Phase1 - Paper Model - Equations

mRNA Equations

$$\frac{da_i}{dt} = \frac{\alpha}{1 + C_i^n} - k_{deg} \cdot a_i$$
$$\frac{db_i}{dt} = \frac{\alpha}{1 + A_i^n} - k_{deg} \cdot b_i$$
$$\frac{dc_i}{dt} = \frac{\alpha}{1 + B_i^n} + \frac{\kappa \cdot S_i}{1 + S_i} - k_{deg} \cdot c_i$$

Protein Equations

$$\frac{dA_i}{dt} = \beta_i \cdot (a_i - A_i)$$
$$\frac{dB_i}{dt} = \beta_i \cdot (b_i - B_i)$$
$$\frac{dC_i}{dt} = \beta_i \cdot (c_i - C_i)$$

Autoinducer Equations

$$\frac{dS_i}{dt} = -k_{s0} \cdot S_i + k_{s1} \cdot A_i + \eta \cdot (S_i - S_e)$$
$$\frac{dS_e}{dt} = k_{diff} \cdot (\overline{S_i} - S_e) - k_{deg_{Se}} \cdot S_e$$

Phase2a - Adriana - Node W - Equations

mRNA Equations

$$\frac{da_i}{dt} = \frac{\alpha}{1 + C_i^n} + \frac{\alpha \cdot W_i^n}{1 + W_i^n} - k_{deg} \cdot a_i$$
$$\frac{db_i}{dt} = \frac{\alpha}{1 + A_i^n} - k_{deg} \cdot b_i$$
$$\frac{dc_i}{dt} = \frac{\alpha}{1 + B_i^n} + \frac{\kappa \cdot S_i}{1 + S_i} - k_{deg} \cdot c_i$$
$$\frac{dw_i}{dt} = \frac{\alpha_w \cdot A_i^n}{1 + A_i^n} - k_{deg} \cdot w_i$$

Protein Equations

$$\frac{dA_i}{dt} = \beta_i \cdot (a_i - A_i)$$
$$\frac{dB_i}{dt} = \beta_i \cdot (b_i - B_i)$$
$$\frac{dC_i}{dt} = \beta_i \cdot (c_i - C_i)$$
$$\frac{dW_i}{dt} = \beta_i \cdot (w_i - W_i)$$

Autoinducer Equations

$$\frac{dS_i}{dt} = -k_{s0} \cdot S_i + k_{s1} \cdot A_i + \eta \cdot (S_i - S_e)$$
$$\frac{dS_e}{dt} = k_{diff} \cdot (\overline{S_i} - S_e) - k_{deg_{Se}} \cdot S_e$$

Phase2a - Sydney - Node x - Equations

mRNA Equations

$$\frac{da_i}{dt} = \frac{\alpha}{1 + C_i^n} - k_{deg} \cdot a_i$$
$$\frac{db_i}{dt} = \frac{\alpha}{1 + A_i^n} + \frac{\alpha \cdot X_i^n}{1 + X_i^n} - k_{deg} \cdot b_i$$
$$\frac{dc_i}{dt} = \frac{\alpha}{1 + B_i^n} + \frac{\kappa \cdot S_i}{1 + S_i} - k_{deg} \cdot c_i$$
$$\frac{dx_i}{dt} = \frac{\alpha_x \cdot A_i^n}{1 + A_i^n} - k_{deg} \cdot x_i$$

Protein Equations

$$\frac{dA_i}{dt} = \beta_i \cdot (a_i - A_i)$$
$$\frac{dB_i}{dt} = \beta_i \cdot (b_i - B_i)$$
$$\frac{dC_i}{dt} = \beta_i \cdot (c_i - C_i)$$
$$\frac{dX_i}{dt} = \beta_i \cdot (x_i - X_i)$$

Autoinducer Equations

$$\frac{dS_i}{dt} = -k_{s0} \cdot S_i + k_{s1} \cdot A_i + \eta \cdot (S_i - S_e)$$
$$\frac{dS_e}{dt} = k_{diff} \cdot (\overline{S_i} - S_e) - k_{deg_{Se}} \cdot S_e$$

Phase2a - Sean - Node Y - Equations

mRNA Equations

$$\frac{da_i}{dt} = \frac{\alpha}{1 + C_i^n} - k_{deg} \cdot a_i$$
$$\frac{db_i}{dt} = \frac{\alpha}{1 + A_i^n} - k_{deg} \cdot b_i$$
$$\frac{dc_i}{dt} = \frac{\alpha}{(1 + B_i^n)(1 + Y_i^n)} + \frac{\kappa \cdot S_i}{1 + S_i} - k_{deg} \cdot c_i$$
$$\frac{dy_i}{dt} = \frac{\alpha_y \cdot B_i^n}{1 + B_i^n} - k_{deg} \cdot y_i$$

