Irena Levitan, J Clin Exp Cardiolog 2016, 7:6(Suppl)
http://dx.doi.org/10.4172/2155-9880.C1.035

Impact of hypercholesterolemia on cardiac K^+ channels

Irena Levitan
University of Illinois, USA

Plasma hypercholesterolemia is well known to be a major risk factor for the development of cardiovascular disease. Our studies focus on the impact of cholesterol on two types of inwardly-rectifying K^+ channels expressed in cardiomyocytes: classical inward rectifiers Kir channels (Kir2) that play a major role in maintaining cardiac membrane potential and G-protein gated Kir (GIRK or Kir3) channels that play an important role in the regulation of atrial action potential. Paradoxically, our studies show that elevation of membrane cholesterol *in vitro* and *in vivo* has opposite effects on Kir2 and Kir3 channels in the same cells. Specifically, enriching cardiomyocytes with cholesterol *in vitro* suppresses the activity of Kir2 channels but enhances the activity of Kir3 channels. Furthermore, plasma dyslipidemia *in vivo* also have opposite effects on these channels in freshly-isolated cardiomyocytes. Both effects are mediated by a decrease or increase in the open probability of Kir2 and Kir3 respectively. Even more surprising, even though cholesterol has opposite effects on the function of Kir2 and Kir3, both effects are abrogated by a specific mutation indicating that they share some structural determinants. These studies are discussed in terms of the structural-mechanistic insights into cholesterol regulation of Kir channels and in terms of the physiological/pathological impact of these coupled effects on cardiac function.

Biography

Irena Levitan, PhD, is Professor of Medicine and Adjunct Professor of Pharmacology and Bioengineering at the University of Illinois at Chicago. Her current research focuses on cholesterol regulation of ion channels and cellular biomechanics. She published more than 70 papers and book chapters and is a recipient of Guyton Distinguished Lecturer award for quantitative and biophysical work on cholesterol modulation of ion channels and how this can affect integrated organ function from the Association of Chairs of Departments of Physiology. She also edited two books "Cholesterol Regulation of Ion Channels and Receptors" ands "Vascular Ion Channels"

levitan@uic.edu

Notes: