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Extracellular Space Geometry Impacts Cell Fate Pattern Induced by a Diffusible Morphogen

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Abstract: Extracellular chemical signaling to determine cell fate is an important function in cell development. The extracellular space then plays a critical role in containing and even diverting such a chemical signal. We consider an egg chamber from *Drosophila melanogaster* and the transition of static epithelial cells to motile cells as signaled by the diffusible morphogen, unpaired (UPD). Central release of UPD beneath the 2D epithelium in uniform extracellular space would tend to produce radially symmetric activation. However, using novel experimental techniques we find that in greater than half of the cases, radial symmetry is replaced by several other patterns. We hypothesize that the underlying extracellular geometry defined by neighboring nurse cells diverts UPD and alters the activation pattern. Patterns predicted from the model have been confirmed in the experimental system.

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