<?xml version="1.0" encoding="UTF-8"?>

<!-- This model was downloaded from BioModels Database -->

<!-- Thu Mar 03 22:08:56 GMT 2011 -->

<!-- http://www.ebi.ac.uk/biomodels/ -->

<sbml xmlns="http://www.sbml.org/sbml/level2/version3" metaid="metaid\_0000001" level="2" version="3">

<model metaid="metaid\_0000002" id="Goldbeter2008\_Somite\_Segmentation\_Clock\_Notch\_Wnt\_FGF">

<notes>

<p xmlns="http://www.w3.org/1999/xhtml">This is a model of the coupled Natch, Wnt and FGF modules as described in:

<br/>

<b>A. Goldbeter and O. Pourquié</b>,

<em>Modeling the segmentation clock as a network of coupled oscillations in the Notch, Wnt and FGF signaling pathways.</em> J Theor Biol. 2008 Jun 7;252(3):574-85, pubmed ID:

<a href="http://www.ncbi.nlm.nih.gov/pubmed/18308339">18308339</a>

<br/>

To uncouple the modules remove the reaction

<em>MAx\_trans\_Xa</em> and set

<em>vsFK=vsF</em>.

<br/>

The SBML version of the model was converted from the CellML

<a href="http://www.cellml.org/models/goldbeter\_pourquie\_2008\_version02">version</a> by Catherine Lloyd for the

<a href="http://www.cellml.org/models"> CellML repository </a>.

</p>

<p xmlns="http://www.w3.org/1999/xhtml">This model originates from BioModels Database: A Database of Annotated Published Models (http://www.ebi.ac.uk/biomodels/). It is copyright (c) 2005-2010 The BioModels.net Team.<br/>

For more information see the <a href="http://www.ebi.ac.uk/biomodels/legal.html" target="\_blank">terms of use</a>.<br/>

To cite BioModels Database, please use: <a href="http://www.ncbi.nlm.nih.gov/pubmed/20587024" target="\_blank">Li C, Donizelli M, Rodriguez N, Dharuri H, Endler L, Chelliah V, Li L, He E, Henry A, Stefan MI, Snoep JL, Hucka M, Le Novère N, Laibe C (2010) BioModels Database: An enhanced, curated and annotated resource for published quantitative kinetic models. BMC Syst Biol., 4:92.</a>

</p>

</notes>

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<vCard:N rdf:parseType="Resource">

<vCard:Family>Lloyd</vCard:Family>

<vCard:Given>Catherine</vCard:Given>

</vCard:N>

<vCard:EMAIL>c.lloyd@auckland.ac.nz</vCard:EMAIL>

<vCard:ORG>

<vCard:Orgname>University of Auckland</vCard:Orgname>

</vCard:ORG>

</rdf:li>

<rdf:li rdf:parseType="Resource">

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<vCard:Given>Lukas</vCard:Given>

</vCard:N>

<vCard:EMAIL>lukas@ebi.ac.uk</vCard:EMAIL>

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<vCard:Orgname>EMBL-EBI</vCard:Orgname>

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<species metaid="metaid\_0000120" id="AK" name="Axin2/Gsk3 destruction complex" compartment="cytosol" boundaryCondition="true" sboTerm="SBO:0000297">

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</rdf:Description>

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</species>

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<species metaid="metaid\_0000075" id="Fgf" name="Fgf" compartment="cytosol" initialConcentration="1" constant="true" sboTerm="SBO:0000252">

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<rdf:Description rdf:about="#metaid\_0000075">

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<parameter metaid="metaid\_0000011" id="vdN" name="vdN" value="2.82" units="flux" sboTerm="SBO:0000324"/>

<parameter metaid="metaid\_0000013" id="KdNa" name="KdNa" value="0.001" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000014" id="VdNa" name="VdNa" value="0.01" units="flux" sboTerm="SBO:0000186"/>

