

Mesenchymal stem cell assays and applications**Mohan C. Vemuri, Lucas G. Chase and Mahendra S. Rao (eds), 2011****Methods in molecular biology; vol. 698****Humana Press – Springer Verlag Heidelberg****ISBN: 978-1-60761-998-7****550 pp – 114 figs – 109,95€**

Among the many types of adult, or better, somatic, stem cells, mesenchymal stem cells (marrow-derived stromal cells, MSC) are those more *versatile* in changing their phenotype during differentiation: from smooth muscle, adipocyte, bone and cartilage cells to name a few. In addition, they are present in large number in adults and relatively easy to isolate and culture. All these features simply explain the already large number of application that their use allow in regenerative medicine, not to tell about researches in which they play a crucial role in understanding the meaning of *stemness* and *stem cell niche* and the other several conceptual paradigms framing the fascinating field of stem cell biology. Having clear in mind this situation, the reader can wonder why three well recognized authority in the stem cell field decide to devote a 550 pages book to MSC assays and applications! Well, the reason is simple as clear as it is the fact that to this applied knowledge we oppose a great basic ignorance of the exact lineages that the MSCs cells follow under differentiation and which are the best useful markers to use to identify (i.e., to define) these cells. Thus, a warm welcome to this title (that could easily complement the series Stem cell biology and regenerative medicine series that the Humana Press is specifically devoting to the stem cell world.

A very detailed analysis of this special cell type spanning 35 chapters is quite difficult to review in few lines but in this case I am facilitated by the fact that the leading experts contributing the chapters were grouped by the Editors in three parts: in fact the first part consists of an *Introduction* where in few pages the three Editors summarize the actual knowledge that the scientific community is handing on MSC. The other three parts are conceptually divided so that the reader can be told about isolation and expansion of MSC from various sources (part II), MSC lineage differentiation and analysis (part III) and MSC phenotypic characterization and extended applications (part IV). This last, fourth final part, do not present much of the actual clinic translational therapies for regenerative medicine applica-

tions; clearly is much more devoted to the phenotypic characterization (which is indeed a great need for the MSC biology).

The MSCs isolation and expansion part II is mainly focused on the MSCs isolation from human tissues with a special note for the different sources (bone marrow, adipose tissue, cord blood, amniotic and placental tissue, dental pulpe, pancreas) rather than the different animals in use now-a-day in basic research. However, one chapter is devoted to the isolation and culture of rodent bone marrow-derived MSCs. Quite interesting are the chapters devoted to the MSCs isolation and expansion from non-classical sources like the pancreas and the dental pulp. The MSCs lineage differentiation analysis include both the cultivation of functional bone grafts and the osteogenic differentiation; both these themes are of very high applied interests considering the ever increasing clinical demand for functional tissue-engineered bone grafts to regenerate bone defects resulting from trauma (always increasing and increasing considering how changing is the demographic structure of the western societies with a prevalence of elderly people) and surgical resection of congenital anomalies. Several other chapters cover the topics of Mscs hepatic differentiation, the dopaminergic neuronal differentiation, chondrogenic and adipogenic differentiation. The last IV part presents the MSC phenotypic characterization and here the reader can easily perceive how much still we have to spend research efforts to gain a really satisfactory situation in which the scientific community can recognise a clear phenotype (a need for the translational clinical applications) of a high grade manufactured MSC cells population: different strategies devoted to one of the many -omics analysis (genomics, proteomics, metabolomics, transcriptomics) and different technologies (quantitative real time PCR, multicolor flow-cytometry, immunohistochemistry, microarray analysis, two-dimensional gel electrophoresis) are well described and clearly written to help to reach this objective.

I think that nowadays the book is a must for those involved with this (these!) fascinating cell that can use the book getting here and there the needed information but, for those entering the field, well, they cannot avoid to go through the five hundreds and fifty pages!

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