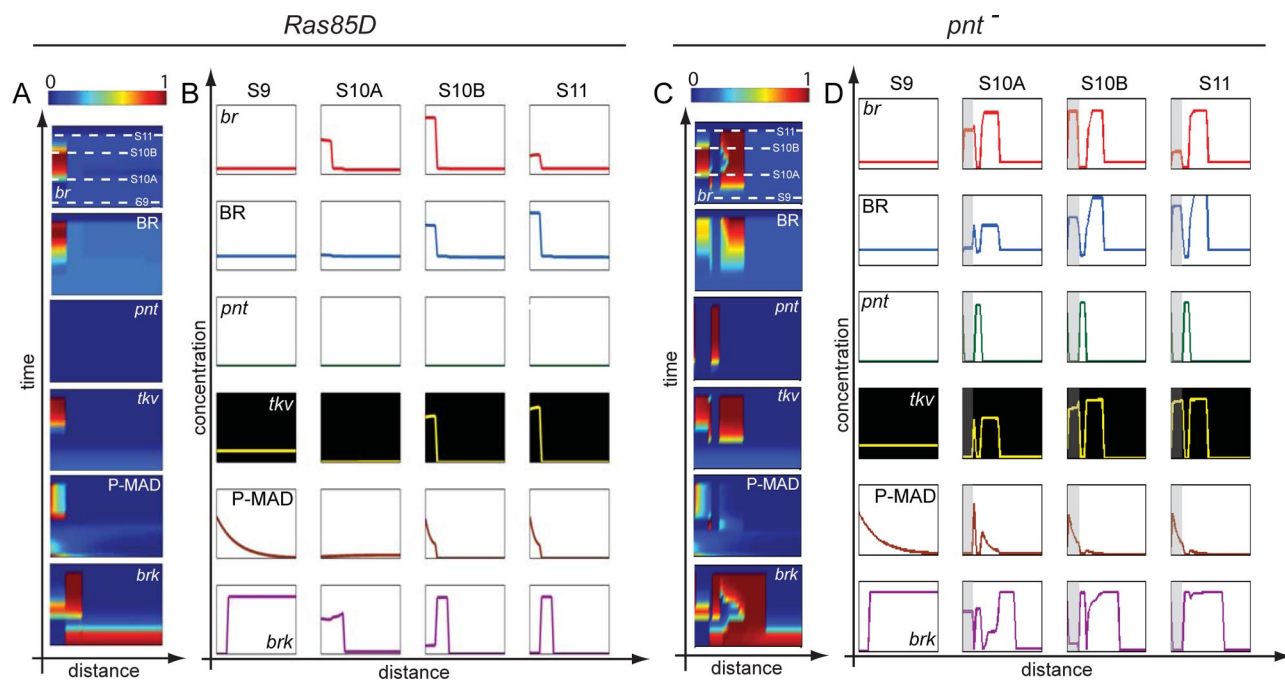


# Supporting Information

Lembong et al. 10.1073/pnas.0810728106



**Fig. S1.** Detailed modeling results in mutant backgrounds. (A and C) Simulation results for all of the network components in the Ras hypomorph and *pnt<sup>-</sup>* clone backgrounds as shown by the color plots of the concentration of each component as a function of space and time. The concentrations are normalized so that their values range from 0 to 1. (B and D) The corresponding predicted concentration profiles of each of the network components in the Ras hypomorph and *pnt<sup>-</sup>* clone backgrounds. Gray boxes mark the locations of the *pnt<sup>-</sup>* clones.