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<parameter metaid="metaid\_0000017" id="KdNan" name="KdNan" value="0.001" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000018" id="VdNan" name="VdNan" value="0.1" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000019" id="KdMF" name="KdMF" value="0.768" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000020" id="KIG1" name="KIG1" value="2.5" units="nanomolar"/>

<parameter metaid="metaid\_0000021" id="vsFK" name="vsFK" units="flux" constant="false" sboTerm="SBO:0000186"/>

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<parameter metaid="metaid\_0000025" id="KdF" name="KdF" value="0.37" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000026" id="vdF" name="vdF" value="0.39" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000027" id="ksF" name="ksF" value="0.3" units="first\_order\_rate\_constant" sboTerm="SBO:0000022"/>

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<parameter metaid="metaid\_0000029" id="vsB" name="vsB" value="0.087" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000030" id="kd2" name="kd2" value="7.062" units="first\_order\_rate\_constant" sboTerm="SBO:0000022"/>

<parameter metaid="metaid\_0000031" id="v0" name="v0" value="0.06" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000032" id="vMB" name="vMB" value="1.64" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000033" id="vmd" name="vmd" value="0.8" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000034" id="KaB" name="KaB" value="0.7" units="nanomolar"/>

<parameter metaid="metaid\_0000035" id="KaXa" name="KaXa" value="0.05" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000036" id="Kmd" name="Kmd" value="0.48" units="nanomolar"/>

<parameter metaid="metaid\_0000037" id="n" name="n" value="2" units="dimensionless" sboTerm="SBO:0000190"/>

<parameter metaid="metaid\_0000038" id="m" name="m" value="2" units="dimensionless" sboTerm="SBO:0000190"/>

<parameter metaid="metaid\_0000039" id="vMXa" name="vMXa" value="0.5" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000040" id="ksAx" name="ksAx" value="0.02" units="first\_order\_rate\_constant" sboTerm="SBO:0000022"/>

<parameter metaid="metaid\_0000041" id="vdAx" name="vdAx" value="0.6" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000042" id="KdAx" name="KdAx" value="0.63" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000048" id="d1" name="d1" value="0.1" units="first\_order\_rate\_constant" sboTerm="SBO:0000338"/>

<parameter metaid="metaid\_0000049" id="a1" name="a1" value="1.8" units="second\_order\_rate\_constant" sboTerm="SBO:0000023"/>

<parameter metaid="metaid\_0000050" id="K1" name="K1" value="0.28" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000051" id="K2" name="K2" value="0.03" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000052" id="kt3" name="kt3" value="0.7" units="first\_order\_rate\_constant" sboTerm="SBO:0000022"/>

<parameter metaid="metaid\_0000053" id="kt4" name="kt4" value="1.5" units="first\_order\_rate\_constant" sboTerm="SBO:0000032"/>

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<parameter metaid="metaid\_0000057" id="vdDusp" name="vdDusp" value="2" units="flux" sboTerm="SBO:0000186"/>

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<parameter metaid="metaid\_0000067" id="kcDusp" name="kcDusp" value="1.35" units="first\_order\_rate\_constant" sboTerm="SBO:0000022"/>

<parameter metaid="metaid\_0000076" id="KaFgf" name="KaFgf" value="0.5" units="nanomolar" sboTerm="SBO:0000191"/>

<parameter metaid="metaid\_0000077" id="KaRas" name="KaRas" value="0.103" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000078" id="KdRas" name="KdRas" value="0.1" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000079" id="KdErk" name="KdErk" value="0.05" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000080" id="KaErk" name="KaErk" value="0.05" units="nanomolar" sboTerm="SBO:0000027"/>

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<parameter metaid="metaid\_0000082" id="KIF" name="KIF" value="0.5" units="nanomolar" sboTerm="SBO:0000191"/>

<parameter metaid="metaid\_0000083" id="KID" name="KID" value="0.5" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000084" id="KdX" name="KdX" value="0.05" units="nanomolar" sboTerm="SBO:0000027"/>

