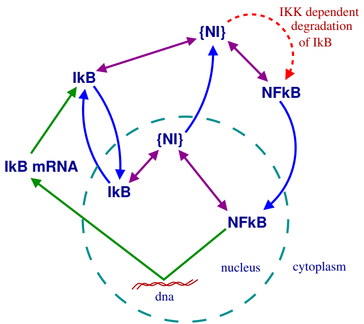
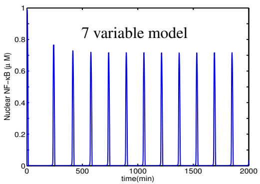
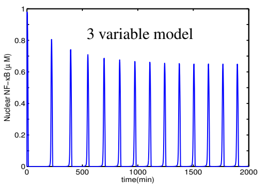
7 variable model







$A = 0.007$

$B = 954.5$

$C = 0.035$

$\epsilon = 2 \times 10^{-5}$

$\delta = 0.029$

4 variable model

Equilibrium of complexes

$$(NI) = (N_{tot} - N_n)\frac{I}{K_I + I}$$

$$N = (N_{tot} - N_n)\frac{K_I}{K_I + I}$$

$$(NI)_n = I_n^{tot}\frac{N_n}{K_N + N_n}$$

$$I_n = I_n^{tot}\frac{K_N}{K_N + N_n}$$

$$\frac{dN_n}{dt} = k_{Nin}K_I\frac{(N_{tot} - N_n)}{K_I + I} - k_{NIout}\frac{I_n^{tot}N_n}{K_N + N_n}$$

$$\frac{dI_m}{dt} = k_t N_n^2 - \gamma_m I_m$$

Small terms deleted

$$\frac{dI}{dt} = k_{tl}I_m - \alpha\frac{(N_{tot} - N_n)I}{K_I + I} - k_{Iin}I + k_{Iout}K_N\frac{I_n^{tot}}{K_N + N_n}$$

$$\frac{dI_n^{tot}}{dt} = k_{Iin}I - k_{Iout}K_N\frac{I_n^{tot}}{K_N + N_n} - k_{NIout}\frac{I_n^{tot}N_n}{K_N + N_n}$$

$I_n^{tot}N_n/(K_N + N_n)$ is significant only when $N_n >> K_n$. At this point I_n^{tot} reaches its minimum

$\Rightarrow I_n^{tot} \approx \frac{k_{Iin}}{k_{NIout}}I$

$(dI_n^{tot}/dt = 0$ and $N_n >> K_N)$

$t \to (1/\gamma_m)t$

$N_n \to N_{tot}N_n$

$I_m \to (k_t N_{tot}^2/\gamma_m)I_m$

$I \to (k_t k_{tl} N_{tot}^2/\gamma_m^2)I$

3 variable model

$$\frac{dN_n}{dt} = A\frac{(1 - N_n)}{\epsilon + I} - B\frac{IN_n}{\delta + N_n}$$

$$\frac{dI_m}{dt} = N_n^2 - I_m$$

$$\frac{dI}{dt} = I_m - C\frac{(1 - N_n)I}{\epsilon + I}$$

where $A = \frac{k_{Nin}K_I\gamma_m}{k_t k_{tl} N_{tot}^2}$; $B = \frac{k_{Iin}k_t k_{tl} N_{tot}}{\gamma_m^3}$; $C = \frac{\alpha\gamma_m}{k_t k_{tl} N_{tot}}$

$\epsilon = \frac{K_I\gamma_m^2}{k_t k_{tl} N_{tot}^2}$; $\delta = K_N/N_{tot}$