

A Reaction-Diffusion Model of the Centromere-Signaling Network
(Technical Report)

Human Gene Editing: With Great Power Comes Great Responsibility
(STS Research Paper)

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Preface

How can genetic science improve disease treatments? Genetic medicine offers extraordinary possibilities for human health, but entails substantial hazards.

How can a model of the Centromere-Signaling Network (CSN) be constructed? The CSN is a cellular signaling pathway that occurs directly before cell division to ensure correct mitotic spindle attachment to the chromosome, and it contains numerous cancer-associated genes. The research team built a two-dimensional reaction-diffusion model of this pathway, using previous data and estimation to determine model parameters, that will enhance our understanding of cancer and possibly reveal new protein targets for chemotherapy. The chromosomal recruitment of the proteins Haspin, Ndc80, and KNL1 are critical for pathway function. When there is excess concentration of the proteins Aurora B kinase, Bub1, Sgo1, Mps1, or Haspin, as observed in certain cancers, then [results]. Future researchers should first validate our model with laboratory experiments. In later work, they may introduce chemotherapeutic drugs into our model to fix pathway dysfunctions, simulating cancer treatment.

How do social groups compete to distinguish responsible from reckless applications of gene editing? Genetic engineering capabilities have surpassed regulatory and ethical codes. Some researchers and patients have pursued advances in genetic engineering at the expense of safety. Governments have just begun to regulate gene editing, but scientists have policed each other since the field's origins in the 1970s.