

# Preface

Signal transduction is at the core of most biological processes and represents a critical area of research. Signal transduction is extremely important not only to molecular biology research, but also to clinical medicine in general since many diseases, such as diabetes, cardiovascular diseases, autoimmunity, and cancer, arise from defects in signal transduction pathways.

At the present time, the complex area of cardiovascular signal transduction is in its infancy, and much of the available information came to light as a by-product of extensive research effort to understand the mechanisms of hypertrophy, apoptosis/cell death, and myocardial remodeling. The heart acts as both transmitter and dynamic receiver of a variety of intracellular and extracellular stimuli, as well as an integrator of numerous interacting transducers, including protein kinases and effectors, the G proteins and small G protein activators which are profoundly influenced by their location in the cell. Given that the targeting and localization of signaling factors and enzymes to discrete subcellular compartments or substrates are important regulatory mechanisms, ensuring specificity of signaling events in response to local stimuli, these systems deserve examination from a subcellular/organellar and a functional standpoint under both physiological and pathophysiological conditions. Moreover, cardiovascular signaling includes a built-in specificity, reversibility and a redundancy of its components, which while making their analysis a very complex undertaking, provides the cardiac cells with great plasticity to respond to insult, as well as to growth stimuli. Understanding this plasticity is fundamental in the discovery of new cardiovascular signal transduction techniques and new therapies.

Gene transfer studies have shown promising results in re-engineering defective signal transduction pathways in animal models of cardiac dysfunction, including heart failure, as well as providing cardioprotection against insults such as myocardial ischemia. Similarly, transduction engineering approaches with vascular remodeling (e.g., angiogenesis) and dysfunction (e.g., hypertension) have been successful in clinical trials. In this volume, we present what is presently known in cell signal transduction pathways, genetics, and cellular biology in heart failure, development of novel therapies for to improve cardiac function, as well as where this field is heading in the future.

As the role of genetic screening in cardiology is strengthened and as research on the multiple signaling pathways involved in cardiac organogenesis and pathology progresses, the time seems appropriate for a book that comprehensively integrates known facts, what is developing and what will be known in the near future. In addition to providing a recount of past discoveries, this book deals with areas that are of emerging interest to medical students, cardiologists, and researchers in diverse fields, eyeing new therapeutic modalities that may improve currently available therapies and interventions in the management of human cardiac diseases. Furthermore, we are now witnessing the transition from the Cardiology of the past to the study of systems biology, the constructive cycle of computational model building, and the experimental verification capable of providing the input for exciting new discoveries and hope. The chapters in this book have been arranged in a way that the readers, who browse it, can to some degree recognize and appreciate the current thoughts and ideas on cardiovascular signaling pathways. We have tried to include original and creative scientific works as much as possible, although humbly we must say that this is a work still in progress.

Hopefully, this book will be a valuable guide to signaling of the heart from a post-genomic perspective, and also an important introduction to new ideas and future progress.

*Deciphering the mystery....*

*progress continues*

*Signals are received and sent.....*

*for us to interpret*

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<http://www.springer.com/978-1-4419-9460-8>

Signaling in the Heart

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2011, XX, 507 p., Hardcover

ISBN: 978-1-4419-9460-8