4_aw_pers			0.000		⊟
N_EO_perc			0.000		⊟
Hn_aw_perc			0.000		⊟
N_EO_aw_perc			0.000		⊟
Ca_FEV_LTR1			0.000		⊟
Ca_FEV_LTR2			0.000		⊟
OL_ASM			0.000		⊟

6 Rules

This is an overview of 101 rules.

6.1 Rule ft_zf

Rule ft_zf is an assignment rule for parameter ft_zf:

$$\text{ft\_zf} = \left\lceil \frac{\text{time}}{\text{T}} \right\rceil + \left\lceil \frac{\text{time} - 360.0}{\text{T}} \right\rceil + \left\lceil \frac{\text{time} - 660.0}{\text{T}} \right\rceil + \left\lceil \frac{\text{time} - 960.0}{\text{T}} \right\rceil \tag{1}$$

Derived unit s

6.2 Rule ft_ml

Rule ft_ml is an assignment rule for parameter ft_ml:

$$\text{ft\_ml} = \left\lceil \frac{\text{time}}{\text{T}} \right\rceil \tag{2}$$

Derived unit s

6.3 Rule ZF_blood_conc

Rule ZF_blood_conc is an assignment rule for parameter ZF_blood_conc:

$$\text{ZF\_blood\_conc} = \text{fup\_ZF} \cdot [\text{ZF\_blood}] \tag{3}$$

6.4 Rule ZF_airways_conc

Rule ZF_airways_conc is an assignment rule for parameter ZF_airways_conc:

$$\text{ZF\_airways\_conc} = [\text{ZF\_airways}] \tag{4}$$

Derived unit $\text{mol} \cdot \text{l}^{-1}$

6.5 Rule ML_blood_conc

Rule ML_blood_conc is an assignment rule for parameter ML_blood_conc:

$$\text{ML\_blood\_conc} = \text{fup\_ML} \cdot [\text{ML\_blood}] \tag{5}$$

6.6 Rule ML_airways_conc

Rule ML_airways_conc is an assignment rule for parameter ML_airways_conc:

$$\text{ML\_airways\_conc} = \text{fup\_ML} \cdot [\text{ML\_blood}] \tag{6}$$

6.7 Rule w_EO

Rule w_EO is an assignment rule for parameter w_EO:

$$\text{w\_EO} = \frac{\text{npi} \cdot \text{diam\_EO}^{3.0}}{6.0} \tag{7}$$

6.8 Rule V_CB

Rule V_CB is an assignment rule for parameter V_CB:

$$\text{V\_CB} = ([\text{EO\_a\_b}] + [\text{EO\_b}] + [\text{EO\_i\_b}]) \cdot \text{N\_A\_pmole} \cdot \text{w\_EO} \cdot \text{vol}(\text{V\_B}) \tag{8}$$

6.9 Rule V_aCB

Rule V_aCB is an assignment rule for parameter V_aCB:

$$\text{V\_aCB} = [\text{EO\_a\_b}] \cdot \text{N\_A\_pmole} \cdot \text{w\_EO} \cdot \text{vol}(\text{V\_B}) \tag{9}$$

6.10 Rule V_LTC_CB

Rule V_LTC_CB is an assignment rule for parameter V_LTC_CB:

$$\text{V\_LTC\_CB} = (\text{naEO\_LTCsyn} \cdot ([\text{EO\_b}] + [\text{EO\_i\_b}]) + [\text{EO\_a\_b}]) \cdot \text{N\_A\_pmole} \cdot \text{w\_EO} \cdot \text{vol}(\text{V\_B}) \tag{10}$$

6.11 Rule V_CAW

Rule V_CAW is an assignment rule for parameter V_CAW:

$$\text{V\_CAW} = ([\text{EO\_a\_aw}] + [\text{EO\_aw}] + [\text{EO\_i\_aw}]) \cdot \text{N\_A\_pmole} \cdot \text{w\_EO} \cdot \text{vol}(\text{V\_AW}) \tag{11}$$

6.12 Rule V_aCAW

Rule V_aCAW is an assignment rule for parameter V_aCAW:

$$\text{V\_aCAW} = [\text{EO\_a\_aw}] \cdot \text{N\_A\_pmole} \cdot \text{w\_EO} \cdot \text{vol}(\text{V\_AW}) \tag{12}$$

6.13 Rule V_LTC_CAW

Rule V_LTC_CAW is an assignment rule for parameter V_LTC_CAW:

$$\begin{aligned}\text{V\_LTC\_CAW} = {} & (\text{naEO\_LTCsyn} \cdot ([\text{EO\_aw}] + [\text{EO\_i\_aw}]) + [\text{EO\_a\_aw}]) \\ & \cdot \text{N\_A\_pmole} \cdot \text{w\_EO} \cdot \text{vol}(\text{V\_AW})\end{aligned} \tag{13}$$

6.14 Rule GSSG_b

Rule GSSG_b is an assignment rule for parameter GSSG_b:

$$\text{GSSG\_b} = \frac{\text{GS\_pool\_b} - \text{GSH\_b}}{2.0} \tag{14}$$

6.15 Rule NADPH_b

Rule NADPH_b is an assignment rule for parameter NADPH_b:

$$\text{NADPH\_b} = \text{NP\_pool\_b} - \text{NADP\_b} \tag{15}$$

6.16 Rule PLA2_D

Rule PLA2_D is an assignment rule for parameter PLA2_D:

$$\text{PLA2\_D} = 1.0 + \frac{\text{Ca}}{\text{K\_PLA2\_Ca}} \tag{16}$$

6.17 Rule PLA2_Ca

Rule PLA2_Ca is an assignment rule for parameter PLA2_Ca:

$$\text{PLA2\_Ca} = \frac{\frac{\text{Ca}}{\text{K\_PLA2\_Ca}}}{\text{PLA2\_D}} \tag{17}$$

6.18 Rule Ki_AA_AA

Rule Ki_AA_AA is an assignment rule for parameter Ki_AA_AA:

$$\text{Ki\_AA\_AA} = \text{Ki\_AA} \tag{18}$$

6.19 Rule K_AA_HETE

Rule K_AA_HETE is an assignment rule for parameter K_AA_HETE:

$$\text{K\_AA\_HETE} = \text{Ki\_HETE} \tag{19}$$

6.20 Rule Ki_HPETE_AA

Rule Ki_HPETE_AA is an assignment rule for parameter Ki_HPETE_AA:

$$\text{Ki\_HPETE\_AA} = \text{Ki\_AA} \tag{20}$$

6.21 Rule OOH_b

Rule OOH_b is an assignment rule for parameter OOH_b:

$$\text{OOH\_b} = [\text{HPETE\_b}] + \text{LOOH\_b} \tag{21}$$

6.22 Rule OH_b

Rule OH_b is an assignment rule for parameter OH_b:

$$\text{OH\_b} = [\text{HETE\_b}] + \text{LOH\_b} \tag{22}$$

6.23 Rule r1

Rule r1 is an assignment rule for parameter r1:

$$\text{r1} = \text{k\_ox} + \frac{\text{k\_ox2} \cdot \text{Ca}}{\text{K\_Ca2}} \tag{23}$$

6.24 Rule r2

Rule r2 is an assignment rule for parameter r2:

$$\mathrm{r2} = \mathrm{k\_red} + \frac{\mathrm{k\_red2} \cdot \mathrm{Ca}}{\mathrm{K\_Ca2}} \tag{24}$$

6.25 Rule REDOX_b

Rule REDOX_b is an assignment rule for parameter REDOX_b:

$$\mathrm{REDOX\_b} = \frac{\frac{\mathrm{r2}}{\mathrm{Ke\_red}} + \frac{\mathrm{r1} \cdot \mathrm{OH\_b}}{\mathrm{Ke\_ox}} + \frac{\mathrm{al} \cdot \mathrm{ki} \cdot \mathrm{ZF\_blood\_conc}}{\mathrm{KdZ}} \cdot \left(1.0 + \frac{\mathrm{Ca}}{\mathrm{K\_Ca3}}\right)}{\mathrm{r2} + \mathrm{r1} \cdot \mathrm{OOH\_b}} \tag{25}$$

6.26 Rule RELFLO5_b

Rule RELFLO5_b is an assignment rule for parameter RELFLO5_b:

$$\mathrm{RELFLO5\_b} = \frac{\frac{\mathrm{k\_lo} \cdot [\mathrm{AA\_b}]}{\mathrm{K\_AA}} + \mathrm{k3} \cdot [\mathrm{HPETE\_b}] \cdot \left(1.0 + \frac{[\mathrm{AA\_b}]}{\mathrm{Ki\_AA}}\right)}{\mathrm{k\_lta\_syn} + \mathrm{k\_3} \cdot \left(1.0 + \frac{[\mathrm{AA\_b}]}{\mathrm{Ki\_HPETE\_AA}}\right)} \tag{26}$$

6.27 Rule DFLOa_b

Rule DFLOa_b is an assignment rule for parameter DFLOa_b:

$$\begin{aligned}\mathrm{DFLOa\_b} = \left(1.0 + \frac{\mathrm{Ca}}{\mathrm{K\_Ca3}}\right) \cdot \Bigg(1.0 + \frac{\mathrm{REDOX\_b} \cdot \left(1.0 + \frac{\mathrm{Ca}}{\mathrm{K\_Ca2}}\right)}{1.0 + \frac{\mathrm{Ca}}{\mathrm{K\_Ca3}}} + \frac{[\mathrm{AA\_b}]}{\mathrm{K\_AA}} \\ \cdot \left(1.0 + \frac{[\mathrm{AA\_b}]}{\mathrm{Ki\_AA\_AA}}\right) + \frac{[\mathrm{AA\_b}]}{\mathrm{Ki\_AA}} \cdot \left(1.0 + \frac{[\mathrm{HETE\_b}]}{\mathrm{K\_AA\_HETE}}\right) + \mathrm{RELFLO5\_b} \\ \cdot \left(1.0 + \frac{[\mathrm{AA\_b}]}{\mathrm{Ki\_HPETE\_AA}}\right) + \frac{[\mathrm{HETE\_b}]}{\mathrm{Ki\_HETE}} + \frac{\mathrm{al} \cdot \mathrm{ZF\_blood\_conc}}{\mathrm{KdZ}}\Bigg)\end{aligned} \tag{27}$$

6.28 Rule FLO3_b

Rule FLO3_b is an assignment rule for parameter FLO3_b:

$$\mathrm{FLO3\_b} = \frac{\mathrm{FLOa}}{\mathrm{DFLOa\_b}} \tag{28}$$

6.29 Rule FLO2_b

Rule FLO2_b is an assignment rule for parameter FLO2_b:

$$\mathrm{FLO2\_b} = \mathrm{FLO3\_b} \cdot \mathrm{REDOX\_b} \tag{29}$$

6.30 Rule FLO3t_b

Rule FLO3t_b is an assignment rule for parameter FLO3t_b:

$$\text{FLO3t\_b} = \text{FLO3\_b} \cdot \left(1.0 + \frac{\text{Ca}}{\text{K\_Ca3}}\right) \tag{30}$$

6.31 Rule FLO2t_b

Rule FLO2t_b is an assignment rule for parameter FLO2t_b:

$$\text{FLO2t\_b} = \text{FLO2\_b} \cdot \left(1.0 + \frac{\text{Ca}}{\text{K\_Ca2}}\right) \tag{31}$$

6.32 Rule FLO5HP_b

Rule FLO5HP_b is an assignment rule for parameter FLO5HP_b:

$$\text{FLO5HP\_b} = \text{FLO3t\_b} \cdot \text{RELFLO5\_b} \tag{32}$$

6.33 Rule C_b

Rule C_b is an assignment rule for parameter C_b:

$$\text{C\_b} = \frac{[\text{HPETE\_b}] \cdot \text{GSH\_b} \cdot \text{GSH\_b}}{\text{Km\_gpx\_HPETE5} \cdot \text{Km\_gpx\_GSH} \cdot \text{Km\_gpx\_GSH}} \tag{33}$$

6.34 Rule A_b

Rule A_b is an assignment rule for parameter A_b:

$$\begin{aligned}\text{A\_b} = {} & \frac{\text{GSH\_b} \cdot \text{GSH\_b}}{\text{Km\_gpx\_GSH} \cdot \text{Km\_gpx\_GSH}} \cdot \left(1.0 + \frac{\text{GSSG\_b}}{\text{Kd\_gpx\_GSSG}}\right) \\ & + \frac{[\text{HPETE\_b}]}{\text{Km\_gpx\_HPETE5}} \cdot \left(1.0 + \frac{[\text{HETE\_b}]}{\text{Kd\_gpx\_HETE5}}\right) + \text{C\_b}\end{aligned} \tag{34}$$

6.35 Rule B_b

Rule B_b is an assignment rule for parameter B_b:

$$\text{B\_b} = \frac{\text{k\_gpx\_cat} \cdot [\text{HPETE\_b}] \cdot \text{GSH\_b} \cdot \text{GSH\_b}}{\text{Km\_gpx\_HPETE5} \cdot \text{Km\_gpx\_GSH} \cdot \text{Km\_gpx\_GSH}} \tag{35}$$

6.36 Rule delta_LTCs_b

Rule delta_LTCs_b is an assignment rule for parameter delta_LTCs_b:

$$\text{delta\_LTCs\_b} = 1.0 + \frac{[\text{LTA4\_b}]}{\text{K\_LTA}} + \frac{\text{GSH\_b}}{\text{K\_GSH}} + \frac{\frac{[\text{LTA4\_b}] \cdot \text{GSH\_b}}{\text{K\_LTA}}}{\text{K\_LTA\_GSH}} + \frac{[\text{LTC4\_b}]}{\text{K\_LTC}} \tag{36}$$

6.37 Rule nom_LTCs_b

Rule nom_LTCs_b is an assignment rule for parameter nom_LTCs_b:

$$\begin{aligned}\text{nom\_LTCs\_b} = \text{Et\_LTCs} \cdot (\text{K\_LTC} \cdot \text{k\_LTCs\_fow} \cdot [\text{LTA4\_b}] \cdot \text{GSH\_b} - \text{k\_LTCs\_back} \\ \cdot \text{K\_LTA\_GSH} \cdot \text{K\_GSH} \cdot [\text{LTC4\_b}])\end{aligned} \tag{37}$$

6.38 Rule den_LTCs_b

Rule den_LTCs_b is an assignment rule for parameter den_LTCs_b:

$$\text{den\_LTCs\_b} = \text{delta\_LTCs\_b} \cdot \text{K\_LTA\_GSH} \cdot \text{K\_GSH} \cdot \text{K\_LTC} \tag{38}$$

