

# PREFACE

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Over the past 5 years there has been great excitement and controversy in the scientific, financial, and lay literature for the potential of stem cell-based strategies for the prevention and treatment of chronic heart failure (CHF). Not that long ago we believed we were born with a set number of cardiac myocytes and that once damaged there was no hope to replace them. The interest in the field stems from the magnitude of cardiovascular disease in the world. Our ability to treat and help patients survive acute myocardial infarction (MI) has resulted in a near epidemic of CHF. There are more than 5 million Americans who currently carry the diagnosis of CHF. With more than 1 million MIs a year in the United States, there are approx 500,000 new cases of CHF diagnosed each year. The goal of *Stem Cells and Myocardial Regeneration* is to present, in a coherent manner, the current state of knowledge of stem cell-based therapies for cardiac dysfunction, including current findings in both the laboratory and the clinic trials.

The first section of this *Stem Cells and Myocardial Regeneration* focuses on the magnitude of the problem and the successes and failures of what we consider optimal medical therapy. It is on this background that stem cell-based therapy needs to build. The following two sections focus on the basic science behind stem cell-based therapies, first reviewing the different stem cell types of interest, then the critical physiological pathways that need to be understood including chemokines, stem cell differentiation, and mechanisms of arrhythmia.

The focus of *Stem Cells and Myocardial Regeneration* then turns to the clinical issues surrounding stem cell delivery to the heart at the time of MI and in patients with CHF. The book ends with separate reviews of findings of stem cell-based clinical trials of acute MI and CHF.

It is my hope that the reader will take away many things from *Stem Cells and Myocardial Regeneration*. First, I hope the reader sees the excitement that this field offers to the millions of patients at risk of or afflicted with cardiovascular disease. We are truly at the beginning of a great frontier of new medical therapy. Second, I hope the reader realizes that although we have learned a great deal about stem cells and the heart, we are still far from correct or optimal therapy and have much yet to learn. And third, I hope the reader develops a framework with which he or she may be able to put future findings in perspective.

It was a great pleasure to work with my many colleagues who graciously gave their time to bring this project to fruition. Although it would be impossible to delve into all the controversies and nuances of stem cell-based therapies for the heart, I believe readers will find this to be a detailed and fair representation of the current state of knowledge.

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