AWARDS

Membrane current evoked by mitochondrial Na^+-Ca^{2+} exchange in mouse heart

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(11th Hiroshi and Aya Irisawa Memorial Award
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I am currently an Associate Professor at the Department of Biochemistry and Molecular Biology, University of Chittagong, Bangladesh. I have conducted my PhD research under the supervision of Professor Satoshi Matsuoka, Department of Integrative and Systems Physiology, University of Fukui, Japan and have been awarded the degree of 'Doctor of Medicine' in June 2020. I have been awarded the Japanese Government (MEXT) scholarship for my doctoral study in the University of Fukui, Japan.

Our research has been focused on the electrophysiological characteristics of mitochondrial Na^+-Ca^{2+} exchanger (NCXm) in mouse heart. NCXm is pivotal in maintaining cellular Ca^{2+} homeostasis thereby regulating various physiological events such as automaticity of cardiomyocytes, B cell receptor mediated Ca^{2+} signalling, chemotaxis of B lymphocytes as well as being associated with Parkinson's disease and Alzheimer's disease. Although biophysical characteristics of NCXm have been extensively studied, the electrogenicity of NCXm has been a debated issue for a long time. Previous studies utilized imaging or isotopic techniques to examine the electrogenicity, and some studies suggested the electrogenic exchange while others electroneutral exchange. No direct measurement of mitochondrial membrane current associated with NCXm has been reported. We succeeded, for the first time, in recording the membrane currents mediated by NCXm using the whole-mitoplast patch clamp technique and we concluded that NCXm is electrogenic and the stoichiometry is 3 or more Na^+: 1 Ca^{2+} exchange. This study provides a final conclusion on the electrogenicity of NCXm which has been controversial for a long time.

Recent studies showed that the impairment of mitochondrial Na^+-Ca^{2+} exchange causes attenuation of Ca^{2+} efflux from mitochondrial matrix to cytosol in neuronal cells which contributes to the pathogenesis of Alzheimer's and Parkinson's disease. However, the electrophysiological properties NCXm in neuronal cells is yet to be determined. In this context, I plan to continue my research in the direction of investigating the electrophysiological characteristics of mitochondrial Na^+-Ca^{2+} exchanger in mouse brain.

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EDUCATION

2006-2007：Master of Sciences（MS）, Department of Biochemistry and Molecular Biology, University of Chittagong, Bangladesh

2015-2020：PhD, Department of Integrative and Systems Physiology, Faculty of Medical Sciences, University of Fukui, Japan

WORK

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