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Mathematical Modelling of Polarizing GTPases in Developing Axons

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The aim of this paper is to contribute to the basic understanding of neuronal polarization mechanisms by developing and studying a reaction-diffusion model for protein activation and inactivation. In particular we focus on a feedback loop between PI3 kinase and certain GTPases, and study its behaviour in dependence of neurite lengths.

We find that if an ultrasensitive activation is included, the model can produce polarization at a critical length as observed in experiments. Symmetry breaking to polarization in the longer neurite is found only if active transport of a substance, in our case active PI3 kinase, is included into the model.

Subjects:	**Subcellular Processes (q-bio.SC)**; Analysis of PDEs (math.AP)
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