Protein Equations

$$\frac{dA_i}{dt} = \beta_i \cdot (a_i - A_i)$$
$$\frac{dB_i}{dt} = \beta_i \cdot (b_i - B_i)$$
$$\frac{dC_i}{dt} = \beta_i \cdot (c_i - C_i)$$
$$\frac{dY_i}{dt} = \beta_i \cdot (y_i - Y_i)$$

Autoinducer Equations

$$\frac{dS_i}{dt} = -k_{s0} \cdot S_i + k_{s1} \cdot A_i + \eta \cdot (S_i - S_e)$$
$$\frac{dS_e}{dt} = k_{diff} \cdot (\overline{S_i} - S_e) - k_{deg_{Se}} \cdot S_e$$

Phase2a - Olivia - Node Z - Equations

mRNA Equations

$$\frac{da_i}{dt} = \frac{\alpha}{1 + C_i^n} - k_{deg} \cdot a_i$$
$$\frac{db_i}{dt} = \frac{\alpha}{(1 + A_i^n)(1 + Z_i^n)} - k_{deg} \cdot b_i$$
$$\frac{dc_i}{dt} = \frac{\alpha}{1 + B_i^n} + \frac{\kappa \cdot S_i}{1 + S_i} - k_{deg} \cdot c_i$$
$$\frac{dz_i}{dt} = \frac{\alpha_z \cdot B_i^n}{1 + B_i^n} - k_{deg} \cdot z_i$$

Protein Equations

$$\frac{dA_i}{dt} = \beta_i \cdot (a_i - A_i)$$
$$\frac{dB_i}{dt} = \beta_i \cdot (b_i - B_i)$$
$$\frac{dC_i}{dt} = \beta_i \cdot (c_i - C_i)$$
$$\frac{dZ_i}{dt} = \beta_i \cdot (z_i - Z_i)$$

Autoinducer Equations

$$\frac{dS_i}{dt} = -k_{s0} \cdot S_i + k_{s1} \cdot A_i + \eta \cdot (S_i - S_e)$$
$$\frac{dS_e}{dt} = k_{diff} \cdot (\overline{S_i} - S_e) - k_{deg_{Se}} \cdot S_e$$

Phase2b - Group Model - Equations

mRNA Equations

$$\frac{da_i}{dt} = \frac{\alpha}{1+C_i^n} + \frac{\alpha \cdot W_i^n}{1+W_i^n} - k_{deg} \cdot a_i$$
$$\frac{db_i}{dt} = \frac{\alpha}{(1+A_i^n)(1+Z_i^n)} + \frac{\alpha \cdot X_i^n}{1+X_i^n} - k_{deg} \cdot b_i$$
$$\frac{dc_i}{dt} = \frac{\alpha}{(1+B_i^n)(1+Y_i^n)} + \frac{\kappa \cdot S_i}{1+S_i} - k_{deg} \cdot c_i$$
$$\frac{dw_i}{dt} = \frac{\alpha_w \cdot A_i^n}{1+A_i^n} - k_{deg} \cdot w_i$$
$$\frac{dx_i}{dt} = \frac{\alpha_x \cdot A_i^n}{1+A_i^n} - k_{deg} \cdot x_i$$
$$\frac{dy_i}{dt} = \frac{\alpha_y \cdot B_i^n}{1+B_i^n} - k_{deg} \cdot y_i$$
$$\frac{dz_i}{dt} = \frac{\alpha_z \cdot B_i^n}{1+B_i^n} - k_{deg} \cdot z_i$$

Protein Equations

$$\frac{dA_i}{dt} = \beta_i \cdot (a_i - A_i)$$
$$\frac{dB_i}{dt} = \beta_i \cdot (b_i - B_i)$$
$$\frac{dC_i}{dt} = \beta_i \cdot (c_i - C_i)$$
$$\frac{dW_i}{dt} = \beta_i \cdot (w_i - W_i)$$
$$\frac{dX_i}{dt} = \beta_i \cdot (x_i - X_i)$$
$$\frac{dY_i}{dt} = \beta_i \cdot (y_i - Y_i)$$
$$\frac{dZ_i}{dt} = \beta_i \cdot (z_i - Z_i)$$

Autoinducer Equations

$$\frac{dS_i}{dt} = -k_{s0} \cdot S_i + k_{s1} \cdot A_i + \eta \cdot (S_i - S_e)$$
$$\frac{dS_e}{dt} = k_{diff} \cdot (\overline{S_i} - S_e) - k_{degSe} \cdot S_e$$