

## Stem Cells : Sources and Applications.

Jin Sup Jung, M.D., Ph.D.

*Department of Physiology, College of Medicine, Pusan National University, Pusan, Korea*

Stem cell research has a history of more than 20 years, and has made some outstanding contributions to our understanding of haematopoiesis and mouse embryology. But the field has been transformed in the past few years by successes achieved in culturing human embryonic stem cells, the building blocks for every tissue we comprise, and in manipulating their differentiation *in vitro*. In the adult, organ formation and regeneration was thought to occur through the action of organ- or tissue-restricted stem cells (i.e. haematopoietic stem cells giving rise to all the cells of the blood, neural stem cells making neurons, astrocytes, and oligodendrocytes). However, it is now believed that stem cells from one organ system, for example the haematopoietic compartment can develop into the differentiated cells within

another organ system, such as the liver, brain or kidney. Recent evidences showed that stem cells recruited outside of injured organ are involved during regenerative process after injury of some organs including kidney. Thus, certain adult stem cells may turn out be as malleable as ES cells and so also be useful in regenerative medicine.

To bring stem cell therapies to the clinic, a better understanding of stem cells at the molecular level and of how they behave in their biological context should be required. The factors that maintain stem cells in a multipotent, proliferative state, or drive them to create differentiated daughter cells *in vitro* or *in vivo*, must be identified.

In this presentation, some of the most recent developments in the use of stem cells for tissue repair and regeneration will be discussed.