6.39 Rule C_hedh_b

Rule C_hedh_b is an assignment rule for parameter C_hedh_b:

$$\begin{aligned}\text{C\_hedh\_b} = \left(1.0 + \frac{[\text{HETE\_b}]}{\text{Kd\_hedh\_HETE5}} + \frac{\text{NADPH\_b}}{\text{Kd\_hedh\_NADPH}}\right) \\ \cdot \left(\frac{\text{k\_hedh\_3} \cdot \text{oxoETE\_b}}{\text{Kd\_hedh\_oxoETE5}} + \frac{\text{k\_hedh\_2} \cdot \text{NADP\_b}}{\text{Kd\_hedh\_NADP}}\right)\end{aligned} \tag{39}$$

6.40 Rule A_hedh_b

Rule A_hedh_b is an assignment rule for parameter A_hedh_b:

$$\begin{aligned}\text{A\_hedh\_b} = \left(1.0 + \frac{\text{NADP\_b}}{\text{Kd\_hedh\_NADP}} + \frac{\text{oxoETE\_b}}{\text{Kd\_hedh\_oxoETE5}}\right) \\ \cdot \left(\frac{\text{k\_hedh\_1} \cdot [\text{HETE\_b}]}{\text{Kd\_hedh\_HETE5}} + \frac{\text{k\_hedh\_4} \cdot \text{NADPH\_b}}{\text{Kd\_hedh\_NADPH}}\right) + \text{C\_hedh\_b}\end{aligned} \tag{40}$$

6.41 Rule B_hedh_b

Rule B_hedh_b is an assignment rule for parameter B_hedh_b:

$$\begin{aligned}\text{B\_hedh\_b} = \frac{\text{k\_hedh\_1} \cdot \text{k\_hedh\_2} \cdot [\text{HETE\_b}] \cdot \text{NADP\_b}}{\text{Kd\_hedh\_HETE5} \cdot \text{Kd\_hedh\_NADP}} \\ - \frac{\text{oxoETE\_b} \cdot \text{NADPH\_b} \cdot \text{k\_hedh\_3} \cdot \text{k\_hedh\_4}}{\text{Kd\_hedh\_oxoETE5} \cdot \text{Kd\_hedh\_NADPH}}\end{aligned} \tag{41}$$

6.42 Rule GSSG_aw

Rule GSSG_aw is an assignment rule for parameter GSSG_aw:

$$\text{GSSG\_aw} = \frac{\text{GS\_pool\_aw} - \text{GSH\_aw}}{2.0} \tag{42}$$

6.43 Rule NADPH_aw

Rule NADPH_aw is an assignment rule for parameter NADPH_aw:

$$\text{NADPH\_aw} = \text{NP\_pool\_aw} - \text{NADP\_aw} \tag{43}$$

6.44 Rule OOH_aw

Rule OOH_aw is an assignment rule for parameter OOH_aw:

$$\text{OOH\_aw} = [\text{HPETE\_aw}] + \text{LOOH\_aw} \tag{44}$$

6.45 Rule OH_aw

Rule OH_aw is an assignment rule for parameter OH_aw:

$$\text{OH\_aw} = [\text{HETE\_aw}] + \text{LOH\_aw} \tag{45}$$

6.46 Rule REDOX_aw

Rule REDOX_aw is an assignment rule for parameter REDOX_aw:

$$\text{REDOX\_aw} = \frac{\frac{\text{r2}}{\text{Ke\_red}} + \frac{\text{r1}\cdot\text{OH\_aw}}{\text{Ke\_ox}} + \frac{\text{al}\cdot\text{ki}\cdot\text{ZF\_airways\_conc}}{\text{KdZ}} \cdot \left(1.0 + \frac{\text{Ca}}{\text{K\_Ca3}}\right)}{\text{r2} + \text{r1} \cdot \text{OOH\_aw}} \tag{46}$$

6.47 Rule RELFLO5_aw

Rule RELFLO5_aw is an assignment rule for parameter RELFLO5_aw:

$$\text{RELFLO5\_aw} = \frac{\frac{\text{k\_lo}\cdot[\text{AA\_aw}]}{\text{K\_AA}} + \text{k3} \cdot [\text{HPETE\_aw}] \cdot \left(1.0 + \frac{[\text{AA\_aw}]}{\text{Ki\_AA}}\right)}{\text{k\_lta\_syn} + \text{k\_3} \cdot \left(1.0 + \frac{[\text{AA\_aw}]}{\text{Ki\_HPETE\_AA}}\right)} \tag{47}$$

6.48 Rule DFLOa_aw

Rule DFLOa_aw is an assignment rule for parameter DFLOa_aw:

$$\begin{aligned}\text{DFLOa\_aw} = \left(1.0 + \frac{\text{Ca}}{\text{K\_Ca3}}\right) \cdot \Bigg(1.0 + \frac{\text{REDOX\_aw} \cdot \left(1.0 + \frac{\text{Ca}}{\text{K\_Ca2}}\right)}{1.0 + \frac{\text{Ca}}{\text{K\_Ca3}}} + \frac{[\text{AA\_aw}]}{\text{K\_AA}} \\ \cdot \left(1.0 + \frac{[\text{AA\_aw}]}{\text{Ki\_AA\_AA}}\right) + \frac{[\text{AA\_aw}]}{\text{Ki\_AA}} \cdot \left(1.0 + \frac{[\text{HETE\_aw}]}{\text{K\_AA\_HETE}}\right) + \text{RELFLO5\_aw} \\ \cdot \left(1.0 + \frac{[\text{AA\_aw}]}{\text{Ki\_HPETE\_AA}}\right) + \frac{[\text{HETE\_aw}]}{\text{Ki\_HETE}} + \frac{\text{al} \cdot \text{ZF\_airways\_conc}}{\text{KdZ}}\Bigg)\end{aligned} \tag{48}$$

6.49 Rule FLO3_aw

Rule FLO3_aw is an assignment rule for parameter FLO3_aw:

$$\text{FLO3\_aw} = \frac{\text{FLOa}}{\text{DFLOa\_aw}} \tag{49}$$

6.50 Rule FLO2_aw

Rule FLO2_aw is an assignment rule for parameter FLO2_aw:

$$\text{FLO2\_aw} = \text{FLO3\_aw} \cdot \text{REDOX\_aw} \tag{50}$$

6.51 Rule FLO3t_aw

Rule FLO3t_aw is an assignment rule for parameter FLO3t_aw:

$$\text{FLO3t\_aw} = \text{FLO3\_aw} \cdot \left(1.0 + \frac{\text{Ca}}{\text{K\_Ca3}}\right) \tag{51}$$

6.52 Rule FLO2t_aw

Rule FLO2t_aw is an assignment rule for parameter FLO2t_aw:

$$\text{FLO2t\_aw} = \text{FLO2\_aw} \cdot \left(1.0 + \frac{\text{Ca}}{\text{K\_Ca2}}\right) \tag{52}$$

6.53 Rule FLO5HP_aw

Rule FLO5HP_aw is an assignment rule for parameter FLO5HP_aw:

$$\text{FLO5HP\_aw} = \text{FLO3t\_aw} \cdot \text{RELFLO5\_aw} \tag{53}$$

6.54 Rule C_aw

Rule C_aw is an assignment rule for parameter C_aw:

$$\text{C\_aw} = \frac{[\text{HPETE\_aw}] \cdot \text{GSH\_aw} \cdot \text{GSH\_aw}}{\text{Km\_gpx\_HPETE5} \cdot \text{Km\_gpx\_GSH} \cdot \text{Km\_gpx\_GSH}} \tag{54}$$

6.55 Rule A_aw

Rule A_aw is an assignment rule for parameter A_aw:

$$\begin{aligned}\text{A\_aw} = {} & \frac{\text{GSH\_aw} \cdot \text{GSH\_aw}}{\text{Km\_gpx\_GSH} \cdot \text{Km\_gpx\_GSH}} \cdot \left(1.0 + \frac{\text{GSSG\_aw}}{\text{Kd\_gpx\_GSSG}}\right) \\ & + \frac{[\text{HPETE\_aw}]}{\text{Km\_gpx\_HPETE5}} \cdot \left(1.0 + \frac{[\text{HETE\_aw}]}{\text{Kd\_gpx\_HETE5}}\right) + \text{C\_aw}\end{aligned} \tag{55}$$

6.56 Rule B_aw

Rule B_aw is an assignment rule for parameter B_aw:

$$\mathrm{B\_aw} = \frac{\mathrm{k\_gpx\_cat} \cdot [\mathrm{HPETE\_aw}] \cdot \mathrm{GSH\_aw} \cdot \mathrm{GSH\_aw}}{\mathrm{Km\_gpx\_HPETE5} \cdot \mathrm{Km\_gpx\_GSH} \cdot \mathrm{Km\_gpx\_GSH}} \tag{56}$$

6.57 Rule delta_LTCs_aw

Rule delta_LTCs_aw is an assignment rule for parameter delta_LTCs_aw:

$$\mathrm{delta\_LTCs\_aw} = 1.0 + \frac{[\mathrm{LTA4\_aw}]}{\mathrm{K\_LTA}} + \frac{\mathrm{GSH\_aw}}{\mathrm{K\_GSH}} + \frac{\frac{[\mathrm{LTA4\_aw}] \cdot \mathrm{GSH\_aw}}{\mathrm{K\_LTA}}}{\mathrm{K\_LTA\_GSH}} + \frac{[\mathrm{LTC4\_aw}]}{\mathrm{K\_LTC}} \tag{57}$$

6.58 Rule nom_LTCs_aw

Rule nom_LTCs_aw is an assignment rule for parameter nom_LTCs_aw:

$$\begin{aligned} \mathrm{nom\_LTCs\_aw} = \mathrm{Et\_LTCs} \cdot (&\mathrm{K\_LTC} \cdot \mathrm{k\_LTCs\_fow} \cdot [\mathrm{LTA4\_aw}] \cdot \mathrm{GSH\_aw} \\ &- \mathrm{k\_LTCs\_back} \cdot \mathrm{K\_LTA\_GSH} \cdot \mathrm{K\_GSH} \cdot [\mathrm{LTC4\_aw}]) \end{aligned} \tag{58}$$

6.59 Rule den_LTCs_aw

Rule den_LTCs_aw is an assignment rule for parameter den_LTCs_aw:

$$\mathrm{den\_LTCs\_aw} = \mathrm{delta\_LTCs\_aw} \cdot \mathrm{K\_LTA\_GSH} \cdot \mathrm{K\_GSH} \cdot \mathrm{K\_LTC} \tag{59}$$

6.60 Rule C_hedh_aw

Rule C_hedh_aw is an assignment rule for parameter C_hedh_aw:

$$\begin{aligned} \mathrm{C\_hedh\_aw} = &\left(1.0 + \frac{[\mathrm{HETE\_aw}]}{\mathrm{Kd\_hedh\_HETE5}} + \frac{\mathrm{NADPH\_aw}}{\mathrm{Kd\_hedh\_NADPH}}\right) \\ &\cdot \left(\frac{\mathrm{k\_hedh\_3} \cdot \mathrm{oxoETE\_aw}}{\mathrm{Kd\_hedh\_oxoETE5}} + \frac{\mathrm{k\_hedh\_2} \cdot \mathrm{NADP\_aw}}{\mathrm{Kd\_hedh\_NADP}}\right) \end{aligned} \tag{60}$$

6.61 Rule A_hedh_aw

Rule A_hedh_aw is an assignment rule for parameter A_hedh_aw:

$$\begin{aligned} \mathrm{A\_hedh\_aw} = &\left(1.0 + \frac{\mathrm{NADP\_aw}}{\mathrm{Kd\_hedh\_NADP}} + \frac{\mathrm{oxoETE\_aw}}{\mathrm{Kd\_hedh\_oxoETE5}}\right) \\ &\cdot \left(\frac{\mathrm{k\_hedh\_1} \cdot [\mathrm{HETE\_aw}]}{\mathrm{Kd\_hedh\_HETE5}} + \frac{\mathrm{k\_hedh\_4} \cdot \mathrm{NADPH\_aw}}{\mathrm{Kd\_hedh\_NADPH}}\right) + \mathrm{C\_hedh\_aw} \end{aligned} \tag{61}$$

6.62 Rule B_hedh_aw

Rule B_hedh_aw is an assignment rule for parameter B_hedh_aw:

$$\begin{aligned}\text{B\_hedh\_aw} = &\frac{\text{k\_hedh\_1} \cdot \text{k\_hedh\_2} \cdot [\text{HETE\_aw}] \cdot \text{NADP\_aw}}{\text{Kd\_hedh\_HETE5} \cdot \text{Kd\_hedh\_NADP}} \\ &- \frac{\text{oxoETE\_aw} \cdot \text{NADPH\_aw} \cdot \text{k\_hedh\_3} \cdot \text{k\_hedh\_4}}{\text{Kd\_hedh\_oxoETE5} \cdot \text{Kd\_hedh\_NADPH}}\end{aligned} \tag{62}$$

6.63 Rule OL_b

Rule OL_b is an assignment rule for parameter OL_b:

$$\begin{aligned}&\text{OL\_b} \\ &= \frac{\text{R1\_portion\_EOa} \cdot \frac{\text{fup\_LT} \cdot [\text{LTD4\_b}]}{\text{Kd\_LT}}}{1.0 + \frac{\text{fup\_LT} \cdot [\text{LTD4\_b}]}{\text{Kd\_LT}} + \frac{\text{ML\_blood\_conc}}{\text{Ki\_ML\_EOa}}} + \frac{(1.0 - \text{R1\_portion\_EOa}) \cdot \frac{\text{fup\_LT} \cdot ([\text{LTC4\_b\_out}] + [\text{LTD4\_b}])}{\text{Kd\_LT\_2}}}{1.0 + \frac{\text{fup\_LT} \cdot ([\text{LTC4\_b\_out}] + [\text{LTD4\_b}])}{\text{Kd\_LT\_2}}}\end{aligned} \tag{63}$$

6.64 Rule OL_aw

Rule OL_aw is an assignment rule for parameter OL_aw:

$$\text{OL\_aw} = \frac{\text{R1\_portion\_EOa} \cdot \frac{[\text{LTD4\_aw}]}{\text{Kd\_LT}}}{1.0 + \frac{[\text{LTD4\_aw}]}{\text{Kd\_LT}} + \frac{\text{ML\_airways\_conc}}{\text{Ki\_ML\_EOa}}} + \frac{(1.0 - \text{R1\_portion\_EOa}) \cdot \frac{[\text{LTC4\_aw\_out}] + [\text{LTD4\_aw}]}{\text{Kd\_LT\_2}}}{1.0 + \frac{[\text{LTC4\_aw\_out}] + [\text{LTD4\_aw}]}{\text{Kd\_LT\_2}}} \tag{64}$$

