

Press Release

A new Italian discovery sheds light on cancer stem cells

Milan, 17 September 2009

Researchers, led by Pier Giuseppe Pelicci (Director of Molecular Oncology at the European Institute of Oncology and Full Professor at the University of Milan), have made an important discovery that sheds light on how **cancer stem cells** multiply. The research, published in the leading international scientific journal, **Cell**, also highlights how certain drugs can be used to interfere with this process.

In the last 20 years, much has been discovered about how cancer cells multiply (or divide). Despite this, very little is known about how cancer stem cells divide. These cells, although a minority within the tumor, are believed to be responsible for tumor growth and the spread of cancer cells around the body (metastasis). It is essential, therefore, that we discover ways to specifically target and eliminate cancer stem cells, in order to treat cancer effectively.

The researchers uncovered a simple, but fundamental difference between normal stem cells and cancer stem cells: the former divide in a mostly **asymmetric** manner, while the latter frequently divide in a **symmetric** manner.

When a normal stem cell divides, it typically generates two daughter cells that differ from one another (*asymmetric division*): one daughter cell retains the parental stem cell identity, while the other becomes specialized and produces the bulk of cells in the tissue. This process allows continual tissue regeneration and maintenance of a constant number of stem cells. A cancer stem cell, on the other hand, frequently divides *symmetrically*, giving rise to two stem cells, each with the ability to form tumor tissue. This results in a progressive increase in the number of cancer stem cells and, consequently, **tumor growth**.

Normal stem cells can also divide symmetrically; however, they do it only rarely, for example, to repair tissue damage. Cancer stem cells, in contrast, frequently undergo symmetric divisions, regardless of need.

The Milan team went on to characterize the **molecular basis** of the phenomenon. They found that a specific gene, known as *p53*, ensures harmony within the tissue by ordering normal stem cells to divide asymmetrically. If *p53* is lacking, this command is lost and the stem cells divide symmetrically.

The research was conducted at the **European Institute of Oncology**, in laboratories situated at the **IFOM-IEO Campus**, in collaboration with the **University of Milan**. The research was made possible thanks to funding from the **Italian Association for Cancer Research (AIRC)**, the **Italian Ministry of Health**, and the **European Community**.

For information, Press Office: 02 89075019