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► **To cite this version:**

Veronique Duranthon, Alexei Evsikov, Daulat Khan, Linh Chi Bui, Roger Leandri, et al.. Differential regulation of LTR retrotransposons during the transition from totipotency to pluripotency in mammalian embryos. *Frontiers of Retrovirology Conference*, Sep 2009, Montpellier, France. hal-02758268

HAL Id: hal-02758268

<https://hal.inrae.fr/hal-02758268>

Submitted on 4 Jun 2020

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Differential regulation of LTR retrotransposons during the transition from totipotency to pluripotency in mammalian embryos

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from *Frontiers of Retrovirology: Complex retroviruses, retroelements and their hosts* Montpellier, France. 21-23 September 2009

Published: 24 September 2009

Retrovirology 2009, **6**(Suppl 2):P34 doi:10.1186/1742-4690-6-S2-P34

This abstract is available from: <http://www.retrovirology.com/content/6/S2/P34>

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Background

Preimplantation mammalian embryo development is characterized by fundamental changes in nuclear function as genomes of gametes, egg and sperm unite to give rise to a totipotent embryonic genome. This totipotency is however a transient property since the first events of differentiation occur after few cell cycles, giving rise to the trophectoderm cells that co-exist with the pluripotent and no more totipotent cells of the inner cell mass at the blastocyst stage. Concomitantly to these cellular events, the newly formed embryonic genome becomes progressively transcriptionally active. We analyzed embryonic gene expression over this period in both the rabbit [1] and the bovine species. We have chosen these species as embryonic models in preference to the mouse since contrarily to this later species, embryonic genome activation (EGA) spans over several cell cycles and is preceded by progressive epigenetic modifications.

Results

In both of the former species we evidenced a huge transcriptional activation of LTR retrotransposons at EGA. This transcriptional activation is faithfully reprogrammed following the transfer of a somatic cell nucleus into the oocyte cytoplasm (somatic cloning) [2]. Very interestingly the expression of some of these retrotransposons is then restricted to the pluripotent inner cell mass cells of the

blastocyst, and further progressively lost concomitantly with their differentiation.

Conclusion

Our results not only extend to other mammalian species data previously established in the mouse both at EGA [3,4] and at the pluripotent stage [5] but the expression pattern of LTR retrotransposons we have evidenced suggest a functional involvement of these sequences in the control of the transition between totipotency and pluripotency.

References

1. Leandri RD, Archilla C, Bui LC, et al: **Revealing the dynamics of gene expression during embryonic genome activation and first differentiation in the rabbit embryo with a dedicated array screening.** *Physiol Genomics* 2009, **36**:98-113.
2. Bui LC, Evsikov AV, Khan DR, Archilla C, Peynot N, Hénaut A, LeBourhis D, Vignon X, Renard JP, Duranthon V: **Retrotransposon expression as a defining event of genome reprogramming in fertilized and cloned bovine embryos.** *Reproduction* 2009 in press.
3. Evsikov AV, de Vries WN, Peaston AE, Radford EE, Fancher KS, Chen FH, Blak JA, Bult CJ, Latham KE, Solter D, Knowles BB: **Systems biology of the 2-cell mouse embryo.** *Cytogenetic and Genome Research* 2004, **105**:240-250.
4. Peaston AE, Evsikov AV, Graber JH, de Vries WN, Holbrook AE, Solter D, Knowles BB: **Retrotransposons regulate host genes in mouse oocytes and preimplantation embryos.** *Developmental Cell* 2004, **7**:597-606.
5. Brûlet P, Condamine H, Jacob F: **Spatial distribution of transcripts of the long repeated ETn sequence during early mouse embryogenesis.** *Proceedings of National Academy of Science USA* 1985, **82**:2054-2058.