6.65 Rule Rec_occup_migr

Rule Rec_occup_migr is an assignment rule for parameter Rec_occup_migr:

$$\text{Rec\_occup\_migr} = \frac{\text{portion\_migr} \cdot \text{fup\_LT} \cdot [\text{LTE4\_b}]}{\text{Kd\_LTE\_migr} + \text{fup\_LT} \cdot [\text{LTE4\_b}]} + \frac{(1.0 - \text{portion\_migr}) \cdot [\text{IL\_b}]}{\text{Kd\_IL\_migr} + [\text{IL\_b}]} \tag{65}$$

6.66 Rule Ca_FEV

Rule Ca_FEV is an assignment rule for parameter Ca_FEV:

$$\begin{aligned}\text{Ca\_FEV} = &\text{Cao\_FEV} + \text{k\_fev\_eff} \\ &\cdot \left(\frac{\text{R1\_portion\_FEV} \cdot \frac{[\text{LTD4\_aw}]}{\text{Kd\_LTR1\_FEV}}}{1.0 + \frac{[\text{LTD4\_aw}]}{\text{Kd\_LTR1\_FEV}} + \frac{\text{ML\_airways\_conc}}{\text{EC50\_ML\_FEV}}} + \frac{\text{R2\_portion\_FEV} \cdot \frac{[\text{LTD4\_aw}] + [\text{LTC4\_aw\_out}]}{\text{Kd\_LTR2\_FEV}}}{1.0 + \frac{[\text{LTD4\_aw}] + [\text{LTC4\_aw\_out}]}{\text{Kd\_LTR2\_FEV}}} \right. \\ &\left. + \frac{(1.0 - \text{R1\_portion\_FEV} - \text{R2\_portion\_FEV}) \cdot \frac{[\text{Hn\_aw}]}{\text{Kd\_Hn\_FEV}}}{1.0 + \frac{[\text{Hn\_aw}]}{\text{Kd\_Hn\_FEV}}} \right)\end{aligned} \tag{66}$$

6.67 Rule r_out_FEV

Rule r_out_FEV is an assignment rule for parameter r_out_FEV:

$$\begin{aligned}&\text{r\_out\_FEV}\\&= \text{R\_FEV} - \frac{\left(\text{R\_FEV} - \left(\text{R\_FEV} \cdot (\text{R\_FEV} - \text{R\_in\_relax\_FEV})^{2.0}\right)^{\frac{1.0}{3.0}}\right) \cdot \text{Ca\_FEV}^{\text{n\_FEV}}}{\text{K\_Ca\_FEV}^{\text{n\_FEV}} + \text{Ca\_FEV}^{\text{n\_FEV}}}\end{aligned} \tag{67}$$

6.68 Rule r_in_FEV

Rule r_in_FEV is an assignment rule for parameter r_in_FEV:

$$\text{r\_in\_FEV} = \text{r\_out\_FEV} - (\text{R\_FEV} - \text{R\_in\_relax\_FEV}) \cdot \left(\frac{\text{R\_FEV}}{\text{r\_out\_FEV}}\right)^{0.5} \tag{68}$$

6.69 Rule FEV1

Rule FEV1 is an assignment rule for parameter FEV1:

$$\text{FEV1} = \text{MAX\_FEV} \cdot \left(\frac{\text{r\_in\_FEV}}{\text{R\_in\_relax\_FEV}}\right)^{2.0} \tag{69}$$

6.70 Rule TSN

Rule TSN is an assignment rule for parameter TSN:

$$\text{TSN} = \frac{\text{TSN\_0} \cdot \left(\text{R\_FEV} - \left(\text{R\_FEV} \cdot (\text{R\_FEV} - \text{R\_in\_relax\_FEV})^{2.0}\right)^{\frac{1.0}{3.0}}\right) \cdot \text{Ca\_FEV\_ex}^{\text{n\_FEV}}}{\text{K\_Ca\_FEV}^{\text{n\_FEV}} + \text{Ca\_FEV\_ex}^{\text{n\_FEV}}} \tag{70}$$

6.71 Rule TSN_Hn

Rule TSN_Hn is an assignment rule for parameter TSN_Hn:

$$\text{TSN\_Hn} = \frac{\text{TSN\_0} \cdot \left(\text{R\_FEV} - \left(\text{R\_FEV} \cdot (\text{R\_FEV} - \text{R\_in\_relax\_FEV})^{2.0}\right)^{\frac{1.0}{3.0}}\right) \cdot \text{Ca\_FEV}^{\text{n\_FEV}}}{\text{K\_Ca\_FEV}^{\text{n\_FEV}} + \text{Ca\_FEV}^{\text{n\_FEV}}} \tag{71}$$

6.72 Rule FEV1_percent

Rule FEV1_percent is an assignment rule for parameter FEV1_percent:

$$\text{FEV1\_percent} = \frac{\text{FEV1} - 3.528}{3.528} \cdot 100.0 \tag{72}$$

6.73 Rule time_hour

Rule time_hour is an assignment rule for parameter time_hour:

$$\text{time\_hour} = \frac{\text{time}}{60.0} \tag{73}$$

6.74 Rule time_day

Rule time_day is an assignment rule for parameter time_day:

$$\text{time\_day} = \frac{\text{time}}{1440.0} \tag{74}$$

6.75 Rule N_EO_bm

Rule N_EO_bm is an assignment rule for parameter N_EO_bm:

$$\text{N\_EO\_bm} = [\text{EO\_bm}] \cdot 6.02 \cdot 10.0^{8.0} \tag{75}$$

6.76 Rule N_EO_b

Rule N_EO_b is an assignment rule for parameter N_EO_b:

$$\text{N\_EO\_b} = [\text{EO\_b}] \cdot 6.02 \cdot 10.0^{8.0} \tag{76}$$

6.77 Rule N_EO_i_b

Rule N_EO_i_b is an assignment rule for parameter N_EO_i_b:

$$\text{N\_EO\_i\_b} = [\text{EO\_i\_b}] \cdot 6.02 \cdot 10.0^{8.0} \tag{77}$$

6.78 Rule N_EO_a_b

Rule N_EO_a_b is an assignment rule for parameter N_EO_a_b:

$$\text{N\_EO\_a\_b} = [\text{EO\_a\_b}] \cdot 6.02 \cdot 10.0^{8.0} \tag{78}$$

6.79 Rule EO_b_tot

Rule EO_b_tot is an assignment rule for parameter EO_b_tot:

$$\text{EO\_b\_tot} = [\text{EO\_b}] + [\text{EO\_i\_b}] + [\text{EO\_a\_b}] \tag{79}$$

Derived unit $\text{mol} \cdot \text{l}^{-1}$

6.80 Rule N_EO_b_tot

Rule N_EO_b_tot is an assignment rule for parameter N_EO_b_tot:

$$\text{N\_EO\_b\_tot} = ([\text{EO\_b}] + [\text{EO\_i\_b}] + [\text{EO\_a\_b}]) \cdot 6.02 \cdot 10.0^{8.0} \tag{80}$$

6.81 Rule N_EO_aw

Rule N_EO_aw is an assignment rule for parameter N_EO_aw:

$$\text{N\_EO\_aw} = [\text{EO\_aw}] \cdot 6.02 \cdot 10.0^{8.0} \tag{81}$$

6.82 Rule N_EO_i_aw

Rule N_EO_i_aw is an assignment rule for parameter N_EO_i_aw:

$$\text{N\_EO\_i\_aw} = [\text{EO\_i\_aw}] \cdot 6.02 \cdot 10.0^{8.0} \tag{82}$$

6.83 Rule N_EO_a_aw

Rule N_EO_a_aw is an assignment rule for parameter N_EO_a_aw:

$$\text{N\_EO\_a\_aw} = [\text{EO\_a\_aw}] \cdot 6.02 \cdot 10.0^{8.0} \tag{83}$$

6.84 Rule EO_aw_tot

Rule EO_aw_tot is an assignment rule for parameter EO_aw_tot:

$$\text{EO\_aw\_tot} = [\text{EO\_aw}] + [\text{EO\_i\_aw}] + [\text{EO\_a\_aw}] \tag{84}$$

Derived unit $\text{mol} \cdot \text{l}^{-1}$

6.85 Rule N_EO_aw_tot

Rule N_EO_aw_tot is an assignment rule for parameter N_EO_aw_tot:

$$\text{N\_EO\_aw\_tot} = ([\text{EO\_aw}] + [\text{EO\_i\_aw}] + [\text{EO\_a\_aw}]) \cdot 6.02 \cdot 10.0^{8.0} \tag{85}$$

6.86 Rule EO_b_tot_per_ss

Rule EO_b_tot_per_ss is an assignment rule for parameter EO_b_tot_per_ss:

$$\text{EO\_b\_tot\_per\_ss} = \frac{100.0 \cdot (\text{EO\_b\_tot} - 5.33E - 4)}{5.33E - 4} \tag{86}$$

6.87 Rule N_EO_aw_tot_perc

Rule N_EO_aw_tot_perc is an assignment rule for parameter N_EO_aw_tot_perc:

$$\text{N\_EO\_aw\_tot\_perc} = \frac{\text{N\_EO\_aw\_tot}}{818735.0} \cdot 100.0 \tag{87}$$

6.88 Rule N_EO_b_tot_perc

Rule N_EO_b_tot_perc is an assignment rule for parameter N_EO_b_tot_perc:

$$\text{N\_EO\_b\_tot\_perc} = \frac{\text{N\_EO\_b\_tot}}{4266021.0} \cdot 100.0 \tag{88}$$

6.89 Rule N_EO

Rule N_EO is an assignment rule for parameter N_EO:

$$\text{N\_EO} = \frac{\text{N\_EO\_b\_tot} \cdot \text{vol}\left(\text{V\_B}\right) + \text{N\_EO\_aw\_tot} \cdot \text{vol}\left(\text{V\_AW}\right)}{\text{vol}\left(\text{V\_B}\right) + \text{vol}\left(\text{V\_AW}\right)} \tag{89}$$

6.90 Rule N_EO_a

Rule N_EO_a is an assignment rule for parameter N_EO_a:

$$\text{N\_EO\_a} = \frac{\text{N\_EO\_a\_b} \cdot \text{vol}\left(\text{V\_B}\right) + \text{N\_EO\_a\_aw} \cdot \text{vol}\left(\text{V\_AW}\right)}{\text{vol}\left(\text{V\_B}\right) + \text{vol}\left(\text{V\_AW}\right)} \tag{90}$$

6.91 Rule LTC4_b_pM

Rule LTC4_b_pM is an assignment rule for parameter LTC4_b_pM:

$$\text{LTC4\_b\_pM} = [\text{LTC4\_b}] \cdot 1000000.0 \tag{91}$$

6.92 Rule LTs_aw_pg

Rule LTs_aw_pg is an assignment rule for parameter LTs_aw_pg:

$$\text{LTs\_aw\_pg} = \frac{\frac{[\text{LTC4\_aw\_out}]}{\text{fup\_LT}} \cdot \text{M\_LTC} + \frac{[\text{LTD4\_aw}]}{\text{fup\_LT}} \cdot \text{M\_LTD} + \frac{[\text{LTE4\_aw}]}{\text{fup\_LT}} \cdot \text{M\_LTE}}{1000.0} \tag{92}$$

6.93 Rule LTD4_b_free

Rule LTD4_b_free is an assignment rule for parameter LTD4_b_free:

$$\text{LTD4\_b\_free} = [\text{LTD4\_b}] \cdot \text{fup\_LT} \tag{93}$$

6.94 Rule ML_uM

Rule ML_uM is an assignment rule for parameter ML_uM:

$$\text{ML\_uM} = \frac{[\text{ML\_blood}]}{1000000.0} \tag{94}$$

6.95 Rule LTD4_aw_pers

Rule LTD4_aw_pers is an assignment rule for parameter LTD4_aw_pers:

$$\text{LTD4\_aw\_pers} = \frac{100.0 \cdot [\text{LTD4\_aw}]}{205.76} \tag{95}$$

6.96 Rule N_EO_perc

Rule N_EO_perc is an assignment rule for parameter N_EO_perc:

$$\text{N\_EO\_perc} = \frac{100.0 \cdot \text{N\_EO}}{358758.0} \tag{96}$$

6.97 Rule Hn_aw_perc

Rule Hn_aw_perc is an assignment rule for parameter Hn_aw_perc:

$$\text{Hn\_aw\_perc} = \frac{100.0 \cdot [\text{Hn\_aw}]}{14161.999999999998} \tag{97}$$

6.98 Rule N_EO_aw_perc

Rule N_EO_aw_perc is an assignment rule for parameter N_EO_aw_perc:

$$\text{N\_EO\_aw\_perc} = \frac{100.0 \cdot \text{N\_EO\_aw\_tot}}{818735.0} \tag{98}$$

6.99 Rule Ca_FEV_LTR1

Rule Ca_FEV_LTR1 is an assignment rule for parameter Ca_FEV_LTR1:

$$\text{Ca\_FEV\_LTR1} = \frac{\text{k\_fev\_eff} \cdot \frac{\text{R1\_portion\_FEV} \cdot \frac{[\text{LTD4\_aw}]}{\text{Kd\_LTR1\_FEV}}}{1.0 + \frac{[\text{LTD4\_aw}]}{\text{Kd\_LTR1\_FEV}} + \frac{\text{ML\_airways\_conc}}{\text{EC50\_ML\_FEV}}}}{\text{Ca\_FEV} - \text{Cao\_FEV}} \tag{99}$$

6.100 Rule Ca_FEV_LTR2

Rule Ca_FEV_LTR2 is an assignment rule for parameter Ca_FEV_LTR2:

$$\begin{aligned}&\text{Ca\_FEV\_LTR2}\\ &= \frac{\text{k\_fev\_eff} \cdot \left(\frac{\text{R2\_portion\_FEV} \cdot \frac{[\text{LTD4\_aw}] + [\text{LTC4\_aw\_out}]}{\text{Kd\_LTR2\_FEV}}}{1.0 + \frac{[\text{LTD4\_aw}] + [\text{LTC4\_aw\_out}]}{\text{Kd\_LTR2\_FEV}}} + \frac{(1.0 - \text{R1\_portion\_FEV} - \text{R2\_portion\_FEV}) \cdot \frac{[\text{Hn\_aw}]}{\text{Kd\_Hn\_FEV}}}{1.0 + \frac{[\text{Hn\_aw}]}{\text{Kd\_Hn\_FEV}}} \right)}{\text{Ca\_FEV} - \text{Cao\_FEV}}\end{aligned} \tag{100}$$

6.101 Rule OL_ASM

Rule OL_ASM is an assignment rule for parameter OL_ASM:

$$\mathrm{OL\_ASM} = \frac{\mathrm{R1\_portion\_FEV} \cdot \frac{[\mathrm{LTD4\_aw}]}{\mathrm{Kd\_LTR1\_FEV}}}{1.0 + \frac{[\mathrm{LTD4\_aw}]}{\mathrm{Kd\_LTR1\_FEV}} + \frac{\mathrm{ML\_airways\_conc}}{\mathrm{EC50\_ML\_FEV}}} + \frac{\mathrm{R2\_portion\_FEV} \cdot \frac{[\mathrm{LTD4\_aw}]+[\mathrm{LTC4\_aw\_out}]}{\mathrm{Kd\_LTR2\_FEV}}}{1.0 + \frac{[\mathrm{LTD4\_aw}]+[\mathrm{LTC4\_aw\_out}]}{\mathrm{Kd\_LTR2\_FEV}}} + \frac{(1.0 - \mathrm{R1\_portion\_FEV} - \mathrm{R2\_portion\_FEV}) \cdot \frac{[\mathrm{Hn\_aw}]}{\mathrm{Kd\_Hn\_FEV}}}{1.0 + \frac{[\mathrm{Hn\_aw}]}{\mathrm{Kd\_Hn\_FEV}}} \tag{101}$$

7 Reactions

This model contains 66 reactions. All reactions are listed in the following table and are subsequently described in detail. If a reaction is affected by a modifier, the identifier of this species is written above the reaction arrow.