<parameter metaid="metaid\_0000085" id="KaMDusp" name="KaMDusp" value="0.5" units="nanomolar" sboTerm="SBO:0000191"/>

<parameter metaid="metaid\_0000086" id="KdMDusp" name="KdMDusp" value="0.5" units="nanomolar" sboTerm="SBO:0000027"/>

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<parameter metaid="metaid\_0000089" id="kc" name="kc" value="3.45" units="first\_order\_rate\_constant" sboTerm="SBO:0000022"/>

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<parameter metaid="metaid\_0000137" id="VMdMDusp" name="VMdMDusp" value="0.5" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000138" id="VMK" name="VMK" value="5.08" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000139" id="VMP" name="VMP" value="1" units="flux" sboTerm="SBO:0000186"/>

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<parameter metaid="metaid\_0000141" id="VMdRas" name="VMdRas" value="0.41" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000142" id="VMaErk" name="VMaErk" value="3.3" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000143" id="VMaX" name="VMaX" value="1.6" units="flux" sboTerm="SBO:0000186"/>

<parameter metaid="metaid\_0000144" id="VMdX" name="VMdX" value="0.5" units="flux" sboTerm="SBO:0000186"/>

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<apply>

<times/>

<ci> vsF </ci>

<apply>

<divide/>

<ci> KIG1 </ci>

<apply>

<plus/>

<ci> KIG1 </ci>

<ci> K </ci>

</apply>

</apply>

</apply>

</math>

</assignmentRule>

<assignmentRule metaid="metaid\_0000123" variable="AK">

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<minus/>

<ci> Kt </ci>

<ci> K </ci>

</apply>

</math>

</assignmentRule>

<assignmentRule metaid="metaid\_0000128" variable="Rasi">

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<minus/>

<ci> Rast </ci>

<ci> Rasa </ci>

</apply>

</math>

</assignmentRule>

<assignmentRule metaid="metaid\_0000131" variable="ERKi">

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<minus/>

<ci> ERKt </ci>

<ci> ERKa </ci>

</apply>

</math>

</assignmentRule>

<assignmentRule metaid="metaid\_0000134" variable="Xi">

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<minus/>

<ci> Xt </ci>

<ci> Xa </ci>

</apply>

</math>

</assignmentRule>

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<reaction metaid="metaid\_0000155" id="n\_synth" name="Notch\_synthesis" reversible="false">

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</rdf:Description>

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</annotation>

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<speciesReference species="N"/>

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<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> cytosol </ci>

<ci> epsilon </ci>

<ci> vsN </ci>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000156" id="N\_degradation" name="N\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

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<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0030163"/>

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</bqbiol:isVersionOf>

</rdf:Description>

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</annotation>

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<speciesReference species="N"/>

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<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

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<divide/>

<apply>

<times/>

<ci> epsilon </ci>

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<ci> vdN </ci>

<ci> N </ci>

</apply>

<apply>

<plus/>

<ci> KdN </ci>

<ci> N </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000157" id="N\_activation" name="Notch\_activation" reversible="false" sboTerm="SBO:0000178">

<annotation>

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<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0007220"/>

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</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

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<speciesReference species="N"/>

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</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="F"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> epsilon </ci>

<ci> cytosol </ci>

<ci> kc </ci>

<ci> N </ci>

<apply>

<power/>

<ci> KIF </ci>

<ci> j </ci>

</apply>

</apply>

<apply>

<plus/>

<apply>

<power/>

<ci> KIF </ci>

<ci> j </ci>

</apply>

<apply>

<power/>

<ci> F </ci>

<ci> j </ci>

</apply>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000158" id="Na\_degradation" name="Na\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000158">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0030163"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="Na"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> epsilon </ci>

<ci> cytosol </ci>

<ci> VdNa </ci>

<ci> Na </ci>

</apply>

<apply>

<plus/>

<ci> KdNa </ci>

<ci> Na </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000159" id="Na\_transport" sboTerm="SBO:0000185">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000159">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:reactome:REACT\_2155.3"/>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0006913"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="Na"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="Nan"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> epsilon </ci>

