Embryonic stem cell therapy for osteo-degenerative diseases
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Among the many degenerative diseases that afflict humans, the osteo-degenerative ones are likely the widespread in all human populations. Unfortunately, due to the inherent inability of these cells to self-repair, these diseases are invalidating due to pain and physical inability. Cellular therapies are among the most hopeful widespread clinical trials for regenerative medicine and mesenchymal stem cells are playing a crucial role in cartilage regeneration and spinal disc among others diseases. Somatic stem cells are useful for these type of treatments but unfortunately, as well known, they senesce in culture thus limiting the potentiality by which the clinicians need them. On the side, embryonic stem cells (ES) that have the intrinsic ability to self renew limitless suffer of some other disadvantages: e.g. our knowledge to switch on the osteogenesis and chondrogenesis pathways is quite limited. The book edited by Prof. Nicole L. zur Nieden of the Dept. of Cell Biology and Neuroscience and Stem Cell Center of the University of California at Riverside (CA, USA), actually try to cover this gap. Nearly half (10) of the book chapters (21) are devoted to state of the art protocols for ES culture with some intriguing novelty like the microwell approach for embryoid body formation: this is an alternative method to the traditional suspension and hanging drop techniques that employ non-adhesive microwell structure, a trick that allow to better control embryo body size which in turn is a critical parameter to finely tune ES differentiation. The second part of the book is devoted to the mesenchymal, osteogenic and chondrogenic cell's production from ES. Several new protocols are well illustrated like the "raclure" method where the human ES are differentiated into mesenchymal stromal cells without the use of exogenous cytokines or any feeder layers as well as improved media compositions are illustrated to get osteoblasts and chondrocytes, the necessary cellular tools to cure humans.

A very interesting chapter is devoted to the (necessary) identification of osteoclasts in culture: without the ability to pick up such cells from the culture, the ES culture can become a cellular mess; thus, the ability to differentiate osteoclasts from monocyte-macrophage lineage cells in the absence of osteoblasts is a very useful techniques that prevents looking for a needle in a haystack!

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