Table 5: Overview of all reactions

№	Id	Name	Reaction Equation	SBO
1	v1	v1	$\emptyset \xrightarrow{\text{AA\_b}} \text{AA\_b}$	
2	v2	v2	$\text{AA\_b} \xrightarrow{\text{AA\_b}} \emptyset$	
3	v3	v3	$\emptyset \xrightarrow{\text{AA\_b, HPETE\_b, AA\_b}} \text{HPETE\_b}$	
4	v4	v4	$\text{HPETE\_b} \xrightarrow{\text{HPETE\_b, HETE\_b}} \text{HETE\_b}$	
5	v5	v5	$\text{HPETE\_b} \longrightarrow \text{HETE\_b}$	
6	v6	v6	$\emptyset \longrightarrow \text{LTA4\_b}$	
7	v7	v7	$\text{LTA4\_b} \longrightarrow \text{LTC4\_b}$	
8	v8	v8	$\text{HETE\_b} \longrightarrow \emptyset$	
9	v9	v9	$\text{LTA4\_b} \xrightarrow{\text{LTA4\_b}} \emptyset$	
10	v10in	v10in	$\text{LTC4\_b} \xrightarrow{\text{LTC4\_b}} \emptyset$	
11	v10out	v10out	$\emptyset \xrightarrow{\text{LTC4\_b, LTC4\_b}} \text{LTC4\_b\_out}$	
12	v11	v11	$\text{LTC4\_b\_out} \xrightarrow{\text{LTC4\_b\_out}} \text{LTD4\_b}$	
13	v12	v12	$\text{LTD4\_b} \xrightarrow{\text{LTD4\_b}} \text{LTE4\_b}$	
14	v13	v13	$\text{LTC4\_b\_out} \xrightarrow{\text{LTC4\_b\_out}} \emptyset$	
15	v14	v14	$\text{LTD4\_b} \xrightarrow{\text{LTD4\_b}} \emptyset$	
16	v15	v15	$\text{LTE4\_b} \xrightarrow{\text{LTE4\_b}} \emptyset$	
17	v16	v16	$\text{EO\_b} \xrightarrow{\text{EO\_b}} \text{EO\_i\_b}$	

№	Id	Name	Reaction Equation	SBO
18	v17	v17	$\mathrm{EO\_i\_b} \xrightarrow{\mathrm{EO\_i\_b}} \mathrm{EO\_a\_b}$	
19	v18	v18	$\mathrm{EO\_a\_b} \xrightarrow{\mathrm{EO\_a\_b}} \mathrm{EO\_b}$	
20	v19	v19	$\mathrm{EO\_b} \xrightarrow{\mathrm{EO\_b}} \emptyset$	
21	v20	v20	$\mathrm{EO\_a\_b} \xrightarrow{\mathrm{EO\_a\_b}} \emptyset$	
22	v21	v21	$\mathrm{EO\_i\_b} \xrightarrow{\mathrm{EO\_i\_b}} \mathrm{EO\_i\_aw}$	
23	v22	v22	$\mathrm{EO\_a\_b} \xrightarrow{\mathrm{EO\_a\_b}} \mathrm{EO\_a\_aw}$	
24	v23	v23	$\mathrm{EO\_b} \xrightarrow{\mathrm{EO\_b}} \mathrm{EO\_aw}$	
25	v24	v24	$\emptyset \xrightarrow{\mathrm{EO\_b,\ EO\_i\_b,\ EO\_a\_b,\ EO\_b,\ EO\_i\_b,\ EO\_a\_b}} \mathrm{Hn\_b}$	
26	v25	v25	$\mathrm{Hn\_b} \xrightarrow{\mathrm{Hn\_b}} \emptyset$	
27	v26	v26	$\emptyset \xrightarrow{\mathrm{EO\_a\_b,\ EO\_a\_b}} \mathrm{IL\_b}$	
28	v27	v27	$\mathrm{IL\_b} \xrightarrow{\mathrm{IL\_b}} \emptyset$	
29	v28	v28	$\mathrm{IL\_b} \xrightarrow{\mathrm{IL\_b,\ IL\_bm}} \mathrm{IL\_bm}$	
30	v29	v29	$\emptyset \xrightarrow{\mathrm{IL\_bm,\ IL\_bm}} \mathrm{EO\_bm}$	
31	v30	v30	$\mathrm{EO\_bm} \xrightarrow{\mathrm{EO\_bm}} \mathrm{EO\_b}$	
32	v31	v31	$\emptyset \xrightarrow{\mathrm{AA\_aw}} \mathrm{AA\_aw}$	
33	v32	v32	$\mathrm{AA\_aw} \xrightarrow{\mathrm{AA\_aw}} \emptyset$	
34	v33	v33	$\emptyset \xrightarrow{\mathrm{AA\_aw,\ HPETE\_aw,\ AA\_aw}} \mathrm{HPETE\_aw}$	
35	v34	v34	$\mathrm{HPETE\_aw} \xrightarrow{\mathrm{HPETE\_aw,\ HETE\_aw}} \mathrm{HETE\_aw}$	
36	v35	v35	$\mathrm{HPETE\_aw} \longrightarrow \mathrm{HETE\_aw}$	
37	v36	v36	$\emptyset \longrightarrow \mathrm{LTA4\_aw}$	
38	v37	v37	$\mathrm{LTA4\_aw} \longrightarrow \mathrm{LTC4\_aw}$	
39	v38	v38	$\mathrm{HETE\_aw} \longrightarrow \emptyset$	

№	Id	Name	Reaction Equation	SBO
40	v39	v39	$\mathrm{LTA4\_aw} \xrightarrow{\mathrm{LTA4\_aw}} \emptyset$	
41	v40in	v40in	$\mathrm{LTC4\_aw} \xrightarrow{\mathrm{LTC4\_aw}} \emptyset$	
42	v40out	v40out	$\emptyset \xrightarrow{\mathrm{LTC4\_aw,\ LTC4\_aw}} \mathrm{LTC4\_aw\_out}$	
43	v41	v41	$\mathrm{LTC4\_aw\_out} \xrightarrow{\mathrm{LTC4\_aw\_out}} \mathrm{LTD4\_aw}$	
44	v42	v42	$\mathrm{LTD4\_aw} \xrightarrow{\mathrm{LTD4\_aw}} \mathrm{LTE4\_aw}$	
45	v43	v43	$\mathrm{LTE4\_aw} \xrightarrow{\mathrm{LTE4\_aw,\ LTE4\_b}} \mathrm{LTE4\_b}$	
46	v44	v44	$\mathrm{LTD4\_aw} \xrightarrow{\mathrm{LTD4\_aw,\ LTD4\_b}} \mathrm{LTD4\_b}$	
47	v45	v45	$\mathrm{LTC4\_aw\_out} \xrightarrow{\mathrm{LTC4\_aw\_out,\ LTC4\_b\_out}} \mathrm{LTC4\_b\_out}$	
48	v46	v46	$\mathrm{EO\_aw} \xrightarrow{\mathrm{EO\_aw}} \mathrm{EO\_i\_aw}$	
49	v47	v47	$\mathrm{EO\_i\_aw} \xrightarrow{\mathrm{EO\_i\_aw}} \mathrm{EO\_a\_aw}$	
50	v48	v48	$\mathrm{EO\_a\_aw} \xrightarrow{\mathrm{EO\_a\_aw}} \mathrm{EO\_aw}$	
51	v49	v49	$\mathrm{EO\_aw} \xrightarrow{\mathrm{EO\_aw}} \emptyset$	
52	v50	v50	$\mathrm{EO\_a\_aw} \xrightarrow{\mathrm{EO\_a\_aw}} \emptyset$	
53	v51	v51	$\emptyset \xrightarrow{\mathrm{EO\_a\_aw,\ EO\_i\_aw,\ EO\_aw,\ EO\_a\_aw,\ EO\_i\_aw,\ EO\_aw}} \mathrm{Hn\_aw}$	
54	v52	v52	$\mathrm{Hn\_aw} \xrightarrow{\mathrm{Hn\_aw,\ Hn\_b}} \mathrm{Hn\_b}$	
55	v53	v53	$\emptyset \xrightarrow{\mathrm{EO\_a\_aw,\ EO\_a\_aw}} \mathrm{IL\_aw}$	
56	v54	v54	$\mathrm{IL\_aw} \xrightarrow{\mathrm{IL\_aw,\ IL\_b}} \mathrm{IL\_b}$	
57	v55	v55	$\mathrm{LTE4\_aw} \xrightarrow{\mathrm{LTE4\_aw}} \emptyset$	
58	v56	v56	$\mathrm{LTD4\_aw} \xrightarrow{\mathrm{LTD4\_aw}} \emptyset$	
59	v57	v57	$\mathrm{LTC4\_aw\_out} \xrightarrow{\mathrm{LTC4\_aw\_out}} \emptyset$	
60	v58	v58	$\mathrm{IL\_aw} \xrightarrow{\mathrm{IL\_aw}} \emptyset$	

№	Id	Name	Reaction Equation	SBO
61	v59	v59	$\text{Hn\_aw} \xrightarrow{\text{Hn\_aw}} \emptyset$	
62	v60	v60	$\text{ZF\_intes} \xrightarrow{\text{ZF\_intes}} \text{ZF\_blood}$	
63	v61	v61	$\text{ZF\_blood} \xrightarrow{\text{ZF\_blood, ZF\_airways}} \text{ZF\_airways}$	
64	v62	v62	$\text{ZF\_blood} \xrightarrow{\text{ZF\_blood}} \emptyset$	
65	v63	v63	$\text{ML\_intes} \xrightarrow{\text{ML\_intes}} \text{ML\_blood}$	
66	v64	v64	$\text{ML\_blood} \xrightarrow{\text{ML\_blood}} \emptyset$	

7.1 Reaction v1

This is a fast irreversible reaction of no reactant forming one product influenced by one modifier.

Name v1

Reaction equation

$$\emptyset \xrightarrow{\text{AA\_b}} \text{AA\_b} \tag{102}$$

Modifier

Table 6: Properties of each modifier.

Id	Name	SBO
AA_b	AA_b	

Product

Table 7: Properties of each product.

Id	Name	SBO
AA_b	AA_b	

Kinetic Law

Derived unit contains undeclared units

$$v_1 = \text{vol}\,(\text{Default}) \cdot \left(\frac{\text{Vmax\_PLA2} \cdot \text{PLA2\_Ca} \cdot \text{PL}}{\text{Km\_PLA2\_APC} + \text{PL}} - \frac{\text{V\_CoA} \cdot [\text{AA\_b}]}{\text{Km\_CoA\_AA} + [\text{AA\_b}]} \right) \tag{103}$$

7.2 Reaction v2

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v2

Reaction equation

$$\text{AA\_b} \xrightarrow{\text{AA\_b}} \emptyset \tag{104}$$

Reactant

Table 8: Properties of each reactant.

Id	Name	SBO
AA_b	AA_b	

Modifier

Table 9: Properties of each modifier.

Id	Name	SBO
AA_b	AA_b	

Kinetic Law

Derived unit contains undeclared units

$$v_2 = \mathrm{vol}\,(\mathrm{Default}) \cdot \frac{\mathrm{k\_lo} \cdot [\mathrm{AA\_b}] \cdot \mathrm{FLO3t\_b}}{\mathrm{K\_AA}} \tag{105}$$

7.3 Reaction v3

This is a fast irreversible reaction of no reactant forming one product influenced by three modifiers.

Name v3

Reaction equation

$$\emptyset \xrightarrow{\mathrm{AA\_b,\ HPETE\_b,\ AA\_b}} \mathrm{HPETE\_b} \tag{106}$$

Modifiers

Table 10: Properties of each modifier.

Id	Name	SBO
AA_b	AA_b	
HPETE_b	HPETE_b	
AA_b	AA_b	

Product

Table 11: Properties of each product.

Id	Name	SBO
HPETE_b	HPETE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_3 = \mathrm{vol}\,(\mathrm{Default}) \cdot (\mathrm{k\_3} \cdot \mathrm{FLO5HP\_b} - \mathrm{k3} \cdot \mathrm{FLO3t\_b} \cdot [\mathrm{HPETE\_b}]) \cdot \left(1.0 + \frac{[\mathrm{AA\_b}]}{\mathrm{Ki\_AA}}\right) \quad (107)$$

7.4 Reaction v4

This is a fast irreversible reaction of one reactant forming one product influenced by two modifiers.

Name v4

Reaction equation

$$\mathrm{HPETE\_b} \xrightarrow{\mathrm{HPETE\_b,\ HETE\_b}} \mathrm{HETE\_b} \quad (108)$$

Reactant

Table 12: Properties of each reactant.

