
Preface

Mesenchymal stem cells (MSC) are adult cells with the capacity for self-renewal and multilineage differentiation. Initially described in the bone marrow, MSC are also present in other organs and tissues. From a therapeutic perspective, because of their straightforward preparation and hypothetical immunologic privilege, MSC emerged as an extremely promising therapeutic agent for tissue regeneration and repair. Currently, there are a significant number of clinical trials underway exploring the use of MSC for the treatment of various diseases including bone defects, graft-versus-host disease, myocardial infarction and heart failure, stroke, Crohn's disease, and wound repair. At the same time, there are still unresolved issues associated with MSC related to their isolation, culture and expansion, phenotypic definition, multipotential differentiation, and mechanisms of action. While researchers should ideally share and use proven methods and protocols to ultimately enable the comparison of results obtained by independent investigators, current MSC research is often considered nonhomogeneous, with different labs using different protocols and definitions.

The present volume aims to outline the current status of the field and to emphasize the need for clearly established and reproducible protocols to better define the identity, function, and use of MSC in cell therapy. In particular, in the first part of the book, a series of state-of-the-art reviews gives the reader a summary on the use of MSC for the treatment of various diseases. Then, in the following three parts, numerous chapters illustrate methods on isolation and characterization of MSC, expansion of MSC for clinical use, and production and definition of the MSC secretome. These protocols include practical advice from researchers who have personalized their methodologies. These insightful tips should dramatically reduce the time and costs involved in setting up MSC protocols in individual labs.

The volume mainly addresses PhD students and postdocs since they are the investigators actively operating in the field of cell and molecular biology, proteomics, and transcriptomics or in the development of clinically compliant manufacturing of therapeutic MSC or their derivatives. However, the state-of-the-art review chapters would be of extreme interest also for more senior investigators.

Pavia, Italy

Massimiliano Gnecci

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