Table S2. Summary of the model's parameters

No.	Symbol	Description
1	$D_{GRK}$	Diffusivity of GRK
2	$D_{DPP}$	Diffusivity of DPP
3	$k_{on,GRK}$	GRK-EGFR binding constant
4	$k_{off,GRK}$	GRK-EGFR unbinding constant
5	$k_{e,GRK}$	GRK-EGFR complex endocytosis/degradation rate constant
6	$k_{on,DPP}$	DPP-TKV binding constant
7	$k_{off,DPP}$	DPP-TKV unbinding constant
8	$k_{e,DPP}$	DPP-TKV complex endocytosis rate constant
9	$k_{d,PNT}$	Degradation rate constant of PNT
10	$k_{d,br}$	Degradation rate constant of <i>br</i>
11	$k_{d,BR}$	Degradation rate constant of BR
12	$k_{d,TKV}$	Ligand independent degradation rate constant of TKV
13	$k_{d,BRK}$	Degradation rate constant of BRK
14	$k_{d,C_{DPP-TKV}}$	Degradation rate constant of internalized DPP-TKV complex
15	$V_{GRK}$	Rate of production of GRK
16	$V_{DPP}$	Rate of production of DPP
17	$\theta_{[SEGR], [PNT]}$	Threshold of EGFR signaling above which PNT is activated
18	$\theta_{[SEGR], [br]}$	Threshold of EGFR signaling above which <i>br</i> is activated
19	$\theta_{[SEGR], [BRK]}$	Threshold of EGFR signaling above which BRK is activated
20	$\theta_{[PNT], [br]}$	Threshold of PNT concentration above which <i>br</i> is repressed
21	$\theta_{[BR], [TKV]}$	Threshold of BR concentration above which TKV is activated
22	$\theta_{[SDPP], [BRK]}$	Threshold of DPP signaling above which BRK is repressed
23	$\theta_{[SDPP], [br]}$	Threshold of DPP signaling above which <i>br</i> is repressed
24	$\theta_{[BRK], [br]}$	Threshold of BRK concentration above which P-MAD repression on <i>br</i> is eliminated
25	$\gamma_{br}$	<i>br</i> production rate constant
26	$\gamma_{PNT}$	PNT production rate constant
27	$\gamma_{TKV}$	TKV production rate constant
28	$\gamma_{BRK}$	BRK production rate constant
29	$\gamma_{BR}$	BR translation rate constant
30	$L$	Length of the quasi-one-dimensional subsystem
31	$f_{br, g, i}$	GRK independent production rate of <i>br</i>
32	$\alpha_{EGFR}$	Signal transduction constant for EGFR signaling
33	$\alpha_{DPP}$	Signal transduction constant for DPP signaling
34	$X_{GRK}$	Lateral boundary of GRK source
35	$\alpha_{br}$	Uniform concentration of <i>br</i> at the beginning of stage 9
36	$\alpha_{TKV}$	Uniform concentration of TKV at the beginning of stage 9
37	$\alpha_{BRK}$	Uniform concentration of BRK at the beginning of stage 9



