

(*ODEs list for the network components*)

(*Traditional form*)

$$\frac{\partial \text{TCR}}{\partial t} = \frac{1}{\exp(-b(\text{WTCR}(t) - .5)) + 1} - \text{DTCR TCR}(t)$$

$$\frac{\partial \text{CD28}}{\partial t} = \frac{1}{\exp(-b(\text{WCD28}(t) - .5)) + 1} - \text{DCD28 CD28}(t)$$

$$\frac{\partial \text{CD8086E}}{\partial t} = \frac{1}{\exp(-b(\text{WCD8086E}(t) - .5)) + 1} - \text{DCD8086E CD8086E}(t)$$

$$\frac{\partial \text{AP1}}{\partial t} = \frac{1}{\exp(-b(\text{WAP1}(t) - .5)) + 1} - \text{DAP1 AP1}(t)$$

$$\frac{\partial \text{CD25}}{\partial t} = \frac{1}{\exp(-b(\text{WCD25}(t) - .5)) + 1} - \text{DCD25 CD25}(t)$$

$$\frac{\partial \text{IL2G}}{\partial t} = \frac{1}{\exp(-b(\text{WIL2G}(t) - .5)) + 1} - \text{DIL2G IL2G}(t)$$

$$\frac{\partial \text{MTOR}}{\partial t} = \frac{1}{\exp(-b(\text{WMTOR}(t) - .5)) + 1} - \text{DMTOR MTOR}(t)$$

$$\frac{\partial \text{ZAP70}}{\partial t} = \frac{1}{\exp(-b(\text{WZAP70}(t) - .5)) + 1} - \text{DZAP70 ZAP70}(t)$$

$$\frac{\partial \text{STAT5}}{\partial t} = \frac{1}{\exp(-b(\text{WSTAT5}(t) - .5)) + 1} - \text{DSTAT5 STAT5}(t)$$

$$\frac{\partial \text{NFAT}}{\partial t} = \frac{1}{\exp(-b(\text{WNFAT}(t) - .5)) + 1} - \text{DNFAT NFAT}(t)$$

$$\frac{\partial \text{NFKB}}{\partial t} = \frac{1}{\exp(-b(\text{WNFKB}(t) - .5)) + 1} - \text{DNFKB NFKB}(t)$$

$$\frac{\partial \text{AKT}}{\partial t} = \frac{1}{\exp(-b(\text{WAKT}(t) - .5)) + 1} - \text{DAKT AKT}(t)$$

$$\frac{\partial \text{CTLA4}}{\partial t} = \frac{1}{\exp(-b(\text{WCTLA4}(t) - .5)) + 1} - \text{DCTLA4 CTLA4}(t)$$

$$\frac{\partial \text{CTLA4DIM}}{\partial t} = \frac{1}{\exp(-b(\text{WCTLA4DIM}(t) - .5)) + 1} - \text{DCTLA4DIM CTLA4DIM}(t)$$

$$\frac{\partial \text{BCL2}}{\partial t} = \frac{1}{\exp(-b(\text{WBCL2}(t) - .5)) + 1} - \text{DBCL2 BCL2}(t)$$

$$\frac{\partial \text{NDRG1}}{\partial t} = \frac{1}{\exp(-b(\text{WNDRG1}(t) - .5)) + 1} - \text{DNDRG1 NDRG1}(t)$$

$$\frac{\partial \text{DAG}}{\partial t} = \frac{1}{\exp(-b(\text{WDAG}(t) - .5)) + 1} - \text{DDAG DAG}(t)$$

$$\frac{\partial \text{SOS}}{\partial t} = \frac{1}{\exp(-b(\text{WSOS}(t) - .5)) + 1} - \text{DSOS SOS}(t)$$

$$\frac{\partial \text{RASGTPR}}{\partial t} = \frac{1}{\exp(-b(\text{WRASGTPR}(t) - .5)) + 1} - \text{DRASGTPR RASGTPR}(t)$$

$$\frac{\partial \text{LCK}}{\partial t} = \frac{1}{\exp(-b(\text{WLCK}(t) - .5)) + 1} - \text{DLCK LCK}(t)$$

$$\frac{\partial \text{PDK1}}{\partial t} = \frac{1}{\exp(-b(\text{WPDK1}(t) - .5)) + 1} - \text{DPDK1 PDK1}(t)$$

$$\frac{\partial \text{MTORC1}}{\partial t} = \frac{1}{\exp(-b(\text{WMTORC1}(t) - .5)) + 1} - \text{DMTORC1 MTORC1}(t)$$

