

**Hyun-Ho Lim, PhD**

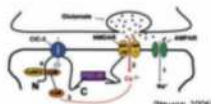
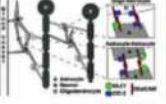
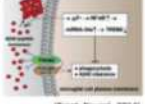
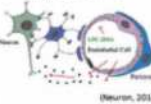
Principal Investigator

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## Molecular physiology & biophysics of the membrane proteins in the nervous system

The cells are enclosed by the selective barrier, phospholipid bilayer, called the membrane. The membrane proteins of the cells are critical to respond to external stimulations, relay signals from outside to inside or vice versa, transport molecules in and out of the cell, catalyze enzymatic activities, and generate cellular electricity. About 30% of genes are predicted to encode transmembrane proteins and more than 50% of current drugs are targeting membrane proteins. We are currently studying various membrane proteins including ion channels, transporters, and receptors. Especially, a membrane receptor critical for the microglial function, a new astrocytic membrane protein for glia-neuron interaction, and  $\text{Cl}^-$  transporting proteins including VRAC, CLC, and BEST1 are focused to understand their functional and structural characteristics and physiological roles in the nervous system. In the long term, we hope to develop a way of modulating membrane proteins based on their molecular mechanisms and 3D-architectures. To tackle the questions on membrane proteins, we are conducting multidisciplinary approaches including electrophysiology, x-ray crystallography, membrane biochemistry, and cell biology.

<b>Aim</b>	Elucidating structure-function relationship of membrane proteins in the nervous system			
<b>Tool</b>	Electrophysiology + Membrane biochemistry + X-ray crystallography			
<b>T A R G E T</b>	<b>Modulating neuronal excitability</b> (Neuronal CLC channel and antiporter)  (Neuron, 2006)	<b>Neuro-glial interaction</b> (Astrocytic MLC1)  (Neuron, 2013)	<b>A<math>\beta</math> clearing</b> (Microglial TREM2)  (Front. Neurol., 2014)	<b>BBB integrity</b> (Endothelial MFSD2a)  (Neuron, 2014)

**Curriculum Vitae**

2013~Present : Principal Investigator, KBRI  
 2007~2013 : Postdoctoral Associate,  
 HHMI / Brandeis Univ., USA  
 2005~2007 : Postdoctoral Fellow,  
 Distribute Network Center, GIST, Korea

**Academic Credential**

2005 : Ph.D., Life Science, GIST  
 1999 : M.S., Life Science, GIST  
 1995 : B.S., Agricultural Biology, Seoul Nat'l University

**Awards/Honors/Memberships**

2018~Present : Secretary, Korean Biophysical Society  
 2016~2017 : Nat'l Brain Science Working Committee,  
 Ministry of Sci. & Tech., KOREA  
 2015 : International Collaboration Committee, Korean Society for  
 Brain and Neuroscience  
 2012 : Treasurer, New England Bioscience Society (NEBS), Boston, USA  
 1998~Present : Member, Biophysical Society  
 1998~Present : Member, Society for Neuroscience

**Research keywords**

Membrane protein, Ion transport, X-ray crystallography, Electrophysiology.

**Key techniques**

Membrane protein biochemistry and crystallography, Liposome-based ion transport assay, Planar lipid bilayer and patch-clamp recordings, and monoclonal antibody generation.

**Research Interests/Topics**

- Structural and functional studies on the membrane proteins involved in the neuro-glia-vascular interactions.
- Structure-function relationship of chloride transporting membrane proteins.

**Research Publications (selected)**

- Park KW, Lee BC, **Lim HH**. Mutation of external glutamate residue reveals a new intermediate transport state and anion binding site in a CLC  $\text{Cl}^-/\text{H}^+$  antiporter. *Proc. Natl. Acad. Sci. USA*, 2019.
- **Lim HH**, Stockbridge RB, Miller C. Fluoride-dependent interruption of the transport cycle of a CLC  $\text{Cl}^-/\text{H}^+$  antiporter. *Nat. Chem. Biol.*, 9(11):721-725, 2013.
- **Lim HH**, Shane T, Miller C. Intracellular proton access in a  $\text{Cl}^-/\text{H}^+$  antiporter. *PLoS Biology*, 10(12):e1001441, 2012. (Recommended by Faculty of 1000)
- Stockbridge RB, **Lim HH**, Otten R, Williams C, Shane T, Weinberg Z, Miller C. Fluoride resistance and transport by riboswitch-controlled CLC antiporters. *Proc. Natl. Acad. Sci. USA*, 109:15289-15294, 2012.
- **Lim HH**, Miller C. It takes two to transport, or is it one? *Nat. Struct. Mol. Biol.*, 19:129-130, 2012. (corresponding author)
- **Lim HH** Fang Y, Williams C. High-efficiency screening of monoclonal antibodies for membrane protein crystallography. *PLoS ONE*, 6:e24653, 2011. (corresponding author)

**Patents (selected)**

- **Lim HH**, Kim HJ, Choi HS, Lee JH. Monoclonal antibody with specificity for human TREM2 protein, hybridoma cell line producing the same and use thereof (10-2018-0129740, patent application)