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Evolution of epigenetic silencing in therian mammals. Insights from out pouched cousins.

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X chromosome inactivation (XCI) is the most dramatic example of epigenetic silencing. It results in the transcriptional silencing of almost an entire chromosome – one of the two Xs in the somatic cells of female therian (eutherian and marsupial) mammals. There are fundamental differences between the apparently complete XCI system in eutherians, and the incomplete inactivation system in marsupials, which can be exploited to dissect the mechanisms and evolution of XCI.

I used RNA-FISH to elucidate the transcriptional status of genes on the inactive X chromosome in representative eutherian and marsupial species. I showed that inactivation of X genes in marsupials was incomplete and locus specific, with escape occurring on a gene-by-gene basis and not dependent on gene location or 5' promoter methylation. This incomplete

stochastic silencing is quite distinct from that observed in eutherians. I also compared XCI with a second classical transcriptional silencing mechanism, genomic imprinting, and draw parallels between these two independently evolved systems.

Presented by

Division of
Evolution, Ecology
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