



## 26/11/2008 - Stem cell proliferation: towards a better understanding of the cell processes linked to cancers?

**In work published on 24 November in the journal Nature biotechnology, Anselme Perrier and his team at I-stem identified a recurrent anomaly in the genome of human embryonic stem cells left in culture for too long. Whether or not by chance, this same anomaly is found in a certain number of cancers. This discovery leaves open the possibility that the same process could be at the origin of stem cell and cancer cell proliferation.**

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The appearance of a cancer is a "multi-stage" process due to the accumulation of mutations in the genes involved in the regulation of cell proliferation. These genetic deteriorations cause a progressive transformation from a normal to a malignant derivative cell. The number and structure anomalies of the chromosomes (or karyotypic anomalies) are frequently-observed events in cancers.

Embryonic stem cells are capable of multiplying practically without limit and differentiating themselves into all cell types of the body (pluripotent cells). In vitro they can be maintained in an undifferentiated state. In precise conditions of culture their differentiation can be oriented towards a given cell type (neurons, blood cells, cardiac cells etc.).

Coordinated by Anselme Perrier, a researcher at Inserm, regular verification of the integrity of the human embryonic stem cell genome led to the identification of a region of the genome that is highly unstable in humans, located on chromosome 20.

A supernumerary copy of a chromosome 20 fragment recurrently appears in human embryonic stem cells maintained in vitro for a long period in an undifferentiated state. This region has already been described as amplified in many cancers, in particular breast, bladder, lung and liver cancer as well as in melanomas and in cervical cancer. Studies have demonstrated that the genetic instability of this amplified region is an important event in tumour progression.

Human embryonic stem cells can thus contribute to a better understanding of the early events that play a part in tumour progression. Apart from that, they have the added advantage for the Inserm researchers in that the involvement of the identified region can be studied in a context where there are no other genetic anomalies.

### **Human embryonic stem cells**

In France most of the teams working on hES cells have received Biomedicine Agency authorisation. They are involved in academic research, and many belong to Inserm (22 protocols out of 35, and 15 authorised teams out of 26). Created on 1 January 2005, I-Stem a centre for research and development dedicated to the study of the therapeutic potential of these cells and its application to rare genetic diseases. The AFM, Inserm and the University of Evry-Val-d'Essonne are its founder members.

Embryonic stem cells come from the human embryo during the very early stages of its development, just several days after impregnation. These cells are known as "pluripotent" – they can be replicated indefinitely (self-renewal), proliferate in culture and differentiate themselves into more than 200 tissue types. During development they are designed to form all tissues of the body. It is particularly because of this capacity that they hold out hope in terms of biological and medical applications.

### **For further details:**

Human embryonic stem cells reveal recurrent genomic instability at 20q11.21

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