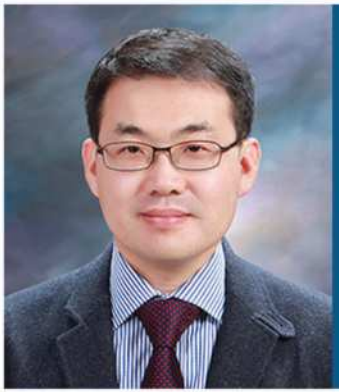

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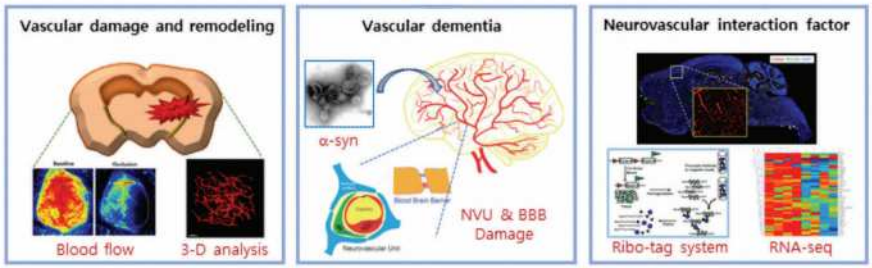
Molecular mechanism of neurovascular unit and blood-brain barrier

Evolution has crafted vertebrates with two exquisitely elaborate systems each specialized to perform their unique and vital functions: the nervous and vascular systems. These two systems are wired intimately to perform many physiological processes such as energy metabolism and hemodynamic control. However, in contrast to our advanced understanding of neural circuit assembly, how the architecture of the neurovascular system is wired and subsequently establishes the proper functional unit in the mammalian brain is still poorly understood. In addition, it has been widely highlighted that the impairments of the neurovascular structure and functions are crucial etiological factors leading the neuropathological conditions such as Alzheimer's disease, Parkinson's disease, and vascular dementia. Using a combination of advanced mouse genetic, histological, molecular and cellular approaches, we are currently investigating basic principles of brain neurovascular development and disease pathogenesis and will facilitate the development of a therapeutic strategy for curing neurological disorders.

Aim	Understanding neurovascular unit formation and functional maintenance
Tool	*In vivo* mouse model + Molecular histology + Brain vasculature physiology

TARGET



Curriculum Vitae

2014~Present : Principal Investigator, KBRI
2007~2014 : Research Fellow, Harvard Medical School, USA
1996~1999 : Researcher, Samsung Biomedical Research Institute, Korea

Academic Credential

2006 : Ph.D., Molecular Medicine, Medical College of Georgia, USA
1995 : M.S., Molecular Biology, Chung-Ang Univ., Korea
1993 : B.S., Biology, Chung-Ang Univ.

Awards/Honors/Memberships

2002~Present : Member, Society for Neuroscience
2015~Present : Member (Academic committee), Korean Society for Vascular Biology and Medicine
2014~Present : Member, The Korean Society for Brain and Neural Sciences
2010~2011 : Alice and Joseph Brooks Fund Postdoctoral Fellowship, USA
2008~2010 : Lefler Fellowship, USA
2006 : Ph.D. with Distinction, Medical College of Georgia, USA

Research keywords

Brain Vasculature, Neurovascular Unit, Blood-Brain Barrier, Vascular Dementia.

Key techniques

Genetics- and surgery-based model mouse development, Molecular Histology, Blood flow and permeability analysis.

Research Interests/Topics

- Mechanism about establishment and maintenance of the neurovascular unit, and screening of novel neurovascular interaction factors.
- Basic mechanism of neuronal disorders by vascular impairment and therapeutic strategy.

Research Publications (selected)

- Choi MG, Kim MJ, Kim DG, Yu R, Jang YN, **Oh WJ**. Sequestration of synaptic proteins by alpha-synuclein aggregates leading to neurotoxicity is inhibited by small peptide. *Plos One, 13(4):e0195339, 2018.*
- **Oh WJ**, Gu C. Establishment of neurovascular congruency in the mouse whisker system by an independent patterning mechanism. *Neuron, 80: 458-469, 2013.*
- Ding JB*, **Oh WJ***, Sabatini BL, Gu C. Semaphorin3E-Plexin-D1 signaling controls pathway-specific synapse formation in the striatum. *Nature Neuroscience, 15:215-223, 2012.* (*equal contribution)
- Kim JH*, **Oh WJ***, Gaiano N, Yoshida Y, Gu C. Semaphorin3E-Plexin-D1 signaling regulates VEGF function in developmental angiogenesis via a feedback mechanism. *Genes and Development, 25:1399-1411, 2011.* (*equal contribution)

Patents (selected)

- Choi MG and **Oh WJ**. A method for suppressing alpha-Synuclein aggregates-mediated cellular toxicity. (10-1896182, patent registered)