

**Table S1: Effect of VEGF gradients on the sprout tip occupancy by WT cells.**

Ratio WT: <i>Vegfr2</i> <sup>+/-</sup>	Uniform	Linear	Sigmoidal	Exponential
<b>1:1</b>	86 (p=1.1·10 <sup>-7</sup> )	71 (p=1.9·10 <sup>-3</sup> )	78 (p=7.8·10 <sup>-5</sup> )	75 (p=3.6·10 <sup>-4</sup> )
<b>1:4</b>	36 (p=8.7·10 <sup>-3</sup> )	57 (p=1.2·10 <sup>-8</sup> )	53 (p=4.6·10 <sup>-7</sup> )	49 (p=3.3·10 <sup>-6</sup> )
<b>1:9</b>	17 (p=9.3·10 <sup>-2</sup> )	13 (p=3.3·10 <sup>-1</sup> )	19 (p=4.1·10 <sup>-2</sup> )	25 (p=1.2·10 <sup>-3</sup> )

**Table S2: Effect of VEGF gradient on cell trajectory data.**

	Uniform	Linear	Sigmoidal	Exponential
<b>Coordination anterograde</b>	0.14 (±0.03)	0.14 (±0.03)	0.14 (±0.02)	0.14 (±0.02)
<b>Coordination retrograde</b>	0.14 (±0.03)	0.14 (±0.03)	0.14 (±0.02)	0.14(±0.02)
<b>Directional motility</b>				
- percentage anterograde	48	29	35	22
- percentage retrograde	48	67	63	75
- percentage stopped	4	3	2	3

**Table S3: Parameter values of the contact inhibition model and the cell elongation model**

Parameter	Description	Value in contact inhibition model	Value in cell elongation model	Unit
$\mu$	Cellular temperature	1	1	-
$A$	Target cell size	50	100	lattice sites
$\lambda_A$	Cell elasticity	0.5	1	-
$J_{cell,ECM}$	Cell-ECM adhesion	0.4	0.35	-
$J_{cell,cell}$	Cell-cell adhesion	0.8	0.5	-
$\lambda_c$	Sensitivity to the chemoattractant	10	10	-
$\alpha$	Secretion rate	1·10 <sup>-3</sup>	1.8·10 <sup>-4</sup>	s <sup>-1</sup>
$\varepsilon$	Decay rate	1·10 <sup>-3</sup>	1.8·10 <sup>-4</sup>	s <sup>-1</sup>
$D$	Diffusion coefficient	1·10 <sup>-13</sup>	1·10 <sup>-13</sup>	m <sup>2</sup> /s
$H_{connectivity}$	Connectivity	1·10 <sup>8</sup>	1·10 <sup>8</sup>	-
$\lambda_l$	Cell length elasticity	-	0.1	-
$L$	Target cell length	-	60	lattice sites

**Table S4: Parameter values VEGF-Dll4-Notch signaling model**

<b>Parameter</b>	<b>Description</b>	<b>Value</b>
$\beta_N$	Production rate Notch	1
$\gamma_N$	Decay rate Notch	0.1
$\beta_D$	Variable production rate Dll4	5
$\gamma_D$	Decay rate Dll4	0.1
$\beta_{Dc}$	Constitutive production rate Dll4	0.1
$\gamma_S$	Decay rate NICD	0.1
$\alpha_S$	Production rate NICD	100
$k_S$	Hill constant that relates Dll4-Notch signaling to NICD production	3000
$n_S$	Hill constant that relates Dll4-Notch signaling to NICD production	2
$m_D$	Hill constant that relates NICD to Dll4 production	1
$k_t$	Trans-signaling coefficient	80
$k_c$	Cis-signaling coefficient	10
$d$	Scaling constant	2
$k_D$	Hill constant that relates VEGF signaling activity to Dll4 production	130000
$\alpha_D$	Production rate of Dll4 depending on VEGF signaling activity	15
$\beta_R$	Variable VEGFR2 production rate	2
$\beta_{RC}$	Constant VEGFR2 production rate	0.01
$\gamma_R$	VEGFR2 decay rate	0.3
$m_R$	VEGF signaling activity	2
$n_D$	Hill constant that relates VEGF signaling activity to Dll4 production	2
$\alpha_A$	Production rate of VEGF signaling activity	100
$n_A$	Hill constant that relates VEGF-VEGFR2 binding to VEGF signaling activity	2
$k_A$	Hill constant that relates VEGF-VEGFR2 binding to VEGF signaling activity	30
$\gamma_A$	Decay rate of VEGF signaling activity	0.1