Id	Name	SBO
HPETE_b	HPETE_b	

Modifiers

Table 13: Properties of each modifier.

Id	Name	SBO
HPETE_b	HPETE_b	
HETE_b	HETE_b	

Product

Table 14: Properties of each product.

Id	Name	SBO
HETE_b	HETE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_4 = \mathrm{vol}\,(\mathrm{Default}) \cdot \mathrm{r1} \cdot \left([\mathrm{HPETE\_b}] \cdot \mathrm{FLO2\_b} - \frac{[\mathrm{HETE\_b}] \cdot \mathrm{FLO3\_b}}{\mathrm{Ke\_ox}} \right) \tag{109}$$

7.5 Reaction v5

This is a fast irreversible reaction of one reactant forming one product.

Name v5

Reaction equation

$$\mathrm{HPETE\_b} \longrightarrow \mathrm{HETE\_b} \tag{110}$$

Reactant

Table 15: Properties of each reactant.

Id	Name	SBO
HPETE_b	HPETE_b	

Product

Table 16: Properties of each product.

Id	Name	SBO
HETE_b	HETE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_5 = \mathrm{vol}\,(\mathrm{Default}) \cdot \frac{\mathrm{GPx} \cdot \mathrm{B\_b}}{\mathrm{A\_b}} \tag{111}$$

7.6 Reaction v6

This is a fast irreversible reaction of no reactant forming one product.

Name v6

Reaction equation

$$\emptyset \longrightarrow \text{LTA4\_b} \tag{112}$$

Product

Table 17: Properties of each product.

Id	Name	SBO
LTA4_b	LTA4_b	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \text{vol}\,(\text{Default}) \cdot \text{k\_lta\_syn} \cdot \text{FLO5HP\_b} \tag{113}$$

7.7 Reaction v7

This is a fast irreversible reaction of one reactant forming one product.

Name v7

Reaction equation

$$\text{LTA4\_b} \longrightarrow \text{LTC4\_b} \tag{114}$$

Reactant

Table 18: Properties of each reactant.

Id	Name	SBO
LTA4_b	LTA4_b	

Product

Table 19: Properties of each product.

Id	Name	SBO
LTC4_b	LTC4_b	

Kinetic Law

Derived unit contains undeclared units

$$v_7 = \mathrm{vol}\,(\mathrm{Default}) \cdot \frac{\mathrm{nom\_LTCs\_b}}{\mathrm{den\_LTCs\_b}} \tag{115}$$

7.8 Reaction v8

This is a fast irreversible reaction of one reactant forming no product.

Name v8

Reaction equation

$$\mathrm{HETE\_b} \longrightarrow \emptyset \tag{116}$$

Reactant

Table 20: Properties of each reactant.

Id	Name	SBO
HETE_b	HETE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_8 = \mathrm{vol}\,(\mathrm{Default}) \cdot \frac{\mathrm{HEDH5} \cdot \mathrm{B\_hedh\_b}}{\mathrm{A\_hedh\_b}} \tag{117}$$

7.9 Reaction v9

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v9

Reaction equation

$$\mathrm{LTA4\_b} \xrightarrow{\mathrm{LTA4\_b}} \emptyset \tag{118}$$

Reactant

Table 21: Properties of each reactant.

Id	Name	SBO
LTA4_b	LTA4_b	

Modifier

Table 22: Properties of each modifier.

Id	Name	SBO
LTA4_b	LTA4_b	

Kinetic Law

Derived unit contains undeclared units

$$v_9 = \mathrm{vol}\,(\mathrm{Default}) \cdot \mathrm{Kd12} \cdot [\mathrm{LTA4\_b}] \tag{119}$$

7.10 Reaction v10in

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v10in

Reaction equation

$$\mathrm{LTC4\_b} \xrightarrow{\mathrm{LTC4\_b}} \emptyset \tag{120}$$

Reactant

Table 23: Properties of each reactant.

Id	Name	SBO
LTC4_b	LTC4_b	

Modifier

Table 24: Properties of each modifier.

Id	Name	SBO
LTC4_b	LTC4_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = \mathrm{vol}\,(\mathrm{Default}) \cdot \mathrm{Kd50} \cdot [\mathrm{LTC4\_b}] \tag{121}$$

7.11 Reaction v10out

This is a fast irreversible reaction of no reactant forming one product influenced by two modifiers.

Name v10out

Reaction equation

$$\emptyset \xrightarrow{\mathrm{LTC4\_b,\ LTC4\_b}} \mathrm{LTC4\_b\_out} \tag{122}$$

Modifiers

Table 25: Properties of each modifier.

Id	Name	SBO
LTC4_b	LTC4_b	
LTC4_b	LTC4_b	

Product

Table 26: Properties of each product.

Id	Name	SBO
LTC4_b_out	LTC4_b_out	

Kinetic Law

Derived unit contains undeclared units

$$v_{11} = \mathrm{vol}\,(\mathrm{Default}) \cdot \mathrm{Kd50} \cdot [\mathrm{LTC4\_b}] \cdot \mathrm{V\_LTC\_CB} \cdot 10.0^{6.0} \tag{123}$$

7.12 Reaction v11

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v11

Reaction equation

$$\text{LTC4\_b\_out} \xrightarrow{\text{LTC4\_b\_out}} \text{LTD4\_b} \tag{124}$$

Reactant

Table 27: Properties of each reactant.

Id	Name	SBO
LTC4_b_out	LTC4_b_out	

Modifier

Table 28: Properties of each modifier.

Id	Name	SBO
LTC4_b_out	LTC4_b_out	

Product

Table 29: Properties of each product.

Id	Name	SBO
LTD4_b	LTD4_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{12} = \text{vol}\left(\text{Vd\_LTC}\right) \cdot \text{k\_ggt} \cdot \text{fup\_LT} \cdot \left[\text{LTC4\_b\_out}\right] \tag{125}$$

7.13 Reaction v12

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v12

Reaction equation

$$\text{LTD4\_b} \xrightarrow{\text{LTD4\_b}} \text{LTE4\_b} \tag{126}$$

Reactant

Table 30: Properties of each reactant.

Id	Name	SBO
LTD4_b	LTD4_b	

Modifier

Table 31: Properties of each modifier.

Id	Name	SBO
LTD4_b	LTD4_b	

Product

Table 32: Properties of each product.

Id	Name	SBO
LTE4_b	LTE4_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{13} = \text{vol}\left(\text{Vd\_LTD}\right) \cdot \text{k\_dp} \cdot \text{fup\_LT} \cdot [\text{LTD4\_b}] \tag{127}$$

7.14 Reaction v13

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v13

Reaction equation

$$\text{LTC4\_b\_out} \xrightarrow{\text{LTC4\_b\_out}} \emptyset \tag{128}$$

Reactant

Table 33: Properties of each reactant.

Id	Name	SBO
LTC4_b_out	LTC4_b_out	

Modifier

Table 34: Properties of each modifier.

Id	Name	SBO
LTC4_b_out	LTC4_b_out	

Kinetic Law

Derived unit contains undeclared units

$$v_{14} = \mathrm{vol}\left(\mathrm{Vd\_LTC}\right) \cdot \mathrm{k\_ltc\_ltd\_el} \cdot \mathrm{fup\_LT} \cdot \left[\mathrm{LTC4\_b\_out}\right] \tag{129}$$

7.15 Reaction v14

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v14

Reaction equation

$$\mathrm{LTD4\_b} \xrightarrow{\mathrm{LTD4\_b}} \emptyset \tag{130}$$

Reactant

Table 35: Properties of each reactant.

Id	Name	SBO
LTD4_b	LTD4_b	

Modifier

Table 36: Properties of each modifier.

Id	Name	SBO
LTD4_b	LTD4_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{15} = \mathrm{vol}\left(\mathrm{Vd\_LTD}\right) \cdot \mathrm{k\_ltc\_ltd\_el} \cdot \mathrm{fup\_LT} \cdot [\mathrm{LTD4\_b}] \tag{131}$$

7.16 Reaction v15

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v15

Reaction equation

$$\mathrm{LTE4\_b} \xrightarrow{\mathrm{LTE4\_b}} \emptyset \tag{132}$$

Reactant

Table 37: Properties of each reactant.

Id	Name	SBO
LTE4_b	LTE4_b	

Modifier

Table 38: Properties of each modifier.

Id	Name	SBO
LTE4_b	LTE4_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{16} = \mathrm{vol}\left(\mathrm{Vd\_LTE}\right) \cdot \left(\mathrm{k\_lte\_el} + \mathrm{k\_acet}\right) \cdot \mathrm{fup\_LT} \cdot [\mathrm{LTE4\_b}] \tag{133}$$

7.17 Reaction v16

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v16

Reaction equation

$$\mathrm{EO\_b} \xrightarrow{\mathrm{EO\_b}} \mathrm{EO\_i\_b} \tag{134}$$

Reactant

Table 39: Properties of each reactant.

Id	Name	SBO
EO_b	EO_b	

Modifier

Table 40: Properties of each modifier.

Id	Name	SBO
EO_b	EO_b	

Product

Table 41: Properties of each product.

Id	Name	SBO
EO_i_b	EO_i_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{17} = \mathrm{ca} \cdot \mathrm{vol}\left(\mathrm{V\_B}\right) \cdot \frac{\mathrm{ka} \cdot \left[\mathrm{EO\_b}\right] \cdot \mathrm{OL\_b}^{\mathrm{h\_act}}}{\mathrm{EC50\_act}^{\mathrm{h\_act}} + \mathrm{OL\_b}^{\mathrm{h\_act}}} \tag{135}$$

7.18 Reaction v17

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v17

Reaction equation

$$\mathrm{EO\_i\_b} \xrightarrow{\mathrm{EO\_i\_b}} \mathrm{EO\_a\_b} \tag{136}$$

Reactant

Table 42: Properties of each reactant.

Id	Name	SBO
EO_i_b	EO_i_b	

Modifier

Table 43: Properties of each modifier.

Id	Name	SBO
EO_i_b	EO_i_b	

Product

Table 44: Properties of each product.

Id	Name	SBO
EO_a_b	EO_a_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{18} = \mathrm{ca} \cdot \mathrm{vol}\left(\mathrm{V\_B}\right) \cdot \mathrm{k\_EO\_m} \cdot \left[\mathrm{EO\_i\_b}\right] \tag{137}$$

7.19 Reaction v18

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v18

Reaction equation

$$\mathrm{EO\_a\_b} \xrightarrow{\mathrm{EO\_a\_b}} \mathrm{EO\_b} \tag{138}$$

Reactant

Table 45: Properties of each reactant.

Id	Name	SBO
EO_a_b	EO_a_b	

Modifier

Table 46: Properties of each modifier.

Id	Name	SBO
EO_a_b	EO_a_b	

Product

Table 47: Properties of each product.

Id	Name	SBO
EO_b	EO_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{19} = \mathrm{ca} \cdot \mathrm{vol}\left(\mathrm{V\_B}\right) \cdot \mathrm{kia} \cdot \left[\mathrm{EO\_a\_b}\right] \tag{139}$$

7.20 Reaction v19

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v19

Reaction equation

$$\mathrm{EO\_b} \xrightarrow{\mathrm{EO\_b}} \emptyset \tag{140}$$

Reactant

Table 48: Properties of each reactant.

Id	Name	SBO
EO_b	EO_b	

Modifier

Table 49: Properties of each modifier.

Id	Name	SBO
EO_b	EO_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{20} = \mathrm{vol}\left(\mathrm{V\_B}\right) \cdot \mathrm{k\_EO\_d} \cdot [\mathrm{EO\_b}] \tag{141}$$

7.21 Reaction v20

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v20

Reaction equation

$$\mathrm{EO\_a\_b} \xrightarrow{\mathrm{EO\_a\_b}} \emptyset \tag{142}$$

Reactant

Table 50: Properties of each reactant.

Id	Name	SBO
EO_a_b	EO_a_b	

Modifier

Table 51: Properties of each modifier.

Id	Name	SBO
EO_a_b	EO_a_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{21} = \mathrm{vol}\left(\mathrm{V\_B}\right) \cdot \mathrm{k\_EO\_a\_d} \cdot [\mathrm{EO\_a\_b}] \tag{143}$$

7.22 Reaction v21

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v21

Reaction equation

$$\mathrm{EO\_i\_b} \xrightarrow{\mathrm{EO\_i\_b}} \mathrm{EO\_i\_aw} \tag{144}$$

Reactant

Table 52: Properties of each reactant.

Id	Name	SBO
EO_i_b	EO_i_b	

Modifier

Table 53: Properties of each modifier.

Id	Name	SBO
EO_i_b	EO_i_b	

Product

Table 54: Properties of each product.

Id	Name	SBO
EO_i_aw	EO_i_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{22} = \mathrm{vol}(\mathrm{V\_B}) \cdot \frac{\mathrm{k\_EO\_t\_baw} \cdot [\mathrm{EO\_i\_b}] \cdot \mathrm{Rec\_occup\_migr}^{\mathrm{h\_migr}}}{\mathrm{EC50\_migr}^{\mathrm{h\_migr}} + \mathrm{Rec\_occup\_migr}^{\mathrm{h\_migr}}} \tag{145}$$

7.23 Reaction v22

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v22

Reaction equation

$$\mathrm{EO\_a\_b} \xrightarrow{\mathrm{EO\_a\_b}} \mathrm{EO\_a\_aw} \tag{146}$$

Reactant

Table 55: Properties of each reactant.

Id	Name	SBO
EO_a_b	EO_a_b	

Modifier

Table 56: Properties of each modifier.

Id	Name	SBO
EO_a_b	EO_a_b	

Product

Table 57: Properties of each product.

Id	Name	SBO
EO_a_aw	EO_a_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{23} = \mathrm{vol}\left(\mathrm{V\_B}\right) \cdot \frac{\mathrm{k\_EO\_t\_baw} \cdot [\mathrm{EO\_a\_b}] \cdot \mathrm{Rec\_occup\_migr}^{\mathrm{h\_migr}}}{\mathrm{EC50\_migr}^{\mathrm{h\_migr}} + \mathrm{Rec\_occup\_migr}^{\mathrm{h\_migr}}} \tag{147}$$

7.24 Reaction v23

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v23

Reaction equation

$$\mathrm{EO\_b} \xrightarrow{\mathrm{EO\_b}} \mathrm{EO\_aw} \tag{148}$$

Reactant

Table 58: Properties of each reactant.

Id	Name	SBO
EO_b	EO_b	

Modifier

Table 59: Properties of each modifier.

