Preface

In the late 1980s to the early 1990s, the discovery of multipotent engraftable stem cells within tissues that were previously thought to be immutable and rigid (e.g., the central nervous system and heart) gave birth to the field of regenerative medicine. By the late 1990s, the ability to isolate cells that were pluripotent expanded the repertoire of cell types that could be generated and transplanted. The discovery that somatic cells from living patients could be reprogrammed back to pluripotence or, with genetic engineering, even transdifferentiated to another somatic cell type without being reprogrammed back to pluripotence further expanded the "palette" from which practitioners of regenerative medicine could choose appropriate cells. Paralleling the discovery of the range of cell types that might be used translationally was a growing appreciation for the multiple therapeutic actions of those cells. It came to be realized that not only might cells be used for replacement of degenerating or missing cells but also they might be used for molecular therapy as chaperone cells for restoring homeostasis to disordered systems. Such actions might be via diffusible factors, through the intercellular transfer of molecules via gap junctions or by the engulfment of microvesicles, or by changing the differentiation fate of host stem/progenitor cells. Contemporaneously with these discoveries was a growing realization of the multiple pathological processes ongoing for each disease, to which the multiple modal actions of the stem cells might be mapped. Translational stem cell biologists came to realize that they must tailor the choice of a particular stem cell to the often-unique needs of a particular disease state. In recognition of growing excitement and potential of stem cells, there is a need to provide comprehensive information and detailed laboratory protocols used in stem cell biology.

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