BE 159: Signal Transduction and Mechanics in Morphogenesis

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Questions to consider: Maître, et al., "Adhesion function in cell sorting by mechanically coupling the cortices of adjacent cells"

Following are some questions that it will be helpful to understand when reading the paper. They are definitely not exhaustive, but useful to help you understand the motivation of the work and the experimental protocols.

1. What are the differences between the primary ideas in this paper and the differential adhesion hypothesis?
2. Does holding the cells with a micropipette under suction affect the surface tensions?
3. The authors use SEM (standard error of the mean) for their error bars. What is SEM? Why would they use that instead of the standard deviation?
4. How is cortical tension generated?
5. What sort of feedback between cortical tension and cell-cell adhesion do the authors propose? What do you think about this?
6. What range of adhesive forces can be probed using the dual pipette assay?
7. If you were to estimate the adhesive energy of cadherin contacts, what would you guess?
8. What is the significance of the presence of cadherin-enriched membrane tethers when adherent cells were pulled apart?
9. What is the significance of the formation of a bulge after separation in the three-cell assay?
10. The authors assume that most of the adhesive interactions between two cells are along the ring of the periphery of their contact. What evidence to they have for this? Does it make sense to you?
11. What roles does elasticity play in these experiments?