Id	Name	SBO
EO_b	EO_b	

Product

Table 60: Properties of each product.

Id	Name	SBO
EO_aw	EO_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \mathrm{vol}\left(\mathrm{V\_B}\right) \cdot \frac{\mathrm{k\_EO\_t\_baw} \cdot [\mathrm{EO\_b}] \cdot \mathrm{Rec\_occup\_migr}^{\mathrm{h\_migr}}}{\mathrm{EC50\_migr}^{\mathrm{h\_migr}} + \mathrm{Rec\_occup\_migr}^{\mathrm{h\_migr}}} \tag{149}$$

7.25 Reaction v24

This is a fast irreversible reaction of no reactant forming one product influenced by six modifiers.

Name v24

Reaction equation

$$\emptyset \xrightarrow{\mathrm{EO\_b,\ EO\_i\_b,\ EO\_a\_b,\ EO\_b,\ EO\_i\_b,\ EO\_a\_b}} \mathrm{Hn\_b} \tag{150}$$

Modifiers

Table 61: Properties of each modifier.

Id	Name	SBO
EO_b	EO_b	
EO_i_b	EO_i_b	
EO_a_b	EO_a_b	
EO_b	EO_b	
EO_i_b	EO_i_b	
EO_a_b	EO_a_b	

Product

Table 62: Properties of each product.

Id	Name	SBO
Hn_b	Hn_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{25} = \mathrm{vol}\left(\mathrm{V\_B}\right) \cdot \mathrm{k\_Hn\_p} \cdot \left(\left[\mathrm{EO\_b}\right] + \left[\mathrm{EO\_i\_b}\right] + \left[\mathrm{EO\_a\_b}\right]\right) \tag{151}$$

7.26 Reaction v25

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v25

Reaction equation

$$\mathrm{Hn\_b} \xrightarrow{\mathrm{Hn\_b}} \emptyset \tag{152}$$

Reactant

Table 63: Properties of each reactant.

Id	Name	SBO
Hn_b	Hn_b	

Modifier

Table 64: Properties of each modifier.

Id	Name	SBO
Hn_b	Hn_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{26} = \mathrm{vol}\left(\mathrm{Vd\_Hn}\right) \cdot \mathrm{k\_Hn\_d} \cdot \mathrm{fup\_Hn} \cdot \left[\mathrm{Hn\_b}\right] \tag{153}$$

7.27 Reaction v26

This is a fast irreversible reaction of no reactant forming one product influenced by two modifiers.

Name v26

Reaction equation

$$\emptyset \xrightarrow{\mathrm{EO\_a\_b,\ EO\_a\_b}} \mathrm{IL\_b} \tag{154}$$

Modifiers

Table 65: Properties of each modifier.

Id	Name	SBO
EO_a_b	EO_a_b	
EO_a_b	EO_a_b	

Product

Table 66: Properties of each product.

Id	Name	SBO
IL_b	IL_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{27} = \mathrm{vol}(\mathrm{V\_B}) \cdot \mathrm{k\_IL\_p} \cdot [\mathrm{EO\_a\_b}] \tag{155}$$

7.28 Reaction v27

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v27

Reaction equation

$$\mathrm{IL\_b} \xrightarrow{\mathrm{IL\_b}} \emptyset \tag{156}$$

Reactant

Table 67: Properties of each reactant.

Id	Name	SBO
IL_b	IL_b	

Modifier

Table 68: Properties of each modifier.

Id	Name	SBO
IL_b	IL_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{28} = \mathrm{vol}(\mathrm{Vd\_IL5}) \cdot \mathrm{k\_IL\_d} \cdot [\mathrm{IL\_b}] \tag{157}$$

7.29 Reaction v28

This is a fast irreversible reaction of one reactant forming one product influenced by two modifiers.

Name v28

Reaction equation

$$\mathrm{IL\_b} \xrightarrow{\mathrm{IL\_b,\ IL\_bm}} \mathrm{IL\_bm} \tag{158}$$

Reactant

Table 69: Properties of each reactant.

Id	Name	SBO
IL_b	IL_b	

Modifiers

Table 70: Properties of each modifier.

Id	Name	SBO
IL_b	IL_b	
IL_bm	IL_bm	

Product

Table 71: Properties of each product.

Id	Name	SBO
IL_bm	IL_bm	

Kinetic Law

Derived unit contains undeclared units

$$v_{29} = \text{k\_IL\_t\_bbm} \cdot ([\text{IL\_b}] - [\text{IL\_bm}]) - \text{J\_BM\_lymfl} \cdot [\text{IL\_bm}] \tag{159}$$

7.30 Reaction v29

This is a fast irreversible reaction of no reactant forming one product influenced by two modifiers.

Name v29

Reaction equation

$$\emptyset \xrightarrow{\text{IL\_bm, IL\_bm}} \text{EO\_bm} \tag{160}$$

Modifiers

Table 72: Properties of each modifier.

Id	Name	SBO
IL_bm	IL_bm	
IL_bm	IL_bm	

Product

Table 73: Properties of each product.

Id	Name	SBO
EO_bm	EO_bm	

Kinetic Law

Derived unit contains undeclared units

$$v_{30} = \mathrm{vol}\,(\mathrm{V\_BM}) \cdot \left(\frac{\mathrm{k1} \cdot [\mathrm{IL\_bm}]^{\mathrm{h\_matur}}}{\mathrm{Km\_1}^{\mathrm{h\_matur}} + [\mathrm{IL\_bm}]^{\mathrm{h\_matur}}} + \mathrm{k1\_min} \right) \tag{161}$$

7.31 Reaction v30

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v30

Reaction equation

$$\mathrm{EO\_bm} \xrightarrow{\mathrm{EO\_bm}} \mathrm{EO\_b} \tag{162}$$

Reactant

Table 74: Properties of each reactant.

Id	Name	SBO
EO_bm	EO_bm	

Modifier

Table 75: Properties of each modifier.

Id	Name	SBO
EO_bm	EO_bm	

Product

Table 76: Properties of each product.

Id	Name	SBO
EO_b	EO_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{31} = \text{ca} \cdot \text{vol}\left(\text{V\_BM}\right) \cdot \text{k\_EO\_t\_bmb} \cdot \left[\text{EO\_bm}\right] \tag{163}$$

7.32 Reaction v31

This is a fast irreversible reaction of no reactant forming one product influenced by one modifier.

Name v31

Reaction equation

$$\emptyset \xrightarrow{\text{AA\_aw}} \text{AA\_aw} \tag{164}$$

Modifier

Table 77: Properties of each modifier.

Id	Name	SBO
AA_aw	AA_aw	

Product

Table 78: Properties of each product.

Id	Name	SBO
AA_aw	AA_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{32} = \mathrm{vol}\,(\mathrm{Default}) \cdot \left(\frac{\mathrm{Vmax\_PLA2} \cdot \mathrm{PLA2\_Ca} \cdot \mathrm{PL}}{\mathrm{Km\_PLA2\_APC} + \mathrm{PL}} - \frac{\mathrm{V\_CoA} \cdot [\mathrm{AA\_aw}]}{\mathrm{Km\_CoA\_AA} + [\mathrm{AA\_aw}]} \right) \quad (165)$$

7.33 Reaction v32

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v32

Reaction equation

$$\mathrm{AA\_aw} \xrightarrow{\mathrm{AA\_aw}} \emptyset \quad (166)$$

Reactant

Table 79: Properties of each reactant.

Id	Name	SBO
AA_aw	AA_aw	

Modifier

Table 80: Properties of each modifier.

Id	Name	SBO
AA_aw	AA_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{33} = \mathrm{vol}\,(\mathrm{Default}) \cdot \frac{\mathrm{k\_lo} \cdot [\mathrm{AA\_aw}] \cdot \mathrm{FLO3t\_aw}}{\mathrm{K\_AA}} \quad (167)$$

7.34 Reaction v33

This is a fast irreversible reaction of no reactant forming one product influenced by three modifiers.

Name v33

Reaction equation

$$\emptyset \xrightarrow{\text{AA\_aw, HPETE\_aw, AA\_aw}} \text{HPETE\_aw} \tag{168}$$

Modifiers

Table 81: Properties of each modifier.

Id	Name	SBO
AA_aw	AA_aw	
HPETE_aw	HPETE_aw	
AA_aw	AA_aw	

Product

Table 82: Properties of each product.

Id	Name	SBO
HPETE_aw	HPETE_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{34} = \text{vol}\,(\text{Default}) \cdot (\text{k\_3} \cdot \text{FLO5HP\_aw} - \text{k3} \cdot \text{FLO3t\_aw} \cdot [\text{HPETE\_aw}]) \cdot \left(1.0 + \frac{[\text{AA\_aw}]}{\text{Ki\_AA}}\right) \tag{169}$$

7.35 Reaction v34

This is a fast irreversible reaction of one reactant forming one product influenced by two modifiers.

Name v34

Reaction equation

$$\text{HPETE\_aw} \xrightarrow{\text{HPETE\_aw, HETE\_aw}} \text{HETE\_aw} \tag{170}$$

Reactant

Table 83: Properties of each reactant.

Id	Name	SBO
HPETE_aw	HPETE_aw	

Modifiers

Table 84: Properties of each modifier.

Id	Name	SBO
HPETE_aw	HPETE_aw	
HETE_aw	HETE_aw	

Product

Table 85: Properties of each product.

Id	Name	SBO
HETE_aw	HETE_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{35} = \mathrm{vol}\,(\mathrm{Default}) \cdot \mathrm{r1} \cdot \left([\mathrm{HPETE\_aw}] \cdot \mathrm{FLO2\_aw} - \frac{[\mathrm{HETE\_aw}] \cdot \mathrm{FLO3\_aw}}{\mathrm{Ke\_ox}} \right) \quad (171)$$

7.36 Reaction v35

This is a fast irreversible reaction of one reactant forming one product.

Name v35

Reaction equation

$$\mathrm{HPETE\_aw} \longrightarrow \mathrm{HETE\_aw} \quad (172)$$

Reactant

Table 86: Properties of each reactant.

Id	Name	SBO
HPETE_aw	HPETE_aw	

Product

Table 87: Properties of each product.

Id	Name	SBO
HETE_aw	HETE_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{36} = \mathrm{vol}\,(\mathrm{Default}) \cdot \frac{\mathrm{GPx} \cdot \mathrm{B\_aw}}{\mathrm{A\_aw}} \tag{173}$$

7.37 Reaction v36

This is a fast irreversible reaction of no reactant forming one product.

Name v36

Reaction equation

$$\emptyset \longrightarrow \mathrm{LTA4\_aw} \tag{174}$$

Product

Table 88: Properties of each product.

Id	Name	SBO
LTA4_aw	LTA4_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{37} = \mathrm{vol}\,(\mathrm{Default}) \cdot \mathrm{k\_lta\_syn} \cdot \mathrm{FLO5HP\_aw} \tag{175}$$

7.38 Reaction v37

This is a fast irreversible reaction of one reactant forming one product.

Name v37

Reaction equation

$$\text{LTA4\_aw} \longrightarrow \text{LTC4\_aw} \tag{176}$$

Reactant

Table 89: Properties of each reactant.

Id	Name	SBO
LTA4_aw	LTA4_aw	

Product

Table 90: Properties of each product.

Id	Name	SBO
LTC4_aw	LTC4_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{38} = \text{vol}\,(\text{Default}) \cdot \frac{\text{nom\_LTCs\_aw}}{\text{den\_LTCs\_aw}} \tag{177}$$

7.39 Reaction v38

This is a fast irreversible reaction of one reactant forming no product.

Name v38

Reaction equation

$$\text{HETE\_aw} \longrightarrow \emptyset \tag{178}$$

Reactant

Table 91: Properties of each reactant.

Id	Name	SBO
HETE_aw	HETE_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{39} = \mathrm{vol}\,(\mathrm{Default}) \cdot \frac{\mathrm{HEDH5} \cdot \mathrm{B\_hedh\_aw}}{\mathrm{A\_hedh\_aw}} \tag{179}$$

7.40 Reaction v39

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v39

Reaction equation

$$\mathrm{LTA4\_aw} \xrightarrow{\mathrm{LTA4\_aw}} \emptyset \tag{180}$$

Reactant

Table 92: Properties of each reactant.

Id	Name	SBO
LTA4_aw	LTA4_aw	

Modifier

Table 93: Properties of each modifier.

Id	Name	SBO
LTA4_aw	LTA4_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{40} = \mathrm{vol}\,(\mathrm{Default}) \cdot \mathrm{Kd12} \cdot [\mathrm{LTA4\_aw}] \tag{181}$$

7.41 Reaction v40in

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v40in

Reaction equation

$$\text{LTC4\_aw} \xrightarrow{\text{LTC4\_aw}} \emptyset \tag{182}$$

Reactant

Table 94: Properties of each reactant.

Id	Name	SBO
LTC4_aw	LTC4_aw	

Modifier

Table 95: Properties of each modifier.

Id	Name	SBO
LTC4_aw	LTC4_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{41} = \text{vol}\,(\text{Default}) \cdot \text{Kd50} \cdot [\text{LTC4\_aw}] \tag{183}$$

7.42 Reaction v40out

This is a fast irreversible reaction of no reactant forming one product influenced by two modifiers.

Name v40out

Reaction equation

$$\emptyset \xrightarrow{\text{LTC4\_aw, LTC4\_aw}} \text{LTC4\_aw\_out} \tag{184}$$

Modifiers

Table 96: Properties of each modifier.

Id	Name	SBO
LTC4_aw	LTC4_aw	
LTC4_aw	LTC4_aw	

Product

Table 97: Properties of each product.

Id	Name	SBO
LTC4_aw_out	LTC4_aw_out	

Kinetic Law

Derived unit contains undeclared units

$$v_{42} = \mathrm{vol}\,(\mathrm{Default}) \cdot \mathrm{Kd50} \cdot [\mathrm{LTC4\_aw}] \cdot \mathrm{V\_LTC\_CAW} \cdot 10.0^{6.0} \tag{185}$$

7.43 Reaction v41

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v41

Reaction equation

$$\mathrm{LTC4\_aw\_out} \xrightarrow{\mathrm{LTC4\_aw\_out}} \mathrm{LTD4\_aw} \tag{186}$$

Reactant

Table 98: Properties of each reactant.

Id	Name	SBO
LTC4_aw_out	LTC4_aw_out	

Modifier

Table 99: Properties of each modifier.

Id	Name	SBO
LTC4_aw_out	LTC4_aw_out	

Product

Table 100: Properties of each product.

