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**In vitro and in vivo differentiation of stem cells into extraembryonic endoderm**

Embryonic Stem (ES) cells, unlike adult stem cells with restrained abilities, have the potential to differentiate into any cell type of the body such as skin, muscle or nervous system. During differentiation, the first cell type that they produce is extraembryonic endoderm. The project aims to understand how extraembryonic endoderm is differentiating and what is its influence on the neighbouring tissue, the epiblast by analysing the molecular interactions between the two tissues.

Two experimental models will be used: the in vitro differentiation of ES cells that will be compared to in vivo embryos, through classical analyses of genes and proteins expression. Transgenic cells and mice will be used to alter gene expression specifically in one of the tissues or both. Therefore, the student will gain a solid training in cell differentiation through the different techniques of immunofluorescence, in situ hybridization, RTqPCR, ES cell culture and embryo handling/culture. In silico analyses will also be carried out to select the best factors extracted from RNAseq data.

**Bouschet T et al**. (2017) “In Vitro Corticogenesis from Embryonic Stem Cells Recapitulates the In Vivo Epigenetic Control of Imprinted Gene Expression.” Cereb Cortex. 27(3):2418-2433.

**Court F and Arnaud P.** (2017) “An annotated list of bivalent chromatin regions in human ES cells: a new tool for cancer epigenetic research.” Oncotarget. 8(3):4110-412410