

Role of Cl⁻ Channels and Transporters in Cardiac Cell volume Homeostasis

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Abstract : Mammalian cells possess an ability to rapidly respond to changes in the difference between their external and internal osmolarity and adjust their cell volume to almost the original value. The regulation of cell volume is a basic property of all mammalian cells and is of particular importance in cardiac cells in heart where cell volume is associated with fatal outcomes. Cell volume homeostasis in th heart is an important new field, and the information about the mechanisms of detecting and transducing volume signals and their significance under physiological and pathophysiological conditions is increasing. Much less is known about the functional properties of Cl⁻ channels in cardiac pathophysiology in comparison to cation channels permeable to Na⁺, K⁺ and Ca²⁺. Recent studies reveal that cardiac Cl⁻ channels contribute to the autonomous regulation of cell volume, and the cell volume homeostasis is an essential cellular function coupled to a variety of physiological processes in the heart, such as cell proliferation, differentiation, migration and apoptosis. This article presents some recent additions to the understanding of the role of cell volume homeostasis and Cl⁻ channels in the heart.

Key words : Chloride channels, Heart disease, Signal transduction, Patch clamp, Cell volume homeostasis