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Dr. Hélène Bœuf
Research Director, CNRS,
INSERM U1026 BioTis,
Université de Bordeaux, FRANCE

Hypoxia/ Physioxia regulates embryonic stem cell physiology

Embryonic Stem Cells (ESCs), derived from the inner cell mass of embryos at the blastocyst stage, are pluripotent cells, meaning that they can self-renew and are able to generate all the cell types of the body. Pluripotency is associated with plasticity, which is the property of stem cells to go back and force from immature to more mature states and to change their fates depending upon environment. ESCs hold great promise for future cell replacement therapies, but these developments need an in-depth knowledge to understand and control the mechanisms of maintenance and exit from the undifferentiated state. The pluripotent state of ESCs can be captured in vitro under specific cell growth conditions, which vary between species, because of the embryonic origin of cells (pre- or post- implantation stages defining respectively the "naïve" and "primed" states of the derived ESCs). We have recently revisited the effect of hypoxia/ physioxia (low [O2], corresponding to physiologic cell growth condition) on stemness and cell plasticity in the murine ESC model. I will present new insights in the physiology of mESCs which, despite their discovery and potentials since 1981 still retain properties to be discovered. This is essential to better handle stemness for the development of pertinent strategies towards regenerative medicine.