Table S4. Summary of the model's parameter groups

No.	Parameter group	Definition
1	$\varepsilon_{PNT}$	$k_{d,br} / k_{d,PNT}$
2	$\varepsilon_{TKV}$	$k_{d,br} / k_{d,TKV}$
3	$\varepsilon_{BRK}$	$k_{d,br} / k_{d,BRK}$
4	$\varepsilon_{BR}$	$k_{d,br} / k_{d,BR}$
5	$\varepsilon_{GRK}$	$L^2 \cdot k_{d,br} / D_{GRK}$
6	$\varepsilon_{DPP}$	$L^2 \cdot k_{d,br} / D_{DPP}$
7	$K_{e,GRK}$	$k_{e,GRK} \cdot k_{on,GRK} / (k_{off,GRK} + k_{e,GRK})$
8	$K_{e,DPP}$	$k_{e,DPP} \cdot k_{on,DPP} / (k_{off,DPP} + k_{e,DPP})$
9	$k_{d,GRK}$	$K_{d,GRK} \cdot [EGFR]$
10	$k_{d,DPP}$	$K_{d,DPP} \cdot TkV_0$
11	$\kappa_{d,DPP}$	$K_{d,DPP} \cdot V_{DPP} \cdot L / D_{DPP} \cdot k_{TKV}$
12	$\varphi_{DPP}^2$	$L^2 \cdot k_{on,DPP} \cdot k_{e,DPP} \cdot TKV_0 / (D_{DPP} \cdot (k_{off,DPP} + k_{e,DPP}))$
13	$\varphi_{GRK}^2$	$L^2 \cdot k_{on,GRK} \cdot k_{e,GRK} \cdot [EGFR] / (D_{GRK} \cdot (k_{off,GRK} + k_{e,GRK}))$
14	$br$	$[br] / (\gamma_{br} / k_{d,br})$
15	$PNT$	$[PNT] / (\gamma_{PNT} / k_{d,PNT})$
16	$TKV$	$[TKV] / (\gamma_{TKV} / k_{d,TKV})$
17	$BRK$	$[BRK] / (\gamma_{BRK} / k_{d,BRK})$
18	$BR$	$[BR] / (\gamma_{BR} \cdot k_{d,BR} \cdot \gamma_{br} / k_{d,br})$
19	$GRK$	$[GRK] / (V_{GRK} / k_{d,GRK})$
20	$DPP$	$[DPP] / (V_{DPP} \cdot L / D_{DPP})$
21	$\alpha'_{EGFR}$	$(1 / S_{EGFR}(S9, x = 0)) \cdot \alpha_{EGFR}$
22	$\alpha'_{DPP}$	$(1 / S_{DPP}(S9, x = 0)) \cdot \alpha_{DPP}$
23	$\theta_{S_{EGFR},PNT}$	$\theta_{[S_{EGFR}], [PNT]} / (V_{GRK} / k_{d,GRK})$
24	$\theta_{S_{EGFR},br}$	$\theta_{[S_{EGFR}], [br]} / (V_{GRK} / k_{d,GRK})$
25	$\theta_{S_{EGFR},BRK}$	$\theta_{[S_{EGFR}], [BRK]} / (V_{GRK} / k_{d,GRK})$
26	$\theta_{S_{DPP},br}$	$\theta_{[S_{DPP}], [br]} / \left( k_{e,DPP} \cdot k_{d,DPP} \cdot V_{DPP} \cdot L / \left( k_{d,C_{DPP-TKV}} \cdot D_{DPP} \right) \right)$
27	$\theta_{S_{DPP},BRK}$	$\theta_{[S_{DPP}], [BRK]} / \left( k_{e,DPP} \cdot k_{d,DPP} \cdot V_{DPP} \cdot L / \left( k_{d,C_{DPP-TKV}} \cdot D_{DPP} \right) \right)$
28	$\theta_{PNT,br}$	$\theta_{[PNT], [br]} / (\gamma_{PNT} / k_{d,PNT})$
29	$\theta_{BR,TKV}$	$\theta_{[BR], [TKV]} / (\gamma_{BR} \cdot k_{d,BR} \cdot \gamma_{br} / k_{d,br})$
30	$\theta_{BRK,br}$	$\theta_{[BRK], [br]} / (\gamma_{BRK} / k_{d,BRK})$
31	$t$	$T / k_{d,br}$
32	$x$	$X / L$
33	$x_{GRK}$	$X_{Grk} / L$

Table S5. Parameter values used in the model

No.	Parameter	Value
1	$\mathcal{E}_{PNT}$	1
2	$\mathcal{E}_{TKV}$	1
3	$\mathcal{E}_{BRK}$	1
4	$\mathcal{E}_{BR}$	10
5	$\mathcal{E}_{GRK}$	0.1
6	$\mathcal{E}_{DPP}$	0.1
7	$\phi_{DPP}$	14
8	$\phi_{GRK}$	2
9	$f_{br,g.i.}$	0.1
10	$\kappa_{d,DPP}$	1
11	$\theta_{S_{EGFR},PNT}$	0.6
12	$\theta_{S_{EGFR},br}$	0.4
13	$\theta_{S_{EGFR},BRK}$	0.3
14	$\theta_{PNT,br}$	0.1
15	$\theta_{BR,TKV}$	0.4
16	$\theta_{S_{DPP},BRK}$	0.06
17	$\theta_{S_{DPP},br}$	0.02
18	$\theta_{BRK,br}$	0.05
19	$x_{GRK}$	0.2
20	$\alpha_{br} \cdot k_{d,br} / \gamma_{br}$	0.1
21	$\alpha_{TKV} \cdot k_{d,TKV} / \gamma_{TKV}$	0.2
22	$\alpha_{BRK} k_{d,BRK} / \gamma_{BRK}$	1

## Other Supporting Information Files

[SI Text](#)