<ci> cytosol </ci>

<apply>

<minus/>

<apply>

<times/>

<ci> kt1 </ci>

<ci> Na </ci>

</apply>

<apply>

<times/>

<ci> kt2 </ci>

<ci> Nan </ci>

</apply>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000160" id="Nan\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000160">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0030163"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="Nan"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> epsilon </ci>

<ci> cytosol </ci>

<ci> VdNan </ci>

<ci> Nan </ci>

</apply>

<apply>

<plus/>

<ci> KdNan </ci>

<ci> Nan </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000161" id="MF\_transkription" reversible="false" sboTerm="SBO:0000183">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000161">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0009299"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="MF"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="Nan"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> epsilon </ci>

<ci> cytosol </ci>

<ci> vsFK </ci>

<apply>

<power/>

<ci> Nan </ci>

<ci> p </ci>

</apply>

</apply>

<apply>

<plus/>

<apply>

<power/>

<ci> KA </ci>

<ci> p </ci>

</apply>

<apply>

<power/>

<ci> Nan </ci>

<ci> p </ci>

</apply>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000162" id="MF\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000162">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0006402"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="MF"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> epsilon </ci>

<ci> cytosol </ci>

<ci> vmF </ci>

<ci> MF </ci>

</apply>

<apply>

<plus/>

<ci> KdMF </ci>

<ci> MF </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000163" id="F\_translation" reversible="false" sboTerm="SBO:0000184">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000163">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0006412"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="F"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="MF"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> epsilon </ci>

<ci> cytosol </ci>

<ci> ksF </ci>

<ci> MF </ci>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000164" id="F\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000164">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0030163"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="F"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> epsilon </ci>

<ci> cytosol </ci>

<ci> vdF </ci>

<ci> F </ci>

</apply>

<apply>

<plus/>

<ci> KdF </ci>

<ci> F </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000165" id="AK\_dissoc" sboTerm="SBO:0000180">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000165">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0043241"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="AK"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="A"/>

<speciesReference species="K"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<apply>

<minus/>

<apply>

<times/>

<ci> d1 </ci>

<ci> AK </ci>

</apply>

<apply>

<times/>

<ci> a1 </ci>

<ci> A </ci>

<ci> K </ci>

</apply>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000166" id="B\_synth" reversible="false">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000166">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0010467"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="B"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<ci> vsB </ci>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000167" id="B\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000167">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0030163"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="B"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<ci> kd1 </ci>

<ci> B </ci>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000168" id="B\_phosphorylation" reversible="false" sboTerm="SBO:0000216">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000168">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:reactome:REACT\_11065.1"/>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0006468"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="B"/>

</listOfReactants>

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<speciesReference species="Bp"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="AK"/>

<modifierSpeciesReference species="D"/>

<modifierSpeciesReference species="Kt"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<apply>

<divide/>

<apply>

<times/>

<apply>

<divide/>

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<ci> VMK </ci>

<ci> KID </ci>

</apply>

<apply>

<plus/>

<ci> KID </ci>

<ci> D </ci>

</apply>

</apply>

<ci> B </ci>

</apply>

<apply>

<plus/>

<ci> K1 </ci>

<ci> B </ci>

</apply>

</apply>

<ci> AK </ci>

</apply>

<ci> Kt </ci>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000169" id="BP\_dephosphorylation" reversible="false" sboTerm="SBO:0000330">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000169">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0006470"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="Bp"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="B"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<ci> VMP </ci>

<ci> Bp </ci>

</apply>

<apply>

<plus/>

<ci> K2 </ci>

<ci> Bp </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000170" id="B\_shuttling" sboTerm="SBO:0000185">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000170">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0006913"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="BN"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="B"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<apply>

<minus/>

<apply>

<times/>

<ci> kt4 </ci>

<ci> BN </ci>

</apply>

<apply>

<times/>

<ci> kt3 </ci>

<ci> B </ci>

</apply>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000171" id="Bp\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000171">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:reactome:REACT\_11063.1"/>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0030163"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="Bp"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<ci> kd2 </ci>

