Dynamics of Cardiac Hypertrophy and Dysfunction

K. Omata

Center for Clinical Sciences,
National Center for Global Health and Medicine,
1-21-1 Toyama, Shinjuku, Tokyo 162-0052, Japan

komata@ri.ncgm.go.jp

It is desirable that experimental studies of molecular signal transmission pathways are supported by theoretical investigations using mathematical models.

Recently, mathematical models based on reaction kinetics have been constructed for several systems such as NF-κB signal oscillation, p53 reaction to DNA damage, transport of Msn2, insurin secretion, the eukaryotic cell cycle, cAMP signal transmission, or glycolytic oscillations \[1,2\]. These studies modeled signal pathways in terms of differential equations. The analysis of the solutions of equations enables to characterize signal pathways mathematically, and to predict more precise structures of pathways.

It is also possible to provide solutions for restoring functions of disordered signal pathways (\textit{i.e.} diseases). Thereby we can discuss how signal pathways should be controlled and predict therapeutic targets.

This lecture presents the basic idea of the study \[3\] and the application to cardiac hypertrophy and dysfunction \[4\].

\[3\] K. Omata, Autumn Meeting (2012) and 68th Meeting of Physical Society of Japan (2013).