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## 3D nuclear positioning of IGF2 alleles and trans interactions with imprinted genes

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### Summary

To explore the relationship between gene activity and nuclear position, genomic imprinting leading to parental-specific expression offers a good model. In one cell, it is possible to compare the nuclear environment of the two alleles for a given locus and search for a potential correlation between their nuclear position and expression status. Using 3D RNA-DNA FISH in porcine fetal liver cells, we focused on the imprinted region of Insulin-like growth factor 2 (IGF2), a paternally expressed gene located on porcine chromosome 2. We investigated the interchromosomal interactions implicating IGF2. Through a 2D FISH screening, imprinted genes from the Imprinted Gene Network (Varrault et al 2006) were tested for interactions in liver cells. The locus DLK1/MEG3 showed the highest rate of colocalization with IGF2. By 3D RNA-DNA FISH combined to confocal microscopy, we demonstrated a preferential implication of the expressed paternal IGF2 allele in a trans association with DLK1/MEG3 region (chromosome 7). We showed that this colocalization occurs also in fetal muscle and demonstrated that it occurs preferentially between the expressed IGF2, DLK1 and MEG3 alleles. We are extending this analysis through an interdisciplinary approach to develop large “functional mapping” studies focused on the mechanisms involved in the transcriptional regulation of genes expressed in muscle during late fetal development.

**Auteur principal:** Mme LAHBIB-MANSAIS, Yvette (INRA)

**Co-auteurs:** M. ROBELIN, David (INRA); Mlle MOMPART, Florence (INRA); M. ACLOQUE, Hervé (INRA); Mme LIAUBET, Laurence (INRA); Mlle MARTI MARIMON, Maria (INRA); Mme BOUISSOU-MATET YERLE, Martine (INRA); M. FOISSAC, Sylvain (INRA); M. VOILLET, valentin (INRA)

**Orateur:** Mme LAHBIB-MANSAIS, Yvette (INRA)

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