<ci> Bp </ci>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000172" id="MAx\_trans\_basal" reversible="false" sboTerm="SBO:0000183">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000172">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0009299"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="MAx"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="BN"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<ci> v0 </ci>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0110172" id="MAx\_trans\_BN" reversible="false" sboTerm="SBO:0000183">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0110172">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0009299"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="MAx"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="BN"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<apply>

<divide/>

<apply>

<times/>

<ci> vMB </ci>

<apply>

<power/>

<ci> BN </ci>

<ci> n </ci>

</apply>

</apply>

<apply>

<plus/>

<apply>

<power/>

<ci> KaB </ci>

<ci> n </ci>

</apply>

<apply>

<power/>

<ci> BN </ci>

<ci> n </ci>

</apply>

</apply>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0100172" id="MAx\_trans\_Xa" reversible="false" sboTerm="SBO:0000183">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0100172">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0009299"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="MAx"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="Xa"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<apply>

<divide/>

<apply>

<times/>

<ci> vMXa </ci>

<apply>

<power/>

<ci> Xa </ci>

<ci> m </ci>

</apply>

</apply>

<apply>

<plus/>

<apply>

<power/>

<ci> KaXa </ci>

<ci> m </ci>

</apply>

<apply>

<power/>

<ci> Xa </ci>

<ci> m </ci>

</apply>

</apply>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000173" id="MAx\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000173">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0006402"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="MAx"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<ci> vmd </ci>

<ci> MAx </ci>

</apply>

<apply>

<plus/>

<ci> Kmd </ci>

<ci> MAx </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000174" id="A\_translation" reversible="false" sboTerm="SBO:0000184">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000174">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0006412"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="A"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="MAx"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<ci> ksAx </ci>

<ci> MAx </ci>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000175" id="A\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000175">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0030163"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="A"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> theta </ci>

<ci> cytosol </ci>

<ci> vdAx </ci>

<ci> A </ci>

</apply>

<apply>

<plus/>

<ci> KdAx </ci>

<ci> A </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000176" id="Ras\_activation" reversible="false">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000176">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:reactome:REACT\_2010.5"/>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0032856"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="Rasa"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="Rasi"/>

<modifierSpeciesReference species="Fgf"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<apply>

<divide/>

<apply>

<times/>

<ci> eta </ci>

<ci> cytosol </ci>

<ci> VMaRas </ci>

<apply>

<power/>

<ci> Fgf </ci>

<ci> r </ci>

</apply>

</apply>

<apply>

<plus/>

<apply>

<power/>

<ci> KaFgf </ci>

<ci> r </ci>

</apply>

<apply>

<power/>

<ci> Fgf </ci>

<ci> r </ci>

</apply>

</apply>

</apply>

<ci> Rasi </ci>

</apply>

<apply>

<plus/>

<ci> KaRas </ci>

<ci> Rasi </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000177" id="Ras\_inactivation" reversible="false">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000177">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0034261"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="Rasa"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> eta </ci>

<ci> cytosol </ci>

<ci> VMdRas </ci>

<ci> Rasa </ci>

</apply>

<apply>

<plus/>

<ci> KdRas </ci>

<ci> Rasa </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000178" id="Erk\_activation" reversible="false">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000178">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:reactome:REACT\_1482.4"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="ERKa"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="ERKi"/>

<modifierSpeciesReference species="Rasa"/>

<modifierSpeciesReference species="Rast"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<apply>

<divide/>

<apply>

<times/>

<ci> eta </ci>

<ci> cytosol </ci>

<ci> VMaErk </ci>

<ci> Rasa </ci>

</apply>

<ci> Rast </ci>

</apply>

<ci> ERKi </ci>

</apply>

<apply>

<plus/>

<ci> KaErk </ci>

<ci> ERKi </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000179" id="Erk\_inactivation" reversible="false">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000179">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:reactome:REACT\_12436.1"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="ERKa"/>

