

# Cardiac Control Pathways Signaling and Transport Phenomena

SAMUEL SIDEMAN

*Faculty of Biomedical Engineering, Technion, Israel Institute of Technology, Haifa, Israel*

**ABSTRACT:** Cell signaling is part of a complex system of communication that governs basic cellular functions and coordinates cell actions. The transfer of ions and signaling molecules, their interactions with appropriate receptors, the trans-membrane transport, the consequent intracellular interactions and the functional cellular response represent a complex system of interwoven phenomena of transport, signaling, conformational changes, chemical activation and /or genetic expression. The well being of the cell thus depends on an harmonic orchestration of all these events and the existence of one or more control mechanism that assure the normal behavior of the various parameters involved and their orderly expression. The ability of cells to sustain life by perceiving and responding correctly to their microenvironment, is the basis for development, tissue repair, immunity as well as normal tissue homeostasis. Natural deviations or man-induced interference in the signaling pathways and/or inter and intracellular transport and information transfer, are responsible for the generation, modulation and control of diseases. This overview of the major parameters involved in the cellular information transfer processes and their control mechanism may help to understand the problems involved in some cardiac functional failures and hopefully lead to efficient therapeutic modalities.

The goal of this volume is to identify and enhance the study of some basic physical transport phenomena, physiological signaling pathways and their biological consequences as well as the role of critical nutritional, endocrine and genetic factors on growth, development and function of the cells, tissues and organs, with particular emphasize on the cardiac system.

**KEYWORDS:** Environmental stimuli, signaling pathways, transport phenomena, control mechanisms, transmembrane transport

**Address for correspondence:** Prof Sam Sideman, D.Sc., D.Sc.Hon., Faculty of Biomedical Engineering, Technion, IIT, Haifa, Israel 32000, Fax:+ 9724 829 4599  
Email: Sam@bm.technion.ac.il