**Supporting Table S1.** Term-by-term description of the model differential equations.

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| --- | --- | --- | --- |
| $$\frac{d(V\_{n}C\_{Dl,n}^{h})}{dt}=$$ | $$+A\_{n}k\_{i}C\_{Dl,c}^{h}$$ | $$-A\_{n}k\_{e}C\_{Dl,n}^{h}$$ |  |
| Time rate of change of the amount of Dl in the nucleus of the compartment h | Transport of Dl from the cytoplasm to the nucleus | Transport of Dl from the nucleus to the cytoplasm |  |
| $$\frac{d(V\_{c}C\_{Dl,c}^{h})}{dt}=$$ | $$+ΓA\_{m}(C\_{Dl,c}^{h+1}-2C\_{Dl,c}^{h}+C\_{Dl,c}^{h-1})$$ | $$+k\_{D}C\_{Dl-cact,c}^{h}V\_{c}$$ | $$-k\_{b}C\_{Dl,c}^{h}C\_{cact,c}^{h}V\_{c}$$ | $$-A\_{n}k\_{i}C\_{Dl,c}^{h}$$ | $$+A\_{n}k\_{e}C\_{Dl,n}^{h}$$ |
| Time rate of change of the amount of Dl in the cytoplasm of the compartment h | Transport of Dl between the cytoplasm of the compartment h and the adjacent compartments | Dissociation of the Dl-Cact complex | Association of Dl and Cactus to form the Dl-Cact complex | Transport of Dl from the cytoplasm to the nucleus | Transport of Dl from the nucleus to the cytoplasm |
| $$\frac{d(V\_{c}C\_{Dl-cact,c}^{h})}{dt}=$$ | $$+ΓA\_{m}(C\_{Dl-cact,c}^{h+1}-2C\_{Dl-cact,c}^{h}+C\_{Dl-cact,c}^{h-1})$$ | $$-k\_{D}C\_{Dl-cact,c}^{h}V\_{c}$$ | $$+k\_{b}C\_{Dl,c}^{h}C\_{cact,c}^{h}V\_{c}$$ |
| Time rate of change of the amount of Dl-Cact complex in the cytoplasm of the compartment h | Transport of Dl-Cact complex between the cytoplasm of the compartment h and the adjacent compartments | Dissociation of the Dl-Cact complex | Association of Dl and Cactus to form the Dl-Cact complex |
| $$\frac{d(V\_{c}C\_{cact,c}^{h})}{dt}=$$ | $$+ΓA\_{m}(C\_{cact,c}^{h+1}-2C\_{cact,c}^{h}+C\_{cact,c}^{h-1})$$ | $$+k\_{D}C\_{Dl-cact,c}^{h}V\_{c}$$ | $$-k\_{b}C\_{Dl,c}^{h}C\_{cact,c}^{h}V\_{c}$$ | $$+P\_{cact}V\_{c}$$ | $$-k\_{Deg}C\_{cact,c}^{h}V\_{c}$$ |
| Time rate of change of the amount of free Cactus in the cytoplasm of the compartment h | Transport of free Cactus between the cytoplasm of the compartment h and the adjacent compartments | Dissociation of the Dl-Cact complex | Association of Dl and Cactus to form the Dl-Cact complex | Production of Cactus | Degradation of Cactus |
| *kD =* | *R / (S + xξ)* |  |  |
| Space-dependent reaction rate constant for dissociation of the Dl-Cactus complex, representing the Toll signaling gradient | R and S determine the maximum value of *kD*, i.e., the amplitude of the Toll signaling gradient, while ξ represents the rate of decay of *kD* with an increase in x (the distance from the ventral midline along the DV axis). |  |  |