

Main model Parameters/Constants			
Parameter Name	Parameter description	Value	Units
κ_{lat}	A constant defining the probability of cell-ECM contacts breakage: $P_{cell-cell} = 1 - \exp(-l^2/k_{lat}^2)$	∞ (WT); 6000 (CCM1); 300 (CCM3)	μm
κ_{bott}	A constant defining the probability of cell-ECM contacts breakage: $P_{cell-ECM} = 1 - \exp(-l^2/k_{bott}^2)$	20 (WT); 5 (CCM1); 20 (CCM3)	μm
κ_z	Spring constant representing cytoskeletal resistance to vertical deformations (spreading)	$100 \cdot S$	N/m
κ_{xy}	Spring constant representing cytoskeletal resistance to in-plane deformations (stretching)	$5 \cdot S$	N/m
κ_{pull}	Spring constant of cell-cell and cell-ECM contact	$0.5 \cdot S$	N/m
R_{long}	The maximal extent of long-range protrusions (the range of cell-cell sensing)	120	μm
R_{short}	The maximal extent of short-range protrusions	40	μm
R_{bott}	The attachment range of ventral protrusions	2.6	μm
N_{bott}	The maximal number of bottom protrusions	19	1
N_{long}	The maximal number of long-range protrusions	5	1
N_{lim}	The limit on the number of extending protrusions	15	1
$u_{prot} (lateral)$	Growth rate of lateral protrusions in the 'extending' mode	0.017	$\mu m / s$
$u_{prot} (bottom)$	Growth rate of ventral protrusions in the 'extending' mode	0.003	$\mu m / s$
u_{retr}	Retraction rate of lateral protrusions in the 'pulling' mode	0.003	$\mu m / s$
η_{xy}	Viscous drag in response to x and y displacement	$0.4 \cdot S$	N*s/m
η_{ab}	Viscous drag in response to cell body elongation	$20 \cdot S$	N*s/m
η_{φ}	Viscous drag in response to cell rotation (in xy-plane)	$0.13 \cdot S$	N*s/m
η_{ξ}	Viscous drag in response to the shift of protrusions bases with respect to the semi-principle axes (in xy-plane)	$0.6 \cdot S$	N*s/m
R_0	Mean radius of individual cells	6.32	μm
R_{box}	Dish radius (simulation domain)	863 (Figs. 2); 1600 (S.Fig. 3)	μm
N	Total number of cells	466 (Figs. 2); 1600 (S.Fig. 3)	1
D	Density of cells per plating area	0.0002 ($N/\pi R_{box}^2$)	$1/\mu m^2$
S	Arbitrary scaling parameter	-	unitless

Green – main parameters that are changed to control the emerging patterns

Yellow – protrusions velocities

Orange – Main Hamiltonian parameters (Derivative parameters along every dimension)

Blue – Cells density; Model dimensions