



**Donnelly Centre**  
for Cellular + Biomolecular Research  
UNIVERSITY OF TORONTO



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## *“Nuclear organization and the recycling of gene regulatory information”*



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Wednesday, January 22, 2014  
12:00 p.m. - 1:00 p.m.  
James Friesen | Cecil Yip  
Red Seminar Room  
Donnelly Centre

### **Abstract:**

The first part of the talk will explore ideas about how regulatory information is encoded in DNA, and how access to that information is controlled in cells. I'll discuss what we've learned about these topics on at least three scales of space and time: (1) How the nuclear envelope acts to create microenvironments for transcription and the coordination of other regulatory activities; (2) How control of the continual competition between nucleosomes and transcription factors at individual promoters may be fundamental to gene regulation; and (3) Two separate examples of the surprising re-use of a given set of DNA regulatory elements: to mediate stress responses in differentiated cells and to control the development of morphologically distinct structures in tissues.

The second part of the talk continues on these themes, with specific application to human disease. Lamin A/C is a major component of the nuclear envelope, and mutations in the lamin A/C gene cause Hutchinson-Hillier progeria syndrome. Children with this syndrome exhibit symptoms resembling aging, including arthritis, osteoporosis, heart attack, and stroke. We mapped interactions between lamin A/C and chromatin in normal and progeria cells. Contrary to the expected localization to heterochromatin as seen with lamin B1, we found associations with promoters and enhancers of active genes. I will argue that contrary to prevailing hypotheses of disease mechanism, correction of altered lamin A/C-chromatin interactions at active enhancers, rather than correction of abnormal nuclear envelope morphology, may be key to progeria treatment.

**Host: Brenda Andrews**