

# An Example for Chromatin Regulation

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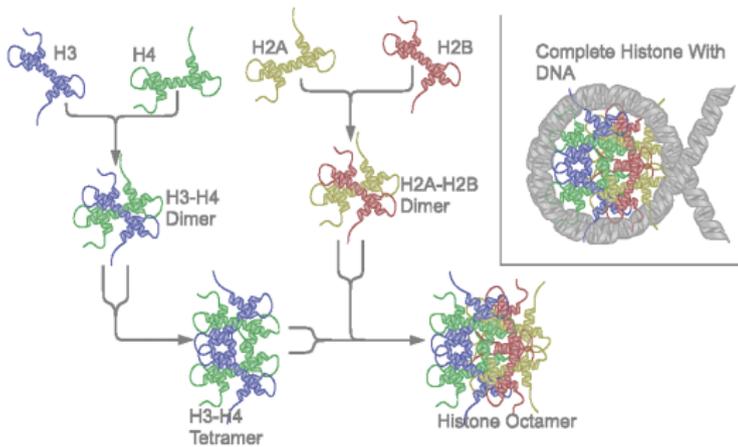
Bioinf

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# Outline

- 1 Histones
- 2 PRCs and Chromatin remodeling
- 3 H3K27me3 in embryonic stem cells
- 4 Chip-seq data for H3K27me3 in mouse ESC

# Nucleosome Structure



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  - found in all multicellular organism

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- PRC1:
  - binds to DNA
  - interact with H3K27me3 →leads to compact chromatin structure
  - without H3K27me3: dissociate from target without chromatin remodeling
  - not detected in *Arabidopsis* and *C. elegans*

# Role of H3K27me3 and PRCs

- keep embryonic cells in undifferentiated state
- H3K27me3 and PRCs occupy in ESC promoters of:
  - key development regulators
  - cell surface molecules
  - morphogenes
  - lineage-specific miRNAs
- cell type and developmental stage specific

# Mouse





## Knowledge from genome-wide maps

- promoters dividable in High-CpG-content promoters(HCPs) and Low-CpG-content promoters(LCPs)
- HCPs typically for housekeeping genes and developmental genes → 22% carry H3K27me3 in ESC
- LCPs typically highly tissue specific genes → no H3K27me3 in ESC

# Data Analysis



- mapping with segemehl
- H3 for verifying the mapping
- WCE for scaling the results and calculating enrichment
- cleaning up the mapping
- threshold calculation
- classify by enrichment/H3K27me3 content

# Is there more?



- ? What happens in not promoter regions?
- ? Are there similar patterns for other modifications?
- ? H3K27me3 occurs in HCPs solely. Do H3K27me3 requires CpGs?

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