

**Table S3. Parameters for the transcriptional module**

Model/ Parameters	Value	Unit	Reference
<b><i>Hog1 Model</i></b>			
$\alpha_{Hog1}$	0.398 *1e+6	$J \cdot m^{-3}$	Taken from [50]
$\beta_{Hog1}$	0.2992		Taken from [50]
$\gamma_{Hog1}$	0.9626*1e+6	$J \cdot m^{-3}$	Taken from [50]
$w_{Hog1}$	4.688*1e+3	$J \cdot m^{-3} \cdot mM^{-1}$	Taken from [50]
$K_{pho}^{Pbs2}$	0.6537	$s^{-1}$	Taken from [50]
$K_{depho}^{Pbs2}$	0.224	$s^{-1}$	Taken from [50]
$K_{pho}^{Hog1}$	186.67	$mM^{-1} \cdot s^{-1}$	Taken from [50]
$K_{depho}^{Hog1PPc}$	1.5*1e-3	$s^{-1}$	Taken from [50]
$K_{imp}^{Hog1c}$	0.0125	$s^{-1}$	Taken from [50]
$K_{exp}^{Hog1n}$	0.106	$s^{-1}$	Taken from [50]
$K_{imp}^{Hog1PPc}$	0.02	$s^{-1}$	Taken from [50]
$K_{exp}^{Hog1PPn}$	0.1179	$s^{-1}$	Taken from [50]
$K_{depho}^{Hog1PPn}$	0.0686	$s^{-1}$	Taken from [50]
$K_{s0}^{Glyc}$	0.0875	$mM \cdot s^{-1}$	Taken from [50]
$K_{s1}^{Glyc}$	0.9357	$mM \cdot s^{-1}$	Taken from [50]
$K_{s2}^{Glyc}$	18.983	$s^{-1}$	Taken from [50]
$K_{exp0}^{Glyc}$	8.333*1e-5	$s^{-1}$	Taken from [50]
$K_{exp1}^{Glyc}$	4.938*1e-4	$s^{-1}$	Taken from [50]

$K_{s0}^{Yr}$	2.018*1e-7	$\mu\text{M}\cdot\text{min}^{-1}$	Taken from [50]
$K_{s1}^{Yr}$	0.02	$\text{s}^{-1}$	Taken from [50]
$K_t^{Yr}$	1.489*1e-4	$\text{s}^{-1}$	Taken from [50]
<b><i>Calcineurin Model</i></b>			
$C_{Ca}$	2.5*1e-6	$\text{mM s}^{-1}$	
$d_{Ca}$	0.05	$\text{s}^{-1}$	Estimated from [25]
$h_{Na\_cyt}^*$	12		Estimated from [25,27]
$h_{Na\_ext}^*$	2		Estimated from [25,27]
$k_{Ca,cyt}^*$	8.0*1e-6	$\text{mM s}^{-1}$	Estimated from [25,27]
$k_{Ca,ext}^*$	2.4*1e-5	$\text{mM s}^{-1}$	Estimated from [25,27]
$Km_{Ca\_cyt}$	180.0	$\text{mM}$	Estimated from [25,27]
$Km_{Ca\_ext}$	500.0	$\text{mM}$	Estimated from [25,27]
$k_{Ca,pH}^*$	1.5*1e-5	$\text{mM s}^{-1}$	
$k_{CN,a}$	1.0e+9	$\text{mM}^{-3} \text{s}^{-1}$	Estimated from [62]
$k_{CN,da}$	5.0*1e-4	$\text{s}^{-1}$	Estimated from [62]
$k_{CN\_Ppz,da}^*$	200.0	$\text{mM}^{-1} \text{s}^{-1}$	Estimated from [63]
$C_{Crz1}$	7.866*1e-7	$\text{mM s}^{-1}$	
$d_{Crz1}$	4.1*1e-3	$\text{s}^{-1}$	
$k_{Crz1}^*$	0.1	$\text{s}^{-1}$	
<b><i>Nrg1p Model</i></b>			
$C_{Nrg1}$	4*1e-7	$\text{mM s}^{-1}$	
$d_{Nrg1}$	7.5*1e-4	$\text{s}^{-1}$	Estimated from [64]

$k_{Nrg1,pH}^*$	$5.25 \cdot 10^{-8}$	$\text{mM s}^{-1}$	Estimated from [34,65]
<b><i>ENAI Model</i></b>			
$C_{ENAI,Nrg1}^*$	$1.5 \cdot 10^{-6}$	$\text{mM s}^{-1}$	Estimated from [33,60,66]
$Km_{ENAI,Nrg1}^*$	$1.143.0 \cdot 10^{-4}$	$\text{mM}$	Estimated from [34,65]
$h_{ENAI,Nrg1}^*$	3		
$k_{ENAI,Crz1}^*$	$4.5 \cdot 10^{-5}$	$\text{s}^{-1}$	Estimated from [27,33]
$k_{ENAI,Hog1}^*$	$1.5 \cdot 10^{-6}$	$\text{s}^{-1}$	Estimated from [27,33]
$d_{ENAI,mRNA}^*$	0.00683	$\text{s}^{-1}$	Estimated from [66]
$kt_{Ena1}$	0.0205	$\text{s}^{-1}$	
$d_{Ena1}$	$1.33 \cdot 10^{-3}$	$\text{s}^{-1}$	Estimated from [64]

\* The values of these parameters were adjusted during the model integration step such that simulation results are consistent with experimental data.