

Table S1: Differential equations for the deterministic model

$$\frac{d(R_A)}{dt} = B_A^R - kdegR_A * R_A - kon_A * L_A * R_A + koff_A * C_A + \frac{F_{2A} * ATF_A}{K_{DA} * \left[1 + \frac{ATF_B}{K_B}\right] + ATF_A}$$

$$\frac{d(C_A)}{dt} = kon_A * L_A * R_A - koff_A * C_A - ke_A * C_A$$

$$\frac{d(ITF_A)}{dt} = B_A^{ITF} - kdegTF_A * ITF_A - \frac{k_{1A} * C_A * ITF_A}{K_{M1A} + ITF_A} + \frac{k_{2A} * P_A * ATF_A}{K_{M2A} + ATF_A} + \frac{F_{1A} * ATF_A}{K_{DA} * \left[1 + \frac{ATF_B}{K_B}\right] + ATF_A}$$

$$\frac{d(ATF_A)}{dt} = \frac{k_{1A} * C_A * ITF_A}{K_{M1A} + ITF_A} - \frac{k_{2A} * P_A * ATF_A}{K_{M2A} + ATF_A} - kdegTF_A * ATF_A$$

$$\frac{d(R_B)}{dt} = B_B^R - kdegR_B * R_B - kon_B * L_B * R_B + koff_B * C_B + \frac{F_{2B} * ATF_B}{K_{DB} * \left[1 + \frac{ATF_A}{K_A}\right] + ATF_B}$$

$$\frac{d(C_B)}{dt} = kon_B * L_B * R_B - koff_B * C_B - ke_B * C_B$$

$$\frac{d(ITF_B)}{dt} = B_B^{ITF} - kdegTF_B * ITF_B - \frac{k_{1B} * C_B * ITF_B}{K_{M1B} + ITF_B} + \frac{k_{2B} * P_B * ATF_B}{K_{M2B} + ATF_B} + \frac{F_{1B} * ATF_B}{K_{DB} * \left[1 + \frac{ATF_A}{K_A}\right] + ATF_B}$$

$$\frac{d(ATF_B)}{dt} = \frac{k_{1B} * C_B * ITF_B}{K_{M1B} + ITF_B} - \frac{k_{2B} * P_B * ATF_B}{K_{M2B} + ATF_B} - kdegTF_B * ATF_B$$

L_A : Ligand for lineage A (constant)

R_A : Lineage-specific receptor for the A lineage

C_A : Ligand-receptor complex for the A lineage

ITF_A : Lineage-specific inactive transcription factor for the A lineage

ATF_A : Active transcription factor for the A lineage

P_A : Phosphatase deactivating ATF_A (constant)

L_B : Ligand for lineage B (constant)

R_B : Lineage-specific receptor for the B lineage

C_B : Ligand-receptor complex for the B lineage

ITF_B : Lineage-specific inactive transcription factor for the B lineage

ATF_B : Active transcription factor for the B lineage

P_B : Phosphatase deactivating ATF_B (constant)