Deciphering chromatin dynamic changes along cell cycle phases.

Léa Costes[1], Kerstin Bystricky[1], and Martin Rey-Millet*[1]

[1]Centre de Biologie Intégrative – CNRS, Université Paul Sabatier - Toulouse III – France

Résumé

Chromatin organization in eukaryote cells has been extensively studied from nucleosome to genome, revealing the importance of chromatin spatial organization in regulating cellular functions. Temporal aspects of chromatin organization, its dynamic properties, are often missing from analyses addressing regulation of DNA related processes.
To determine chromatin dynamics quantitatively, our team developed a live-microscopy approach named High resolution Diffusion mapping (HiD). HiD measures the local motion of chromatin at sub-pixel accuracy in a single whole nucleus. Using this method, we previously observed that chromatin mobility is dependent of the transcriptional state by comparing quiescent (G0) and cycling (G1) cells. Despite dramatic changes in DNA content and processes, it is still unclear how chromatin dynamics may fluctuate with the progression of the cell cycle.

To describe chromatin dynamics along the different cell cycle phases in single interphase nucleus, we combine the fluorescence ubiquitination cell cycle indicator (FUCCI) to color-code the phase of the cell cycle in real-time with HiD. We notably observed differences in motion between phases G1 and G2 and we are now investigating the influence of sister chromatid cohesion in this process.
With this project, we aimed to describe cell cycle phases in term of chromatin dynamics and provide new insight on what is influencing chromatin motion and its polymer properties.

Mots-Clés: Chromatin Dynamic, Cell Cycle, Interphases, HiD

*Intervenant