

～ミニシンポジウムのお知らせ～

Mechanosensitive ion channels
mini-symposium in Osaka

Date: June 7th, 2024 (Fri) 16:00～18:30

Location: Osaka university graduate school of medicine,
Lecture room #C

< Agenda >

Opening remarks Dr. Masanori P. Takahashi

Lecture series

Dr. Kotaro Hirano, *University of Shizuoka*

“The mechanosensitive ion channel PIEZO1 as a biophysical sensor
of skeletal muscle stem cells”

Dr. Yun Lyna Luo, *Western University*

“Mechano-electrical coupling in PIEZO channels”

Dr. Jerome Lacroix, *Western University*

“Molecular mechanisms of PIEZO channel modulation
by small molecules”

Discussion

All speakers with audience, (Facilitator Dr. Tomoya Kubota)

Closing remarks Dr. Tomoya Kubota

問い合わせ先:医学系研究科保健学専攻 久保田智哉 内線2587

～セミナーのお知らせ～

The mechanosensitive ion channel PIEZO1 as a biophysical sensor of skeletal muscle stem cells

Kotaro Hirano 先生

Assistant Professor

School of Pharmaceutical Sciences, University of Shizuoka

日時: 2024年6月7日(金) 16:00～16:40

場所: 大阪大学医学部医学科講義棟 C講堂

< Abstract >

Muscle satellite cells (MuSCs), myogenic stem cells in skeletal muscles, play an essential role in muscle regeneration. However, the molecular mechanisms as to how MuSCs sense physical stimuli remain to be elucidated. Here we identified PIEZO1, a mechanosensitive Ca^{2+} channel that is activated by membrane tension, as a key regulator of myofiber regeneration. Our results reveal that PIEZO1 plays a role in MuSC division in a Rho-dependent manner, suggesting that the mechanosensing machinery is central to the maintenance of skeletal muscle homeostasis.

< Selected publications >

Hirano, et. al., The mechanosensitive ion channel PIEZO1 promotes satellite cell function in muscle regeneration, *Life Science Alliance*, 2023

～セミナーのお知らせ～

Mechano-electrical coupling in PIEZO channels

Yun Lyna Luo 先生

Associate Professor

Biotechnology and Pharmaceutical Sciences,
Western University

日時: 2024年6月7日(金) 16:40～17:20

場所: 大阪大学医学部医学科講義棟 C講堂

Mechanosensitive ion channels, PIEZO1 and PIEZO2, convert mechanical forces into electrical signals in vertebrates. Using atomistic and hybrid-resolution molecular dynamics techniques, we simulated PIEZO1&2 gating motion in response to changes in membrane curvature and physiological lateral tension. To investigate whether multiple PIEZO channels may undergo cooperative gating, we developed a super coarse-grained model to simulate the spontaneous clustering of channels in a submicron membrane patch.

Jiang, et. al., Structural and thermodynamic framework for PIEZO1 modulation by small molecules, *PNAS*, 2023

Jiang, et. al., Crowding-induced opening of the mechanosensitive Piezo1 channel in silico. *Commun. Biol.* 2021

Botello-Smith, et al., A molecular Mechanism for the Chemical Activation of the Mechanosensitive Piezo1 Channel, *Nat. Commun.*, 2019

保健学科国際交流センター共催

問い合わせ先: 医学系研究科保健学専攻 久保田智哉 内線2587

～セミナーのお知らせ～

Molecular mechanisms of PIEZO channel modulation by small molecules

Jerome Lacroix 先生

Associate Professor

Department of Basic Medical Sciences,
Western University of Health Sciences, USA

日時: 2024年6月7日 (金) 17:20～18:00

場所: 大阪大学医学部医学科講義棟 C講堂

PIEZO1/2 ion channels constitute essential mechanotransducers in vertebrates. Pharmacological modulation of PIEZO1 and PIEZO2 could offer many clinical benefits to treat a diversity of ailments including pain, cancer, hypertension, and wound healing. My talk will focus on our efforts in identifying the binding site and pharmacological mechanism of Yoda1, a synthetic small molecule PIEZO1 activator, and how to harness this knowledge for future structure-based drug discovery.

Structural and thermodynamic framework for PIEZO1 modulation by small molecules.
Jiang et al., PNAS, 2023

Yoda1's energetic footprint on Piezo1 channels and its modulation by voltage and temperature.
Wijerathne et al., PNAS, 2022

A mechanism for the activation of the mechanosensitive Piezo1 channel by the small molecule Yoda1.
Botello-Smith et. al., Nature Communications, 2019

Probing the gating mechanism of the mechanosensitive channel Piezo1 with the small molecule Yoda1.
Lacroix et. al., Nature Communications, 2018

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