</listOfReactants>

<listOfModifiers>

<modifierSpeciesReference species="Dusp"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> eta </ci>

<ci> cytosol </ci>

<ci> kcDusp </ci>

<ci> Dusp </ci>

<ci> ERKa </ci>

</apply>

<apply>

<plus/>

<ci> KdErk </ci>

<ci> ERKa </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000180" id="X\_activation" reversible="false">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000180">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0051091"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="Xa"/>

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<listOfModifiers>

<modifierSpeciesReference species="ERKa"/>

<modifierSpeciesReference species="ERKt"/>

<modifierSpeciesReference species="Xi"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<apply>

<divide/>

<apply>

<times/>

<ci> eta </ci>

<ci> cytosol </ci>

<ci> VMaX </ci>

<ci> ERKa </ci>

</apply>

<ci> ERKt </ci>

</apply>

<ci> Xi </ci>

</apply>

<apply>

<plus/>

<ci> KaX </ci>

<ci> Xi </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000181" id="X\_inactivation" reversible="false">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000181">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0043433"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="Xa"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> eta </ci>

<ci> cytosol </ci>

<ci> VMdX </ci>

<ci> Xa </ci>

</apply>

<apply>

<plus/>

<ci> KdX </ci>

<ci> Xa </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000182" id="MDusp\_transkription" reversible="false" sboTerm="SBO:0000183">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000182">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0009299"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="MDusp"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="Xa"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

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<apply>

<times/>

<ci> eta </ci>

<ci> cytosol </ci>

<ci> VMsMDusp </ci>

<apply>

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<ci> Xa </ci>

<ci> q </ci>

</apply>

</apply>

<apply>

<plus/>

<apply>

<power/>

<ci> KaMDusp </ci>

<ci> q </ci>

</apply>

<apply>

<power/>

<ci> Xa </ci>

<ci> q </ci>

</apply>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000183" id="MDusp\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000183">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0006402"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="MDusp"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<divide/>

<apply>

<times/>

<ci> eta </ci>

<ci> cytosol </ci>

<ci> VMdMDusp </ci>

<ci> MDusp </ci>

</apply>

<apply>

<plus/>

<ci> KdMDusp </ci>

<ci> MDusp </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000184" id="Dusp\_translation" reversible="false" sboTerm="SBO:0000184">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000184">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0006412"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfProducts>

<speciesReference species="Dusp"/>

</listOfProducts>

<listOfModifiers>

<modifierSpeciesReference species="MDusp"/>

</listOfModifiers>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<apply>

<times/>

<ci> eta </ci>

<ci> cytosol </ci>

<ci> ksDusp </ci>

<ci> MDusp </ci>

</apply>

</math>

</kineticLaw>

</reaction>

<reaction metaid="metaid\_0000185" id="Dusp\_degradation" reversible="false" sboTerm="SBO:0000179">

<annotation>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:vCard="http://www.w3.org/2001/vcard-rdf/3.0#" xmlns:bqbiol="http://biomodels.net/biology-qualifiers/" xmlns:bqmodel="http://biomodels.net/model-qualifiers/">

<rdf:Description rdf:about="#metaid\_0000185">

<bqbiol:isVersionOf>

<rdf:Bag>

<rdf:li rdf:resource="urn:miriam:obo.go:GO%3A0030163"/>

</rdf:Bag>

</bqbiol:isVersionOf>

</rdf:Description>

</rdf:RDF>

</annotation>

<listOfReactants>

<speciesReference species="Dusp"/>

</listOfReactants>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

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<divide/>

<apply>

<times/>

<ci> eta </ci>

<ci> cytosol </ci>

<ci> vdDusp </ci>

<ci> Dusp </ci>

</apply>

<apply>

<plus/>

<ci> KdDusp </ci>

<ci> Dusp </ci>

</apply>

</apply>

</math>

</kineticLaw>

</reaction>

</listOfReactions>

</model>

</sbml>