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SÉMINAIRE

Heterochromatin induction and spreading by mouse ERVs

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Transposable elements (TEs) are often thought to be harmful because of their potential to spread heterochromatin (a repressive chromatin state) into nearby sequences. However, there are few examples of spreading of heterochromatin caused by TE insertions, even though TEs are often found in regions of repressive chromatin. We developed a model to study heterochromatin induction by TEs in a natural system. We studied two mouse embryonic stem cell lines harboring polymorphic retrotransposons belonging to three different families, such that one cell line possesses a particular TE copy (full site) while the other cell line lacks the copy at the same genomic location (empty site). We compared the chromatin state of these full and empty sites. Nearly all IAP copies, a family of retroviral-like elements, are able to strongly induce repressive heterochromatin surrounding their insertion sites, with the repressive histone modifications extending at least one kb and sometimes up to 5 kb from the IAP. This heterochromatin induction was not observed for the LINE family of non-viral retrotransposons and for only a minority of copies of another retroviral-like family, ETn/MusD. We found only one gene that was partly silenced by IAP-induced heterochromatin. Therefore, while induction of heterochromatin occurs after IAP insertion, measurable impacts on host gene expression are rare. Nonetheless, this phenomenon may play a role in rapid change in gene expression and therefore in host adaptive potential. Post Doc, Terry Fox Laboratory, British Columbia Cancer Agency, Vancouver, British Columbia, Canada