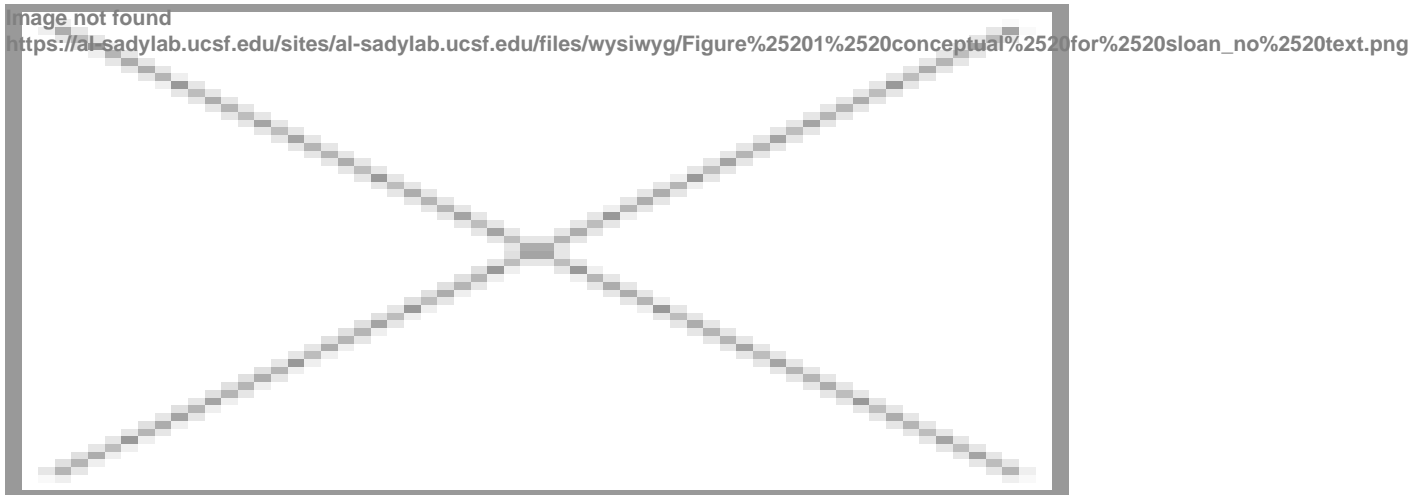


## Mechanisms of formation and maintenance of epigenetic elements

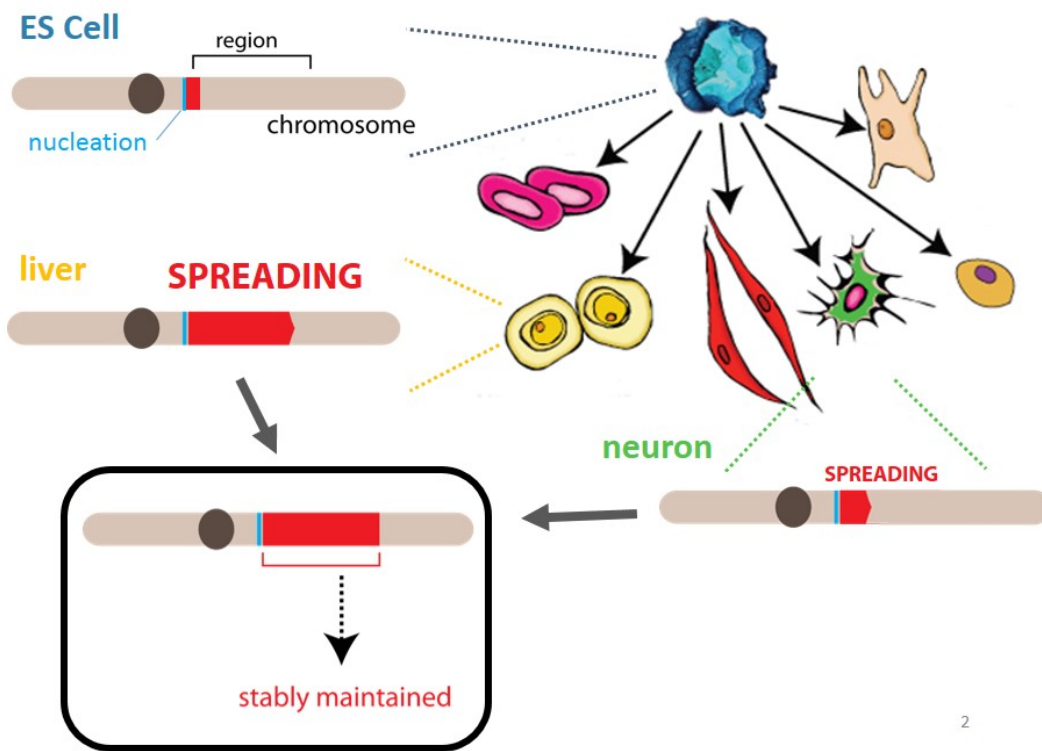
### Overview of how we approach mechanisms of heterochromatin spreading



Heterochromatin is a specialized protein-nucleic acid composite that silences the activity of genes over large contiguous chromosomal regions, and that has been visualized as a distinct nuclear ultra-structure for almost a century. Remarkably, the mechanisms guiding heterochromatin self-assembly and propagation remain obscure, although they critically relate to the potential of heterochromatin to epigenetically regulate genomic loci.

Excitingly, it is now appreciated that heterochromatin spreading plays a key role in the genome partitioning process that shapes cell fate. Heterochromatin exists in small regions, presumably around nucleation sites in embryonic stem cells (ESCs) that expand differentially depending on the lineage track. Once the spreading reaction has completed, the new pattern is stably adopted. How heterochromatin spreading is developmentally regulated starting in ESCs to drive lineage fates, or how lineages decisions direct differential spreading is completely unknown.

**Heterochromatin spreading is differentially regulated in differentiation**



The lab is interested to elucidate critical mechanisms that underlie normal formation of epigenetic states their inheritance and developmental regulation focussing on the following questions:

1) What are the the biochemical mechanisms underlying template-guided heterochromatin assembly? We are using full biochemical reconstitution systems with pure components to address this questions.

2) what is the cellular regulatory architecture that enables high intergenerational fidelity of spreading, which enables adoption of true epigenetic states? What are the process that allow a cell to regulate the extent of spreading?

To address these questions, we use a single cell assay to examine heterochromatin spreading in individual cells in real time. We are examining this question in both yeast and mammalian system.

Contact Us  
UCSF Main Site

© 2013 The Regents of the University of California

---

**Source URL:** <https://al-sadylab.ucsf.edu/research>