$$\frac{\partial \text{MTORC2}}{\partial t} = \frac{1}{\exp(-b(\text{WMTORC2}(t) - .5)) + 1} - \text{DMTORC2 MTORC2}(t)$$

$$\frac{\partial \text{LAT}}{\partial t} = \frac{1}{\exp(-b(\text{WLAT}(t) - .5)) + 1} - \text{DLAT LAT}(t)$$

$$\frac{\partial \text{PLC}}{\partial t} = \frac{1}{\exp(-b(\text{WPLC}(t) - .5)) + 1} - \text{DPLC PLC}(t)$$

$$\frac{\partial \text{PIP2}}{\partial t} = \frac{1}{\exp(-b(\text{WPIP2}(t) - .5)) + 1} - \text{DPIP2 PIP2}(t)$$

$$\frac{\partial \text{PIP3}}{\partial t} = \frac{1}{\exp(-b(\text{WPIP3}(t) - .5)) + 1} - \text{DPIP3 PIP3}(t)$$

$$\frac{\partial \text{CA}}{\partial t} = \frac{1}{\exp(-b(\text{WCA}(t) - .5)) + 1} - \text{DCA CA}(t)$$

$$\frac{\partial \text{PKC}}{\partial t} = \frac{1}{\exp(-b(\text{WPKC}(t) - .5)) + 1} - \text{DPKC PKC}(t)$$

$$\frac{\partial \text{TBET}}{\partial t} = \frac{1}{\exp(-b(\text{WTBET}(t) - .5)) + 1} - \text{DTBET TBET}(t)$$

$$\frac{\partial \text{IFNG}}{\partial t} = \frac{1}{\exp(-b(\text{WIFNG}(t) - .5)) + 1} - \text{DIFNG IFNG}(t)$$

$$\frac{\partial \text{GATA3}}{\partial t} = \frac{1}{\exp(-b(\text{WGATA3}(t) - .5)) + 1} - \text{DGATA3 GATA3}(t)$$

$$\frac{\partial \text{IL4}}{\partial t} = \frac{1}{\exp(-b(\text{WIL4}(t) - .5)) + 1} - \text{DIL4 IL4}(t)$$

$$\frac{\partial \text{FOXP3}}{\partial t} = \frac{1}{\exp(-b(\text{WFOXP3}(t) - .5)) + 1} - \text{DFOXP3 FOXP3}(t)$$

$$\frac{\partial \text{IL10}}{\partial t} = \frac{1}{\exp(-b(\text{WIL10}(t) - .5)) + 1} - \text{DIL10 IL10}(t)$$

$$\frac{\partial \text{TGFB}}{\partial t} = \frac{1}{\exp(-b(\text{WTGFB}(t) - .5)) + 1} - \text{DTGFB TGFB}(t)$$

$$\frac{\partial \text{RORGT}}{\partial t} = \frac{1}{\exp(-b(\text{WRORGT}(t) - .5)) + 1} - \text{DRORGT RORGT}(t)$$

$$\frac{\partial \text{IL21}}{\partial t} = \frac{1}{\exp(-b(\text{WIL21}(t) - .5)) + 1} - \text{DIL21 IL21}(t)$$

$$\frac{\partial \text{IL17}}{\partial t} = \frac{1}{\exp(-b(\text{WIL17}(t) - .5)) + 1} - \text{DIL17 IL17}(t)$$

$$\frac{\partial \text{LKB1}}{\partial t} = \frac{1}{\exp(-b(\text{WLKB1}(t) - .5)) + 1} - \text{DLKB1 LKB1}(t)$$

$$\frac{\partial \text{AMPK}}{\partial t} = \frac{1}{\exp(-b(\text{WAMPK}(t) - .5)) + 1} - \text{DAMPK AMPK}(t)$$

$$\frac{\partial \text{Glycolysis}}{\partial t} = \frac{1}{\exp(-b(\text{WGlycolysis}(t) - .5)) + 1} - \text{DGlycolysis Glycolysis}(t)$$

$$\frac{\partial \text{OXPHOS}}{\partial t} = \frac{1}{\exp(-b(\text{WOXPHOS}(t) - .5)) + 1} - \text{DOXPHOS OXPHOS}(t)$$

$$\frac{\partial \text{AMPATPratio}}{\partial t} = \frac{1}{\exp(-b(\text{WAMPATPratio}(t) - .5)) + 1} - \text{DAMPATPratio AMPATPratio}(t)$$