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Inter-organelle communications in neural circuits

Membrane-bound cellular organelles are distinct compartments for specialized functions. However recent studies revealed surprisingly extensive communication and network between these organelles. Their membranous structures such as mitochondria and associated membranes are folding into various shapes showing highly curved morphology, and the network is dynamic depending cellular conditions. Vesicles and autophagy also show dynamic structures depending cellular conditions. The visualization of the network has been tried by super resolution fluorescence microscopy. However, their resolution has still limitation for detail membranes in organelles. Therefore, high-resolution analyses of the network at electron microscopy level are crucial to understand the cellular functions and dysfunction in disease.

Our current research aims at investigating connections between mitochondria and other organelles, balance between proteasome and autophagy, and function of extracellular vesicles in neuronal cells.

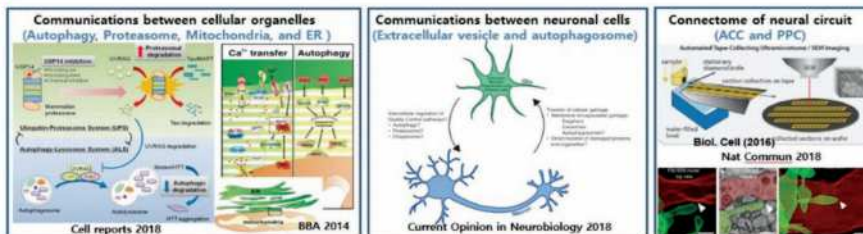
Aim

Functional and structural relationship between cellular organelles in neuron and glia

Tool

Single particle analysis + Cryo-EM + Correlative microscopy + 3DEM

TARGET



Curriculum Vitae

2018~Present : Principal Investigator, KBRI
 2014~2017 : Assistant Professor, Eulji University
 2009~2014 : Postdoctoral Fellow, Medical school,
 University of Massachusetts

Academic Credential

2009 : Ph.D., School of life Sciences and biotechnology,
 Korea University (Thesis : Three dimensional analysis
 on functional structure of cellular organelles)
 2002 : M.S., School of life Sciences and biotechnology,

Korea University (Thesis : Effects of cypermethrin on the dopaminergic
 neurons in the progressive hemiparkinsonian rats)
 2000 : B.S., Microbiology, Chungnam Nat'l University

Awards/Honors/Memberships

2000~Present : Member, Korean Society of Microscopy
 2017~Present : Editorial Board (Applied microscopy), Korean Society of Microscopy
 2000~Present : Member, Korean Society of Molecular and Cellular Biology (KSMCB)
 2019~Present : Award Committee for KSMCB
 2009~Present : Member, Biophysical Society
 2017~Present : Member, Society for neuroscience

Research keywords

Network between Cellular organelles, MAM, proteasome, autophagy, extracellular vesicle.

Key techniques

Cryo-TEM, 3D electron microscopy, Correlative light and electron microscopy.

Research Interests/Topics

- Network between cellular organelles.
- Transfer of damaged proteins and organelles between neuronal cells.

Research Publications (selected)

- Kim E*, Park S*, Lee JH*, **Mun JY***, Choi WH, Yun Y, Lee J, Kim JH, Kang MJ, Lee MJ. Dual Function of USP14 Deubiquitinase in Cellular Proteasomal Activity and Autophagic Flux. *Cell Rep.*, 24(3):732-743, 2018. (*equal contribution)
- Jung MK, **Mun JY**. Sample Preparation and Imaging of Exosomes by Transmission Electron Microscopy. *J Vis Exp.*, 131, 2018.
- Choi H, Son JB, Kang J, Kwon J, Kim JH, Jung M, Kim SK, Kim S, **Mun JY**. Leucine-induced localization of Leucyl-tRNA synthetase in lysosome membrane. *Biochem Biophys Res Commun.*, 493(2):1129-1135, 2017.
- Bae Y, Jung MK, Song SJ, Green ES, Lee S, Park HS, Jeong SH, Han J, **Mun JY***, Ko KS*, Choi JS*. Functional nanosome for enhanced mitochondria-targeted gene delivery and expression. *Mitochondrion*, 37:27-40, 2017. (*co-correspondence)
- **Mun JY***, Previs MJ*, Yu HY, Gulick J, Tobacman LS, Beck Previs S, Robbins J, Warshaw DM, Craig R. Myosin-binding protein C displaces tropomyosin to activate cardiac thin filaments and governs their speed by an independent mechanism. *Proc Natl Acad Sci USA*, 111(6):2170-2175, 2014. (*equal contribution)