



Lab of Cytoskeletal Dynamics and Cell Division  
Institute for Research in Immunology & Cancer  
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We study the molecular mechanisms of **cell shape change in cytokinesis**: the assembly, organization and function of the actomyosin contractile ring. With live-cell imaging of fluorescent probes, we monitor the dynamics of the ring in early *C. elegans* embryos. Because of the highly stereotypical nature of cell division events in *C. elegans*, we can devise novel quantitative assays for cytokinesis.

The conserved actin-, myosin and septin-binding protein **Anillin** is a prime candidate for optimizing organization in the contractile ring. We demonstrated that Anillin is required to break circumferential symmetry in the contractile ring. While abnormal ring symmetry can be compensated for by other behaviors of the ring, asymmetry appears to help make cytokinesis robust to random errors. Thus, by taking different views of the contractile ring and quantifying speed, geometry, and protein localization, we uncovered a novel facet of the redundant mechanisms that ensure successful cytokinesis.

We are looking for a new **graduate student or postdoc** who would be excited to work on one or more of these projects:

1) Biochemical purifications have yielded several good candidates for novel contributions to **organization and function of the contractile ring**. A trainee will characterize the defects in cytokinesis following their depletion, make GFP fusion strains and antibodies, and confirm the interactions by “reverse” co-IP.

2) The *C. elegans* early embryo is always the same size and shape, and is essentially a cylinder. Therefore, it is highly amenable to descriptive and predictive mathematical modeling. For example, preliminary studies **correlating contractile ring dynamics with cell shape change** indicate that actomyosin organization, not just quantity, affects the kinetics of cell shape transitions. A trainee will devise image analysis software to track cell shape and protein localization, and create a model for contractile ring function.

3) We are **pioneering the use of tissue/cell types other than the early embryo for cell division studies**. A trainee will optimize protein depletion and live-cell imaging in one such tissue and compare cell division kinetics and dynamics with those in the embryo and cultured somatic cells.

All projects entail molecular biology, micromanipulation and dissection, live-cell imaging, and computer-based analysis. Experience with programming (Matlab, C++) would be a plus.

Start date: any time after Sept. 1, 2009  
Application deadline: July 15, 2009

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