



# Specialized Research Group for Intractable Neurological Disorders(SReGIND)

## Major research goals

SReGIND is a research group focusing on the development of novel therapeutics or techniques to manage intractable neurological disorders such as neurodegenerative disorders, cerebrovascular disorders, neuropathic pain disorders or rare neurogenetic disorders. Our major research fields cover molecular biology, stem cells, electrophysiology, genetics, optical imaging and modeling of human diseases in animals(mouse and zebrafish).

## Major research topics and achievements

SReGIND consists of 4 major research teams.

### 1. Team for Alzheimer Disease(AD)

- A. Search tools: mouse AD model(TG2576, 5xFAD, TauKO mouse and  $\delta$ -catenin AD TG mouse), electrophysiology(patch clamp), optical imaging technique.
- B. Major achievements: Identification of the effect of an oats extract on synaptic plasticity in mouse AD model(Figure 1).
- C. Ongoing interests
  - Alteration of LTP with ageing in AD mouse

model

- Preclinical study of GSKIII-related drugs for AD

### 2. Team for Cerebrovascular Diseases

- A. Research tools: remote ischemic postconditioning, nanotransporter-based anti-atherosclerosis technique, MCAO mouse model
- B. Major achievements: Identification of the effect of Caveolin-1 on brain edema(Figure 2)
- C. Ongoing interests
  - Development of a preventive measure for vasospasm in SAH using remote ischemic postconditioning.
  - Development of nanotransporter-based anti-atherosclerotic technique
  - Development of co-regulation strategy for cancer and stroke.

### 3. Team for Neuropathic Pain Disorders

- A. Research tools: Neuropathic or inflammatory pain
- B. mouse model, cDNA profiling
- C. Major achievements: Intrathecal nefopam-induced antinociception through activation of descending serotonergic projections involving spinal 5-HT<sub>7</sub> but not 5-HT<sub>3</sub> receptors

Director

Prof. Myeong-Kyu Kim, M.D., Ph.D.

## D. Ongoing interests

- The effect of natural extracts on inflammatory pain
- The role of Wnt signal in pathogenesis of chemotherapy-induced pain

## 4. Team for Rare Neurogenetic Disorders

- A. Research tools: transgenic zebrafish model, whole mount *in situ* hybridization, next generation sequencing, animal behavioral test
- B. Major achievements: Development of transgenic Zebrafish model of Human diseases(Figure 3).
- C. Ongoing interests
- Zebrafish modeling non-neuropathic nociceptor overexpressed central sensitization.
  - Identification of disease-causing genes of congenital brain malformation or epileptic encephalopathies.

## Major Relevant Publications

1. Jo J et al.  $A\beta(1-42)$  inhibition of LTP is mediated by signaling pathway involving caspase-3, Akt1 and GSK-3 $\beta$ . *Nat Neurosci* 2011;14:545-7.
2. Choi KH et al. Regulation of Caveolin-1 Expression Determines Early Brain Edema After Experimental Focal Cerebral Ischemia. *Stroke* 2016;47:1336-43.
3. Lee HG et al. Intrathecal nefopam-induced antinociception through activation of descending serotonergic projections involving spinal 5-HT7 but not 5-HT3 receptors. *Neuroscience Letters* 2015;587:120-5.
4. Lossin C et al. Altered fast and slow inactivation of the N440K Nav1.4 mutant in a periodic paralysis syndrome. *Neurology* 2012;79:1033-40.

