

# New Aspects of Calcium Ion-Permeable Channels: From Excitation of Nerve and Muscle to Cell Proliferation and Death

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**Organizers:** Yuji Imaizumi (Graduate School of Pharmaceutical Sciences, Nagoya City University)  
Shuji Kaneko (Graduate School of Pharmaceutical Sciences, Kyoto University)

$\text{Ca}^{2+}$  is a key factor in the regulation of cellular functions, and also in the regulation of cell life itself, such as proliferation, differentiation, and death in a variety of cells.  $\text{Ca}^{2+}$ -permeable channels on the plasma membrane have obligatory roles in functional complexes of such regulation, and their molecular entities and mechanisms for regulation have been considered as one of the major targets of drugs. In this symposium, new aspects of voltage-dependent (VDCCs) and -independent  $\text{Ca}^{2+}$  permeable channels will be introduced. Following the great success of dihydropyridine  $\text{Ca}^{2+}$  antagonists as antihypertensive drugs based on the blocking of L-type VDCCs in vascular organs, novel agents acting on P/Q-type VDCCs in the brain have recently been developed and will be hopefully used as a neurological clinical drug in the near future. On the other hand, a large family of transient receptor potential channels (TRPs) has been identified as molecular components of voltage-independent  $\text{Ca}^{2+}$ -permeable channels in many types of cells. It has been established that stimulation of membrane receptors can activate some types of TRPs as receptor-operated  $\text{Ca}^{2+}$  channels. Moreover, recent studies have revealed that TRPs are also activated by diverse range of stimuli such as heat, osmotic/mechanical stress, and oxidative stress, suggesting that TRPs are also biological sensors of the cellular environment and are involved in signaling pathways essential for cell destiny. The potential of  $\text{Ca}^{2+}$ -permeable channels as novel targets of drug development is now increasing and will be extensively discussed by five speakers: VDCC, Satomi, Adachi-Akahane (University of Tokyo) and Tetsuhiro Niidome (Eisai Pharmaceut. Co. Ltd/Kyoto University), TRP, Katsuhiko Muraki (Nagoya City University), Yasuo Mori (Kyoto University), and Shuji Kaneko (Kyoto University).