Id	Name	SBO
LTD4_aw	LTD4_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{43} = \mathrm{vol}\left(\mathrm{Vd\_AW\_LTC}\right) \cdot \mathrm{k\_ggt} \cdot \left[\mathrm{LTC4\_aw\_out}\right] \tag{187}$$

7.44 Reaction v42

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v42

Reaction equation

$$\mathrm{LTD4\_aw} \xrightarrow{\mathrm{LTD4\_aw}} \mathrm{LTE4\_aw} \tag{188}$$

Reactant

Table 101: Properties of each reactant.

Id	Name	SBO
LTD4_aw	LTD4_aw	

Modifier

Table 102: Properties of each modifier.

Id	Name	SBO
LTD4_aw	LTD4_aw	

Product

Table 103: Properties of each product.

Id	Name	SBO
LTE4_aw	LTE4_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{44} = \mathrm{vol}\left(\mathrm{Vd\_AW\_LTD}\right) \cdot \mathrm{k\_dp} \cdot \left[\mathrm{LTD4\_aw}\right] \tag{189}$$

7.45 Reaction v43

This is a fast irreversible reaction of one reactant forming one product influenced by two modifiers.

Name v43

Reaction equation

$$\mathrm{LTE4\_aw} \xrightarrow{\mathrm{LTE4\_aw,\ LTE4\_b}} \mathrm{LTE4\_b} \tag{190}$$

Reactant

Table 104: Properties of each reactant.

Id	Name	SBO
LTE4_aw	LTE4_aw	

Modifiers

Table 105: Properties of each modifier.

Id	Name	SBO
LTE4_aw	LTE4_aw	
LTE4_b	LTE4_b	

Product

Table 106: Properties of each product.

Id	Name	SBO
LTE4_b	LTE4_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{45} = \text{Q\_AW\_blf} \cdot \text{R\_LTE\_B} \cdot \left(\frac{[\text{LTE4\_aw}] \cdot \text{R\_LTE\_AW}}{\text{Kp\_LTE\_AW}} - [\text{LTE4\_b}] \right) \tag{191}$$

7.46 Reaction v44

This is a fast irreversible reaction of one reactant forming one product influenced by two modifiers.

Name v44

Reaction equation

$$\text{LTD4\_aw} \xrightarrow{\text{LTD4\_aw, LTD4\_b}} \text{LTD4\_b} \tag{192}$$

Reactant

Table 107: Properties of each reactant.

Id	Name	SBO
LTD4_aw	LTD4_aw	

Modifiers

Table 108: Properties of each modifier.

Id	Name	SBO
LTD4_aw	LTD4_aw	
LTD4_b	LTD4_b	

Product

Table 109: Properties of each product.

Id	Name	SBO
LTD4_b	LTD4_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{46} = \text{Q\_AW\_blf} \cdot \text{R\_LTD\_B} \cdot \left(\frac{[\text{LTD4\_aw}] \cdot \text{R\_LTD\_AW}}{\text{Kp\_LTD\_AW}} - [\text{LTD4\_b}] \right) \tag{193}$$

7.47 Reaction v45

This is a fast irreversible reaction of one reactant forming one product influenced by two modifiers.

Name v45

Reaction equation

$$\text{LTC4\_aw\_out} \xrightarrow{\text{LTC4\_aw\_out, LTC4\_b\_out}} \text{LTC4\_b\_out} \tag{194}$$

Reactant

Table 110: Properties of each reactant.

Id	Name	SBO
LTC4_aw_out	LTC4_aw_out	

Modifiers

Table 111: Properties of each modifier.

Id	Name	SBO
LTC4_aw_out	LTC4_aw_out	
LTC4_b_out	LTC4_b_out	

Product

Table 112: Properties of each product.

Id	Name	SBO
LTC4_b_out	LTC4_b_out	

Kinetic Law

Derived unit contains undeclared units

$$v_{47} = \text{Q\_AW\_blf} \cdot \text{R\_LTC\_B} \cdot \left(\frac{[\text{LTC4\_aw\_out}] \cdot \text{R\_LTC\_AW}}{\text{Kp\_LTC\_AW}} - [\text{LTC4\_b\_out}] \right) \quad (195)$$

7.48 Reaction v46

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v46

Reaction equation

$$\text{EO\_aw} \xrightarrow{\text{EO\_aw}} \text{EO\_i\_aw} \quad (196)$$

Reactant

Table 113: Properties of each reactant.

Id	Name	SBO
EO_aw	EO_aw	

Modifier

Table 114: Properties of each modifier.

Id	Name	SBO
EO_aw	EO_aw	

Product

Table 115: Properties of each product.

Id	Name	SBO
EO_i_aw	EO_i_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{48} = \mathrm{ca} \cdot \mathrm{vol}\left(\mathrm{V\_AW}\right) \cdot \frac{\mathrm{ka} \cdot [\mathrm{EO\_aw}] \cdot \mathrm{OL\_aw}^{\mathrm{h\_act}}}{\mathrm{EC50\_act}^{\mathrm{h\_act}} + \mathrm{OL\_aw}^{\mathrm{h\_act}}} \tag{197}$$

7.49 Reaction v47

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v47

Reaction equation

$$\mathrm{EO\_i\_aw} \xrightarrow{\mathrm{EO\_i\_aw}} \mathrm{EO\_a\_aw} \tag{198}$$

Reactant

Table 116: Properties of each reactant.

Id	Name	SBO
EO_i_aw	EO_i_aw	

Modifier

Table 117: Properties of each modifier.

Id	Name	SBO
EO_i_aw	EO_i_aw	

Product

Table 118: Properties of each product.

Id	Name	SBO
EO_a_aw	EO_a_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{49} = \mathrm{ca} \cdot \mathrm{vol}\left(\mathrm{V\_AW}\right) \cdot \mathrm{k\_EO\_m} \cdot \left[\mathrm{EO\_i\_aw}\right] \tag{199}$$

7.50 Reaction v48

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v48

Reaction equation

$$\mathrm{EO\_a\_aw} \xrightarrow{\mathrm{EO\_a\_aw}} \mathrm{EO\_aw} \tag{200}$$

Reactant

Table 119: Properties of each reactant.

Id	Name	SBO
EO_a_aw	EO_a_aw	

Modifier

Table 120: Properties of each modifier.

Id	Name	SBO
EO_a_aw	EO_a_aw	

Product

Table 121: Properties of each product.

Id	Name	SBO
EO_aw	EO_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{50} = \mathrm{ca} \cdot \mathrm{vol}\left(\mathrm{V\_AW}\right) \cdot \mathrm{kia} \cdot [\mathrm{EO\_a\_aw}] \tag{201}$$

7.51 Reaction v49

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v49

Reaction equation

$$\mathrm{EO\_aw} \xrightarrow{\mathrm{EO\_aw}} \emptyset \tag{202}$$

Reactant

Table 122: Properties of each reactant.

Id	Name	SBO
EO_aw	EO_aw	

Modifier

Table 123: Properties of each modifier.

Id	Name	SBO
EO_aw	EO_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{51} = \mathrm{vol}\left(\mathrm{V\_AW}\right) \cdot \mathrm{k\_EO\_d} \cdot \left[\mathrm{EO\_aw}\right] \tag{203}$$

7.52 Reaction v50

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v50

Reaction equation

$$\mathrm{EO\_a\_aw} \xrightarrow{\mathrm{EO\_a\_aw}} \emptyset \tag{204}$$

Reactant

Table 124: Properties of each reactant.

Id	Name	SBO
EO_a_aw	EO_a_aw	

Modifier

Table 125: Properties of each modifier.

Id	Name	SBO
EO_a_aw	EO_a_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{52} = \mathrm{vol}\left(\mathrm{V\_AW}\right) \cdot \mathrm{k\_EO\_a\_d} \cdot \left[\mathrm{EO\_a\_aw}\right] \tag{205}$$

7.53 Reaction v51

This is a fast irreversible reaction of no reactant forming one product influenced by six modifiers.

Name v51

Reaction equation

$$\emptyset \xrightarrow{\text{EO\_a\_aw, EO\_i\_aw, EO\_aw, EO\_a\_aw, EO\_i\_aw, EO\_aw}} \text{Hn\_aw} \tag{206}$$

Modifiers

Table 126: Properties of each modifier.

Id	Name	SBO
EO_a_aw	EO_a_aw	
EO_i_aw	EO_i_aw	
EO_aw	EO_aw	
EO_a_aw	EO_a_aw	
EO_i_aw	EO_i_aw	
EO_aw	EO_aw	

Product

Table 127: Properties of each product.

Id	Name	SBO
Hn_aw	Hn_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{53} = \text{vol}(\text{V\_AW}) \cdot \text{k\_Hn\_p} \cdot ([\text{EO\_a\_aw}] + [\text{EO\_i\_aw}] + [\text{EO\_aw}]) \tag{207}$$

7.54 Reaction v52

This is a fast irreversible reaction of one reactant forming one product influenced by two modifiers.

Name v52

Reaction equation

$$\text{Hn\_aw} \xrightarrow{\text{Hn\_aw, Hn\_b}} \text{Hn\_b} \tag{208}$$

Reactant

Table 128: Properties of each reactant.

Id	Name	SBO
Hn_aw	Hn_aw	

Modifiers

Table 129: Properties of each modifier.

Id	Name	SBO
Hn_aw	Hn_aw	
Hn_b	Hn_b	

Product

Table 130: Properties of each product.

Id	Name	SBO
Hn_b	Hn_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{54} = \text{Q\_AW\_blf} \cdot \text{R\_Hn\_B} \cdot \left(\frac{[\text{Hn\_aw}] \cdot \text{R\_Hn\_AW}}{\text{Kp\_Hn\_AW}} - [\text{Hn\_b}] \right) \tag{209}$$

7.55 Reaction v53

This is a fast irreversible reaction of no reactant forming one product influenced by two modifiers.

Name v53

Reaction equation

$$\emptyset \xrightarrow{\text{EO\_a\_aw, EO\_a\_aw}} \text{IL\_aw} \tag{210}$$

Modifiers

Table 131: Properties of each modifier.

Id	Name	SBO
EO_a_aw	EO_a_aw	
EO_a_aw	EO_a_aw	

Product

Table 132: Properties of each product.

Id	Name	SBO
IL_aw	IL_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{55} = \mathrm{vol}\,(\mathrm{V\_AW}) \cdot \mathrm{k\_IL\_p} \cdot [\mathrm{EO\_a\_aw}] \tag{211}$$

7.56 Reaction v54

This is a fast irreversible reaction of one reactant forming one product influenced by two modifiers.

Name v54

Reaction equation

$$\mathrm{IL\_aw} \xrightarrow{\mathrm{IL\_aw,\ IL\_b}} \mathrm{IL\_b} \tag{212}$$

Reactant

Table 133: Properties of each reactant.

Id	Name	SBO
IL_aw	IL_aw	

Modifiers

Table 134: Properties of each modifier.

Id	Name	SBO
IL_aw	IL_aw	
IL_b	IL_b	

Product

Table 135: Properties of each product.

Id	Name	SBO
IL_b	IL_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{56} = \text{k\_IL\_t\_awb} \cdot ([\text{IL\_aw}] - [\text{IL\_b}]) + \text{J\_AW\_lymfl} \cdot [\text{IL\_aw}] \tag{213}$$

7.57 Reaction v55

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v55

Reaction equation

$$\text{LTE4\_aw} \xrightarrow{\text{LTE4\_aw}} \emptyset \tag{214}$$

Reactant

Table 136: Properties of each reactant.

Id	Name	SBO
LTE4_aw	LTE4_aw	

Modifier

Table 137: Properties of each modifier.

Id	Name	SBO
LTE4_aw	LTE4_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{57} = \mathrm{vol}\left(\mathrm{Vd\_AW\_LTE}\right) \cdot \left(\mathrm{k\_lte\_el} + \mathrm{k\_acet}\right) \cdot \left[\mathrm{LTE4\_aw}\right] \tag{215}$$

7.58 Reaction v56

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v56

Reaction equation

$$\mathrm{LTD4\_aw} \xrightarrow{\mathrm{LTD4\_aw}} \emptyset \tag{216}$$

Reactant

Table 138: Properties of each reactant.

Id	Name	SBO
LTD4_aw	LTD4_aw	

Modifier

Table 139: Properties of each modifier.

Id	Name	SBO
LTD4_aw	LTD4_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{58} = \mathrm{vol}\left(\mathrm{Vd\_AW\_LTD}\right) \cdot \mathrm{k\_ltc\_ltd\_el} \cdot \left[\mathrm{LTD4\_aw}\right] \tag{217}$$

7.59 Reaction v57

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v57

Reaction equation

$$\text{LTC4\_aw\_out} \xrightarrow{\text{LTC4\_aw\_out}} \emptyset \tag{218}$$

Reactant

Table 140: Properties of each reactant.

Id	Name	SBO
LTC4_aw_out	LTC4_aw_out	

Modifier

Table 141: Properties of each modifier.

Id	Name	SBO
LTC4_aw_out	LTC4_aw_out	

Kinetic Law

Derived unit contains undeclared units

$$v_{59} = \text{vol}\left(\text{Vd\_AW\_LTC}\right) \cdot \text{k\_ltc\_ltd\_el} \cdot \left[\text{LTC4\_aw\_out}\right] \tag{219}$$

7.60 Reaction v58

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v58

Reaction equation

$$\text{IL\_aw} \xrightarrow{\text{IL\_aw}} \emptyset \tag{220}$$

Reactant

Table 142: Properties of each reactant.

Id	Name	SBO
IL_aw	IL_aw	

Modifier

Table 143: Properties of each modifier.

Id	Name	SBO
IL_aw	IL_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{60} = \mathrm{vol}\left(\mathrm{V\_AW}\right) \cdot \mathrm{k\_IL\_d} \cdot \left[\mathrm{IL\_aw}\right] \tag{221}$$

7.61 Reaction v59

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v59

Reaction equation

$$\mathrm{Hn\_aw} \xrightarrow{\mathrm{Hn\_aw}} \emptyset \tag{222}$$

Reactant

Table 144: Properties of each reactant.

Id	Name	SBO
Hn_aw	Hn_aw	

Modifier

Table 145: Properties of each modifier.

Id	Name	SBO
Hn_aw	Hn_aw	

Kinetic Law

Derived unit contains undeclared units

$$v_{61} = \mathrm{vol}\left(\mathrm{Vd\_AW\_Hn}\right) \cdot \mathrm{k\_Hn\_d} \cdot [\mathrm{Hn\_aw}] \tag{223}$$

7.62 Reaction v60

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v60

Reaction equation

$$\mathrm{ZF\_intes} \xrightarrow{\mathrm{ZF\_intes}} \mathrm{ZF\_blood} \tag{224}$$

Reactant

Table 146: Properties of each reactant.

