

ANNOUNCEMENT

Department of Physiological Science,
School of Medicine Fukuoka University,

We are looking for postdoctoral fellows who would like to make research studies with ours. Here, our research aims and specific projects are described as follows:

Research title

'A Coupling Mechanism of Ca²⁺ channels and Ca²⁺ binding molecules for Calcium Signal Transductions in Excitatory Cells'

Our research is aimed at understanding the molecule and structural underpinnings of the decoding of Calcium Signals. Among in the typical ions for homeostasis regulations, calcium ions have greatest gradient between extra- and intracellular ~10,000 times from bacterial to mammalian cells. All such phenomena – from the **Neuronal Synaptic Transmission**, to **Muscle Contraction**, to control of processes as varied as **Gene Transcription**, **Neuronal Memory**, **Cell Division**, or **Cellular Apoptosis**- are ultimately mediated at a protein coupling of two proteins: Ca²⁺ ion channels and Ca²⁺ binding molecules.

We seek to understand the molecular mechanisms by which **Ca channels (Voltage-gated Ca channels and TRP channels)** open and close to switch the flows of calcium ions across cellular membranes, and by which **Ca²⁺ binding molecules** are receive calcium ions to conduct calcium multiple functions. To elucidate such functions, we technically apply electrophysiological analysis such as *patch-clamp*, *in vivo* fluorescence energy transfer (**FRET**) analysis, and *protein crystallizations* that is for the atomic resolution structure of ion channel and calcium binding protein complexes. By applying these approaches to a large number of Ca channels (voltage-gated or TRP channels) or Ca binding molecules such as **Calmodulin**, we are now at the exciting point of having a global view of the regulatory mechanism of Ca channels and driving different

aspects of Ca signals. The aim of the new researcher's (or student's) project is to develop a tethering molecule to evaluate perimembrane (submembrane) calcium signals which is composed glycine flexible polymer, with the imaging to FRET system and functional assay with patch clamp to evaluate the distance from membrane and functional correlation. Our department has an expertise especially on electrophysiology for TRP channels and Voltage-gated ion channels with wet lab biologists. We have also ongoing collaborations with this field at Kyushu University, Kyoto University and Johns Hopkins University.

The ideal candidates have background knowledge in **Physiological** and/or **Biophysical** science **Molecular biology, Biochemistry** and data analysis with **EXCEL** and/or **MATLAB**. No need to cover all of these, but must need to an interest of this field.

Yours truly,

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Contact address

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Selected Publications (from 2003~)

Mori MX, Vander Kooi CW, Leahy DJ, Yue DT.(2008) Crystal structure of the CaV2 IQ domain in complex with Ca²⁺/calmodulin: high-resolution mechanistic implications for channel regulation by Ca²⁺. *Structure*.16, 607-620.

Yang PS, Alseikhan BA, Hiel H, Grant L, Mori MX, Yang W, Fuchs PA, Yue DT. (2006) Switching of Ca^{2+} -dependent inactivation of $\text{Ca}_v1.3$ channels by calcium binding proteins of auditory hair cells. *J Neurosci.* 26, 10677-10689

Kawaguchi A., Mori M.X., Mori Y., Imoto K., Ichida S. , (2005) Effects of calmodulin and Ca^{2+} channel blockers on omega-conotoxin GVIA binding to crude membranes from alpha1B subunit ($\text{Ca}_v2.2$) expressed BHK cells and mice brain lacking the alpha1B subunits. Wada T., Imanishi T., *Neurochem Res.* 8, 1045-1054.

Mori MX., Erickson MG., and Yue DT. (2004). Functional Stoichiometry and local enrichment of CaM interacting with Channels. *Science* 5669, 432-435

Shi J, Mori E, Mori Y, Mori M, Li J, Ito Y, Inoue R. (2004) Multiple regulation by calcium of murine homologues of transient receptor potential proteins TRPC6 and TRPC7 expressed in HEK293 cells. *J Physiol.*, 561, 415-32

Liang H, DeMaria CD, Erickson MG, Mori MX, Alseikhan BA, Yue DT (2003) Unified mechanisms of Ca^{2+} regulation across the Ca^{2+} channel family. *Neuron.*39: 951-960.

Erickson MG, Liang H., Mori MX, and Yue DT (2003). FRET two-hybrid mapping reveals function and location of L-type Ca^{2+} channel CaM preassociation. *Neuron* 39, 97-107.

Mori, M., Konno, T., Morii, T., Nagayama, K., and Imoto, K. (2003). Regulatory interaction of sodium channel IQ-motif with calmodulin C-terminal lobe. *Biochem Biophys Res Commun* 307, 290-296.

Weiss, L.A., Escayg, A., Kearney, JA., Trudeau, M., MacDonald, BT., Mori, M., Reichert, J., Buxbaum, J. D., and Meisler, M. H. (2003). Sodium channels SCN1A, SCN2A and SCN3A in familial autism. *Mol.Psychiatry* 8, 186-194

Stable expression and characterization of human PN1 and PN3 sodium channels. Akiba, I., Seki, T., Mori, M., Iizuka, M., Nishimura, S., Sasaki, S., Imoto, K., and Mori, M., Barsoumian, E. L. (2003). *Receptors Channels* 9, 291-299.