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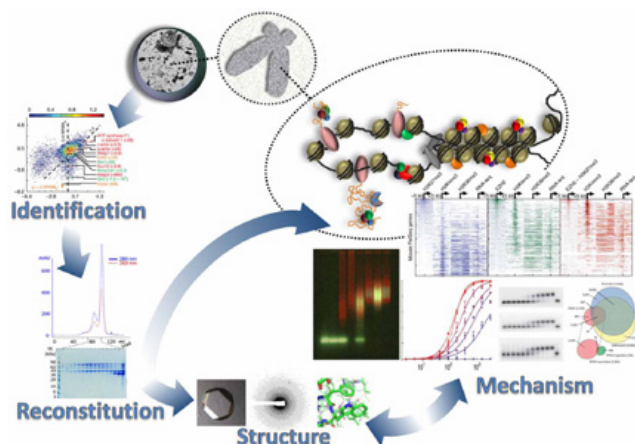
### Research Background

We wish to understand the detailed molecular events that underlie the recruitment and regulation of chromatin-modifying complexes by their co factor proteins, RNAs and DNA. We are aiming to uncover the function of long non coding RNAs (lncRNAs) that have been widely linked to this process, even though their binding specificity and molecular mechanisms are still obscure.

Our current focus is on Polycomb-group (PcG) proteins, which mainly appear as histone modifier complexes. They function in epigenetic silencing during differentiation and in multiple types of cancer. We seek to understand, down to atomic resolution, how the function of these chromatin-modifying complexes is modulated by their environment and various binding partners. We combine next-generation sequencing-based techniques with molecular biology and biochemical approaches, *in vitro* and *in vivo*, for coherent functional study. We also study the structural basis for the function of chromatin-modifying complexes, at low and high resolution, using structural biology approaches such as high-resolution cryo-electron microscopy (cryo-EM), X-ray crystallography and small-angle X-ray scattering (SAXS).

### Research Projects

1. How Polycomb-mediated epigenetic repression takes place?
2. How are chromatin-modifying factors regulated by lncRNAs and RNA transcripts?
3. How epigenetic de-repression takes place during development and in cancer?



We seek to understand, down to atomic resolution, how the function of chromatin-modifying complexes is modulated by their environment and various binding partners.

### Selected significant publications:

1. Wang X, Goodrich KJ, Gooding AR, Naeem H, Archer S, Paucek RD, Youmans DT, Cech TR, **Davidovich C**. 2017. Targeting of Polycomb repressive complex 2 to RNA by short repeats of consecutive guanines. *Mol Cell* 65(6):1056-1067.
2. Lu Z, Zhang QC, Lee B, Flynn RA, Smith MA, Robinson JT, **Davidovich C**, Gooding AR, Goodrich KJ, Mattick JS, Mesirov JP, Cech TR, Chang HY. 2016. RNA Duplex Map in Living Cells Reveals Higher-Order Transcriptome Structure. *Cell* 165(5):1267-79.
3. **Davidovich C**, Wang X, Cifuentes-Rojas C, Goodrich KJ, Gooding AR, Lee JT, Cech TR. 2015. Toward a consensus on the binding specificity and promiscuity of PRC2 for RNA. *Mol Cell*. 57(3),552-8.
4. **Davidovich C**, Zheng L, Goodrich KJ, Cech TR. 2013. Promiscuous RNA binding by Polycomb repressive complex 2. *Nat Struct Mol Biol*. 20(11),1250-7.
5. **Davidovich C**, Bashan A, Yonath A. 2008. Structural basis for cross-resistance to ribosomal PTC antibiotics. *Proc Natl Acad Sci USA*. 105(52), 20665-70.