Stem cell therapy has made rapid strides in recent years and has generated considerable interest among scientific communities, clinicians and general public. A lot of attention emanates from the great promise offered by this technique, most notably with regard to the application of stem cell therapy for diseases that are currently difficult to treat or incurable. Hence, study of stem cells and cell-based therapies, that was traditionally viewed as a core research area and thought to be of interest mainly to the researchers and scientists, is fast getting into the paradigm of clinical care.

For diagnostic and interventional radiologists, it is particularly advantageous to be actively involved in the bench to bedside development of these therapies. While diagnostic radiologists can become experts in imaging, tracking, and monitoring of stem cells and in the assessment of engraftment efficiency, the interventional radiologist can play an important role in targeted stem cell delivery by means of different routes (percutaneous, selective intravenous, or intra-arterial).

The prevailing literature in stem cell therapy predominantly targets the core researchers. Also, the subject matter is complex, has abundant technical jargon that is somewhat difficult to comprehend for an average clinician. This book will present a simplified review of stem cell and cell-based therapies with a focus on imaging.

The current volume will provide a review of imaging techniques and applications in stem cell transplantation and other cell-based therapies. The basis of different molecular imaging techniques will be explained in detail. Applications of stem cell transplant in different organ systems will be discussed, with reference to imaging wherever feasible. The reader can expect to get comprehensive information on the role of clinical and molecular imaging in stem cell therapy from this book. This book will provide opportunities to learn the current gamut of stem cell applications in adults and pediatric populations, understand the scope of molecular imaging in stem cell and cell-based therapies, understand role of clinical imaging in stem cell therapy and gain knowledge in several state of the art applications in this field like use of nanotechnology in stem cell applications, stem cell use in cardiology, cancer and angiogenesis. This information will be presented in a simplified form that will generate reader interest in this technology.
The work is primarily targeted towards radiologists and physicians involved in molecular imaging who are interested in developing a basic understanding of stem cell imaging and applications of stem cells and cell-based therapies. However, it will also be of interest to clinical scientists and researchers alike. A variety of physicians can benefit from this volume including, but not limited to, radiologists, cardiologists, hematologists, interventionists and transplant physicians. PhD researchers involved in stem cell labeling, tracking and imaging, cancer therapy, angiogenesis and cardiac regeneration will find this issue highly useful.

The book is organized in two main sections. Section 1 provides overview of stem cell indications and techniques in adult and pediatric population with review of molecular imaging techniques and shall discuss role of newer applications like use of nanotechnology in stem cell transplant. Section 2 is devoted to review common applications in stem cell and cell-based therapies. Overall, the objective is to provide a unique resource, focusing on imaging in stem cell and cell-based therapies with review of stem cell therapy applications and to provide simplified explanation of technical concepts and terminology. The text is written from a clinician’s perspective that will help the average physician to keep abreast with stem cell research and encourage him/her to adopt this technology.

While each section will have a hierarchical organization of reviews encompassing basic to advanced topics, each chapter will be self-sufficient enough so that it can be reviewed independently of one another.

The text is compiled by a variety of authors who bring in years of experience in stem cell research and clinical imaging. The cross-disciplinary expertise of the contributors will ensure that the book will present a balanced perspective. The authors of this book are national leaders in their respective areas and well known internationally through their work and citations. The contributors span the entire length and breadth of United States with several overseas contributors as well. Also, they represent premier organizations and universities in the United States and abroad, well known for quality academics and research work in stem cells.

I hope that this work will accomplish its objectives. Like any similar book project this would not have reached fruition but for the support from the contributing authors. I wish to thank all authors for their hard work in compiling the chapters and sharing their expertise with the world. I am extremely grateful to the Series Editor of Stem Cell Biology and Regenerative Medicine, Dr. Kursad Turksen for giving me this opportunity to edit this series. Last but not the least, I am ever grateful to my parents, lovely wife and sons for their continued support, and to my students who have kept me motivated all these years!

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