Preface

The primary goal of this textbook is to provide an overview of cutting-edge and emerging topics in cardiology as seen by experts from diverse clinical and biomedical backgrounds engaged in these fields of research. The premise is to highlight areas of investigation that are currently (or will be) topics of keen interest to those practicing or researching translational cardiology. Throughout this book, the authors communicate complex, molecular mechanisms via easy to follow text that is complimented with valuable figures that are used to illustrate the key topics. This textbook is intended for practicing physicians, residents, fellows, and graduate students from a variety of specialties related to cardiac disease.

Three broad themes associated with translational cardiology are covered in this text (1) cardiac energy metabolism, (2) novel mechanisms of cardiac adaptation to stress, and (3) molecular- and cellular-based therapies and imaging modalities used in treating and diagnosing cardiac disease.

Over the past several decades, few topics in cardiology have been as overlooked as energy metabolism. Despite this, the role that energy metabolism plays in heart failure, ischemia, and diabetes is now emerging at an exciting pace with astounding molecular detail. Chapter 1 begins with the exciting discoveries being made that link myocardial ischemia/reperfusion and time of day (circadian rhythms) to cardiac energy metabolism. Chapters 2–5 go on to cover the systems involved in ATP shuttling (phosphotransfer reactions, Chap. 2), mitochondria and mitochondrial dynamics in cardiac disease (Chap. 3), and the regulation of fatty acid and glucose substrate metabolism and mitochondrial biogenesis by the PPAR/PGC-1 complex (Chap. 4). The role of AMPK in energy homeostasis in the context of metabolic remodeling is then discussed in the context of cardiac disease (Chap. 5).

Following the chapters covering cardiac energy metabolism, the text explores the ability of the heart to respond and remodel in the face of physiological and pathological stress. Recognition of the role of mechanically induced signal transduction (e.g., stretch) in cardiomyocytes has long been known to occur. However, the mechanistic details associated with these signal transduction pathways are just now emerging and are discussed here in the context of cardiac hypertrophy and ischemia (Chap. 6). Following this, the heart's response to such stressors, that is, its ability to

remodel, is then covered broadly in Chap. 7 and more specifically in the context of proteasome involvement in Chap. 8. The mechanisms of cardiac dysfunction associated with cancer therapies (Chap. 9) are then presented. In Chap. 10, the molecular basis of congenital heart disease is discussed. Unlike the other stressors that are induced by either physiological or pathological processes, the cardiac stress brought about by congenital cardiac defects is, in many cases, present even as the heart is developing. The response and adaptation to such stressors represent a unique challenge to the heart.

Lastly, the emergence of molecular- and cellular-based therapies is discussed as they relate to human cardiovascular disease. Specifically, gene therapy delivered using adeno-associated virus vectors (Chap. 12) and the use of nonbiologic morpholino constructs to regulate gene expression (Chap. 13) are discussed in terms of how they have been applied to both preclinical and early human studies in the treatment of heart failure and the cardiomyopathy associated with muscular dystrophy. Cellular-based therapies in the infarcted heart have proven noteworthy and are covered in Chap. 11. Lastly, Chap. 14 discusses how the molecular advances made in the understanding of the mechanisms involved in certain cardiac diseases have allowed the development of powerful tools such as contrast-enhanced ultrasound that are now being used routinely in the treatment of cardiac disease.

Chapel Hill, NC, USA

Cam Patterson, MD, MBA
Monte S. Willis, MD, PhD

http://www.springer.com/978-1-61779-890-0

Translational Cardiology
Molecular Basis of Cardiac Metabolism, Cardiac Remodeling,
Translational Therapies and Imaging Techniques
(Eds.)C. Patterson; M.S. Willis
2012, XV, 543 p. 67 illus., 52 in color., Hardcover
ISBN: 978-1-61779-890-0
A product of Humana Press