# Role of a mechanosensitive ion channel PIEZO1 in muscle satellite cells

Kotaro Hirano[1], Seiji Takabayashi[1], Mari Takeuchi[1], Masaki Tsuchiya[1], Yuji Hara[1,2], Masato Umeda[1]

[1]*Grad. Sch. Eng., Kyoto Univ.,* [2]*AMED, PRIME*

Muscle-resident stem cells called muscle satellite cells (MuSC) play an essential role in muscle regeneration. Mechanosensation is presumed to be critical for activation of MuSCs, but the molecular entity that determines the cell fate in MuSCs through converting the mechanical stimuli into biochemical signals remains to be elucidated. Here we identify PIEZO1, a mechanosensitive ion channel that is activated by membrane tension, as a critical determinant for activation of MuSCs. *In silico* analysis demonstrates that PIEZO1 is predominantly expressed in MuSCs but not in mature myofibers. By utilizing *Piezo1-tdTomato* mice where endogenous PIEZO1 is fused with a fluorescent protein tdTomato, our immunofluorescent analysis reveals that PIEZO1 is accumulated to the cleavage furrow during cell division of MuSCs. Moreover, a conditional deletion of *Piezo1* leads to delayed myofibers regeneration after cardiotoxin-induced myofiber injury, at least in part due to the cell division delay in MuSCs. Thus, our results indicate that PIEZO1 is a bona fide mechanosensor whose ion channel activity is required for completion of cell division in MuSCs.