Chromatin topological transitions

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DNA supercoiling keeps the balance between twist and writhe

Rad51

h~19bp/turn

tw

wr

Nucleosomes

Wr—1/nuc

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Transcription occurs in a chromatin context

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Chromatin is subjected to forces and torques in vivo

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Forces and torques can be reproduced \textit{in vitro}


Chromatin shows a surprising torsional resilience

(Nucleosome-induced) crossing are the favorite substrates for relaxation \textit{in vivo}

Salceda et al. "Topoisomerase II, not topoisomerase I, is the proficient relaxase of nucleosomal DNA." \textit{EMBO J} 2006

DNA supercoiling is not just something "to get rid off"

Should we think about "mechanomics" / "supercoilingomics"?


High torques may drive nucleosome structural changes


Lavelle et al. “Right-handed nucleosomes: myth or reality?” Cell 2009
(Fortuitous) tributes and really puzzling questions

Lavelle. "Left is right; right is wrong." EMBO Rep 2009

Furuyama and Henikoff. "Centromeric nucleosomes induce positive supercoils." Cell 2009

Work in progress

- Native chromatin (vs reconstituted)
- Chromatin relaxation
- Chromatin remodeling (collab T. Owen-Hughes)
- Linker histone role
- Histone chaperones role (collab J. Gerton)
- Chromatin in procaryotes (collab V. Arluison)
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