**CNRS 6293, INSERM U1103, Institut GReD (Génétique, Reproduction et Développement), Université Clermont-Auvergne**

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**Impacts of chromatin context on the repair of DNA double-strand breaks.**

DNA is subject to damage by environmental and metabolic factors. This damage includes the highly toxic DNA double-strand breaks, which can be repaired very effectively by recombination. The general objective of this project is the better understanding of the genetic and epigenetic influences determining the choices of the mechanisms of recombination in DNA break repair in eukaryotes, and in particular in plants.

For this, new CRISPR / Cas tools will be used to specifically target DNA breaks in their natural context at selected sites across the genome of Arabidopsis thaliana. The breaks will be targeted on only one of the two homologous chromosomes of hybrid plants. Indeed, the sequence polymorphisms will allow a coherent analysis of the roles of the structure of chromatin and the chromosomal context on the choice of the recombination pathway. The involvement of small non-coding RNAs and recombinant mediator proteins in repairing DNA breaks will be integrated into this analysis. Mutant lines, cytogenetics and in vivo imaging of fluorescent fusion proteins will be used to test the recruitment of key factors involved in repair mechanisms.

- Roles of XRCC2, RAD51B and RAD51D in RAD51-independent SSA recombination. Serra, H., Da Ines, O., Degroote, F., Gallego, M.E. and C. I. White. (2013). PLoS Genetics 9(11)

- Analysis of the Impact of the Absence of RAD51 Strand Exchange Activity in Arabidopsis Meiosis. Gunjita Singh, Olivier Da Ines, Maria E. Gallego and Charles I. White (2017). PLoS One 12(8)