Preface

Degenerative diseases are the main cause of death globally and, owing to the lack of innovative drugs and several limits of organ transplantation, new cost-effective solutions for treating damaged organs are compelling needs. In this respect, the prowess of stem cells to repair tissues damaged by degenerative disorders has created universal interest, even if the related technologies are still in their infancy. Indeed, decades of intensive studies on stem cell behavior have not generated yet the clinical revolution so much announced and expected. This situation has been determined by many impeding factors, among which the lack of standardized protocols to isolate and handle stem cells has played a major role. Stem cell technology is among the most complex research endeavors and requires strict standardization of the materials and procedures, through a long-term process driven by merging the quantum of knowledge resident in different disciplines and international laboratories. This implies a strong impetus for change, in which cross-fertilization is encouraged to create a positive and explosive melting pot of ideas, methods, and expertise to benefit research and sustain advanced biomedical industries. Therefore, we should be aware that Stem Cell Standardization cannot be a concern of the biomedical field alone, but must involve the knowledge accumulated in a multiplicity of fields. The convergence between biomedicine and engineering holds promise to benefit both the patients and the industries. In this way only, we can hope to transform an artisanal activity, as stem cell research is today, in an industrialized process able to supply patients with efficient, safe, and cost-effective cell treatments.

This book collects stem cell protocols from some of the major laboratories involved in stem cell research in the world. They have made available their protocols in the hope to ignite a fruitful discussion on adult stem cells standardization to take further the first enthusiastic wave that has often produced only fragmented knowledge and unsuitable options for innovative treatments to be delivered in the clinical setting.

Inevitably, the book does not report protocols related to the isolation and culture of stem cells in all possible living tissues. The editors have selected some of those that they considered most reliable; it does not mean that the protocols excluded should be considered of minor interest.

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