Id	Name	SBO
ZF_intes	ZF_intes	

Modifier

Table 147: Properties of each modifier.

Id	Name	SBO
ZF_intes	ZF_intes	

Product

Table 148: Properties of each product.

Id	Name	SBO
ZF_blood	ZF_blood	

Kinetic Law

Derived unit contains undeclared units

$$v_{62} = \mathrm{vol}\,(\mathrm{Default}) \cdot \mathrm{k\_abs\_zf} \cdot \left([\mathrm{ZF\_intes}] + \frac{\mathrm{oral} \cdot \mathrm{F\_zf} \cdot (\mathrm{a} \cdot \mathrm{ft\_zf} + (1.0 - \mathrm{a})) \cdot \mathrm{DOSE\_zf} \cdot 1000.0}{\mathrm{M\_ZF}} \right) \tag{225}$$

7.63 Reaction v61

This is a fast irreversible reaction of one reactant forming one product influenced by two modifiers.

Name v61

Reaction equation

$$\mathrm{ZF\_blood} \xrightarrow{\mathrm{ZF\_blood,\ ZF\_airways}} \mathrm{ZF\_airways} \tag{226}$$

Reactant

Table 149: Properties of each reactant.

Id	Name	SBO
ZF_blood	ZF_blood	

Modifiers

Table 150: Properties of each modifier.

Id	Name	SBO
ZF_blood	ZF_blood	
ZF_airways	ZF_airways	

Product

Table 151: Properties of each product.

Id	Name	SBO
ZF_airways	ZF_airways	

Kinetic Law

Derived unit contains undeclared units

$$v_{63} = \text{Q\_AW\_blf} \cdot \text{R\_ZF\_B} \cdot \left([\text{ZF\_blood}] - \frac{[\text{ZF\_airways}] \cdot \text{R\_ZF\_AW}}{\text{Kp\_ZF\_AW}} \right) \tag{227}$$

7.64 Reaction v62

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v62

Reaction equation

$$\text{ZF\_blood} \xrightarrow{\text{ZF\_blood}} \emptyset \tag{228}$$

Reactant

Table 152: Properties of each reactant.

Id	Name	SBO
ZF_blood	ZF_blood	

Modifier

Table 153: Properties of each modifier.

Id	Name	SBO
ZF_blood	ZF_blood	

Kinetic Law

Derived unit contains undeclared units

$$v_{64} = \text{vol}\,(\text{Vd\_ZF}) \cdot \text{k\_elim\_zf} \cdot [\text{ZF\_blood}] \tag{229}$$

7.65 Reaction v63

This is a fast irreversible reaction of one reactant forming one product influenced by one modifier.

Name v63

Reaction equation

$$\text{ML\_intes} \xrightarrow{\text{ML\_intes}} \text{ML\_blood} \tag{230}$$

Reactant

Table 154: Properties of each reactant.

Id	Name	SBO
ML_intes	ML_intes	

Modifier

Table 155: Properties of each modifier.

Id	Name	SBO
ML_intes	ML_intes	

Product

Table 156: Properties of each product.

Id	Name	SBO
ML_blood	ML_blood	

Kinetic Law

Derived unit contains undeclared units

$$v_{65} = \mathrm{vol}\,(\mathrm{Default}) \cdot \mathrm{k\_abs\_ml} \cdot \left([\mathrm{ML\_intes}] + \frac{\mathrm{oral} \cdot \mathrm{F\_ml} \cdot (\mathrm{a} \cdot \mathrm{ft\_ml} + (1.0 - \mathrm{a})) \cdot \mathrm{DOSE\_ml} \cdot 1.0E9}{\mathrm{M\_ML}} \right) \quad (231)$$

7.66 Reaction v64

This is a fast irreversible reaction of one reactant forming no product influenced by one modifier.

Name v64

Reaction equation

$$\mathrm{ML\_blood} \xrightarrow{\mathrm{ML\_blood}} \emptyset \quad (232)$$

Reactant

Table 157: Properties of each reactant.

Id	Name	SBO
ML_blood	ML_blood	

Modifier

Table 158: Properties of each modifier.

Id	Name	SBO
ML_blood	ML_blood	

Kinetic Law

Derived unit contains undeclared units

$$v_{66} = \mathrm{vol}\,(\mathrm{Vd\_ML}) \cdot \mathrm{k\_elim\_ml} \cdot [\mathrm{ML\_blood}] \tag{233}$$

8 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.

Identifiers for kinetic laws highlighted in gray cannot be verified to evaluate to units of SBML `substance` per `time`. As a result, some SBML interpreters may not be able to verify the consistency of the units on quantities in the model. Please check if

- parameters without an unit definition are involved or
- volume correction is necessary because the `hasOnlySubstanceUnits` flag may be set to `false` and `spacialDimensions`> 0 for certain species.

8.1 Species AA_b

Name AA_b

Initial concentration $0.2890944\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in v2 and as a product in v1 and as a modifier in v1, v2, v3, v3).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{AA\_b} = v_1 - v_2 \tag{234}$$

8.2 Species HPETE_b

Name HPETE_b

Initial concentration $0.2965837\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in v4, v5 and as a product in v3 and as a modifier in v3, v4).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{HPETE\_b} = v_3 - v_4 - v_5 \tag{235}$$

8.3 Species HETE_b

Name HETE_b

Initial concentration $5.037703\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in v8 and as a product in v4, v5 and as a modifier in v4).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{HETE\_b} = v_4 + v_5 - v_8 \tag{236}$$

8.4 Species LTA4_b

Name LTA4_b

Initial concentration $1.081167\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in v7, v9 and as a product in v6 and as a modifier in v9).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LTA4\_b} = v_6 - v_7 - v_9 \tag{237}$$

8.5 Species LTC4_b

Name LTC4_b

Initial concentration $0.8869873\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in v10in and as a product in v7 and as a modifier in v10in, v10out, v10out).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LTC4\_b} = v_7 - v_{10} \tag{238}$$

8.6 Species LTC4_b_out

Name LTC4_b_out

SBO:0000290 physical compartment

Initial concentration 2168.571 $\mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in v11, v13 and as a product in v10out, v45 and as a modifier in v11, v13, v45).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LTC4\_b\_out} = v_{11} + v_{47} - v_{12} - v_{14} \tag{239}$$

8.7 Species LTD4_b

Name LTD4_b

Initial concentration 1308.488 $\mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in v12, v14 and as a product in v11, v44 and as a modifier in v12, v14, v44).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LTD4\_b} = v_{12} + v_{46} - v_{13} - v_{15} \tag{240}$$

8.8 Species LTE4_b

Name LTE4_b

Initial concentration 2053.137 $\mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in v15 and as a product in v12, v43 and as a modifier in v15, v43).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LTE4\_b} = v_{13} + v_{45} - v_{16} \tag{241}$$

8.9 Species EO_b

Name EO_b

Initial concentration $4.68114\cdot 10^{-7}$ $\mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in ten reactions (as a reactant in v16, v19, v23 and as a product in v18, v30 and as a modifier in v16, v19, v23, v24, v24).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{EO\_b} = v_{19} + v_{31} - v_{17} - v_{20} - v_{24} \tag{242}$$

8.10 Species EO_i_b

Name EO_i_b

Initial concentration $5.479176 \cdot 10^{-8}\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in v17, v21 and as a product in v16 and as a modifier in v17, v21, v24, v24).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{EO\_i\_b} = v_{17} - v_{18} - v_{22} \tag{243}$$

8.11 Species EO_a_b

Name EO_a_b

Initial concentration $5.383185 \cdot 10^{-4}\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in eleven reactions (as a reactant in v18, v20, v22 and as a product in v17 and as a modifier in v18, v20, v22, v24, v24, v26, v26).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{EO\_a\_b} = v_{18} - v_{19} - v_{21} - v_{23} \tag{244}$$

8.12 Species EO_i_aw

Name EO_i_aw

Initial concentration $1.358698 \cdot 10^{-7}\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in v47 and as a product in v21, v46 and as a modifier in v47, v51, v51).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{EO\_i\_aw} = v_{22} + v_{48} - v_{49} \tag{245}$$

8.13 Species EO_a_aw

Name EO_a_aw

Initial concentration $0.001358713\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in ten reactions (as a reactant in v48, v50 and as a product in v22, v47 and as a modifier in v48, v50, v51, v51, v53, v53).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{EO\_a\_aw} = v_{23} + v_{49} - v_{50} - v_{52} \tag{246}$$

8.14 Species EO_aw

Name EO_aw

Initial concentration $1.176558 \cdot 10^{-6}\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in eight reactions (as a reactant in v46, v49 and as a product in v23, v48 and as a modifier in v46, v49, v51, v51).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{EO\_aw} = v_{24} + v_{50} - v_{48} - v_{51} \tag{247}$$

8.15 Species Hn_b

Name Hn_b

Initial concentration $14995.88\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in v25 and as a product in v24, v52 and as a modifier in v25, v52).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Hn\_b} = v_{25} + v_{54} - v_{26} \tag{248}$$

8.16 Species IL_b

Name IL_b

Initial concentration $0.5994857\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in v27, v28 and as a product in v26, v54 and as a modifier in v27, v28, v54).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IL\_b} = v_{27} + v_{56} - v_{28} - v_{29} \tag{249}$$

8.17 Species IL_bm

Name IL_bm

Initial concentration $0.4023394\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a product in v28 and as a modifier in v28, v29, v29).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IL\_bm} = v_{29} \tag{250}$$

8.18 Species EO_bm

Name EO_bm

Initial concentration $1.637391 \cdot 10^{-6}\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in v30 and as a product in v29 and as a modifier in v30).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{EO\_bm} = v_{30} - v_{31} \tag{251}$$

8.19 Species AA_aw

Name AA_aw

Initial concentration $0.1304887\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in v32 and as a product in v31 and as a modifier in v31, v32, v33, v33).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{AA\_aw} = v_{32} - v_{33} \tag{252}$$

8.20 Species HPETE_aw

Name HPETE_aw

Initial concentration $1.780604\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in v34, v35 and as a product in v33 and as a modifier in v33, v34).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{HPETE\_aw} = v_{34} - v_{35} - v_{36} \tag{253}$$

8.21 Species HETE_aw

Name HETE_aw

Initial concentration $1.960926\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in v38 and as a product in v34, v35 and as a modifier in v34).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{HETE\_aw} = v_{35} + v_{36} - v_{39} \tag{254}$$

8.22 Species LTA4_aw

Name LTA4_aw

Initial concentration 41.69257 $\mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in v37, v39 and as a product in v36 and as a modifier in v39).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LTA4\_aw} = v_{37} - v_{38} - v_{40} \tag{255}$$

8.23 Species LTC4_aw

Name LTC4_aw

Initial concentration 6.806687 $\mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in v40in and as a product in v37 and as a modifier in v40in, v40out, v40out).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LTC4\_aw} = v_{38} - v_{41} \tag{256}$$

8.24 Species LTC4_aw_out

Name LTC4_aw_out

Initial concentration 359.9744 $\mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in v41, v45, v57 and as a product in v40out and as a modifier in v41, v45, v57).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LTC4\_aw\_out} = v_{42} - v_{43} - v_{47} - v_{59} \tag{257}$$

8.25 Species LTD4_aw

Name LTD4_aw

Initial concentration 205.7602 $\mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in v42, v44, v56 and as a product in v41 and as a modifier in v42, v44, v56).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LTD4\_aw} = v_{43} - v_{44} - v_{46} - v_{58} \tag{258}$$

8.26 Species LTE4_aw

Name LTE4_aw

Initial concentration 322.6366 mol · l^{-1}

This species takes part in five reactions (as a reactant in v43, v55 and as a product in v42 and as a modifier in v43, v55).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LTE4\_aw} = v_{44} - v_{45} - v_{57} \tag{259}$$

8.27 Species Hn_aw

Name Hn_aw

Initial concentration 14162.15 mol · l^{-1}

This species takes part in five reactions (as a reactant in v52, v59 and as a product in v51 and as a modifier in v52, v59).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Hn\_aw} = v_{53} - v_{54} - v_{61} \tag{260}$$

8.28 Species IL_aw

Name IL_aw

Initial concentration 0.6627439 mol · l^{-1}

This species takes part in five reactions (as a reactant in v54, v58 and as a product in v53 and as a modifier in v54, v58).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IL\_aw} = v_{55} - v_{56} - v_{60} \tag{261}$$

8.29 Species ZF_intes

Name ZF_intes

Initial concentration 0 mol · l^{-1}

This species takes part in two reactions (as a reactant in v60 and as a modifier in v60).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{ZF\_intes} = -v_{62} \tag{262}$$

8.30 Species ZF_blood

Name ZF_blood

Initial concentration $0\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in v61, v62 and as a product in v60 and as a modifier in v61, v62).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{ZF\_blood} = v_{62} - v_{63} - v_{64} \tag{263}$$

8.31 Species ZF_airways

Name ZF_airways

Initial concentration $0\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in two reactions (as a product in v61 and as a modifier in v61).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{ZF\_airways} = v_{63} \tag{264}$$

8.32 Species ML_intes

Name ML_intes

Initial concentration $0\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in v63 and as a modifier in v63).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{ML\_intes} = -v_{65} \tag{265}$$

8.33 Species ML_blood

Name ML_blood

Initial concentration $0\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in v64 and as a product in v63 and as a modifier in v64).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{ML\_blood} = v_{65} - v_{66} \tag{266}$$

A Glossary of Systems Biology Ontology Terms

SBO:0000290 physical compartment: Specific location of space, that can be bounded or not. A physical compartment can have 1, 2 or 3 dimensions

SBML2LaTeX was developed by Andreas Dräger[a], Hannes Planatscher[a], Dieudonné M Wouamba[a], Adrian Schröder[a], Michael Hucka[b], Lukas Endler[c], Martin Golebiewski[d] and Andreas Zell[a]. Please see http://www.ra.cs.uni-tuebingen.de/software/SBML2LaTeX for more information.

[a]Center for Bioinformatics Tübingen (ZBIT), Germany
[b]California Institute of Technology, Beckman Institute BNMC, Pasadena, United States
[c]European Bioinformatics Institute, Wellcome Trust Genome Campus, Hinxton, United Kingdom
[d]EML Research gGmbH, Heidelberg, Germany