



Looking to the Future: Stem Cells, Organoids and Regenerative Medicine



The discovery of stem cells was a remarkable breakthrough in biological research. Two major types of stem cells exist during the lifecycle of multicellular organisms: embryonic stem cells, resulting from the early divisions of the egg, characterized by their “pluripotency”, i.e. the capacity, that they share with the egg cell itself, to produce all the cell types found in the adult organism, and the tissue-specific stem cells present in the tissues and organs of the adult. The latter play an important role in renewing the cells of the various organs during the entire life. They are particularly active in tissues and organs in which the lifespan of the differentiated cells is short, like blood, skin and the inner cell layer covering the intestinal cavity, as well as skeletal muscle. These adult stem cells are highly specialized and can only produce the tissue in which they reside. They are “unipotent” or “multipotent”.

These adult stem cells will be the subject of this workshop. Scientists have learned to grow them in a dish into mini-versions of the mouse and human organs from which they derive. This so-called “organoid technology” opens new avenues for the study of development, physiology and disease and for personalized medicine. In the future, cultured mini-organs may replace organ transplants from donors and open the way to regenerative medicine.