

Biological Sketch

Name:

Hyang Woon Lee, M.D., Ph.D.,

Position Title:

Professor, Department of Neurology,
 Director of Epilepsy & Sleep Center,
 Director, Ewha Medi-Tech Research Institute
 Chair, Academic Committee, Korean Neurological Association
 Chair, Finance Committee, Society for Korean Human Brain Mapping
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Educations:

Visiting Professor, Yale University School of Medicine, Departments of Neurology and Diagnostic Radiology, New Haven, CT, USA / 2010-11
 Clinical Fellow, NINDS, Clinical Epilepsy Section, Bethesda, MD, USA / 2002-03
 Postdoctoral Fellow, Johns Hopkins Univ. School of Medicine, Baltimore, MD, USA / 2001-02
 Ph.D. in Medicine (Neurophysiology), Korea Univ. Graduate School of Medicine, Seoul, South Korea / 1996-99
 M.S. in Medicine (Neuropathology), Ewha Womans Univ. Graduate School of Medicine, South Korea / 1994-96
 M.D./B.S. in Medicine, Ewha Womans Univ. School of Medicine, Seoul, South Korea / 1987-93

Academic and Professional Experiences:

2024~present: Director, Ewha Bio-Medical Research Institute, Ewha Medical Center, Seoul, Korea
 2024~present: Vice President, Medical Branch of Ewha University-Industry Cooperation Institute, Ewha Womans University, Seoul, Korea
 2024~present: Chair, Women Faculty Special Interest Group, Organization for Human Brain Mapping (OHBM)
 2022~present: Chair, International Committee, Local Organizing Committee of OHBM (Organization for Human Brain Mapping) & Society for Korean Human Brain Mapping (KHBM), Seoul, Korea
 2020~present: Director, Ewha Medi-Tech Research Institute, Ewha Womans University, Seoul, Korea
 2019~2021: Chair, Academics Committee, Korean Neurological Association (KNA), Seoul, Korea
 2020~2022: Chair, Finance Committee, Society for Korean Human Brain Mapping (KHBM), Seoul, Korea
 2019~2021: Chair, Academic Committee, Society for Korean Human Brain Mapping (KHBM), Seoul, Korea
 2018~2020: Editor-in-Chief, Journal of Epilepsy Research, Published by Korean Epilepsy Society, Seoul, Korea;
 2017~2021: Task Force Member, Diversity & Inclusivity Committee, Organization of Human Mapping (OHBM)
 2015~2017: Task Force Member, Education Committee on Neuropsychiatry, International League Against Epilepsy (ILAE)

2015~present: Chair, Department of Neurology, Ewha Womans University School of Medicine, Seoul, Korea

2012~present: Professor, Department of Neurology, Ewha Womans University School of Medicine, Seoul, Korea

2010~present: Director, Epilepsy & Sleep Center, Ewha Womans University Mogdong Hospital, Seoul, Korea

2003~2012: Assistant / Associate Professor, Department of Neurology, Ewha Womans University School of Medicine, Seoul, Korea

2002~2003: Clinical fellow & special volunteer, Clinical epilepsy section, NINDS, Bethesda, MD

2001~2002: Postdoctoral fellow, Epilepsy center, Department of Neurology, Johns Hopkins University School of Medicine, Baltimore, MD

1998~2000: Clinical fellow, Epilepsy and Sleep disorder program, Department of Neurology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

1994~1998: Resident, Department of Neurology, Ewha Womans University Hospital

1993~1994: Intern, Ewha Womans University Hospital

Academic and fellowship honors:

Korean Human Brain Mapping, Outstanding Research Achievement Award, 2015;

https://www.khbm.org/english/02_conference/awardee.htm

Korean Epilepsy Society, Outstanding Research Achievement Award, 2007

Ewha Womans University Hospital, Best Doctor of the Year Award, 2007

NINDS Intramural Competitive Postdoctoral Fellowship Award, 2003

American Epilepsy Society, Postdoctoral Research Fellowship Award, Milken Family Foundation, 2003

Ewha Womans University Alumni, Best Researcher of the Year Award, 2001

Korea Science and Engineering Foundation (KOSEF), Overseas Postdoctoral Training Award in Neuroscience Field 2001

Korean Medical Women's Association (KMWA), Outstanding Research Achievement Award 2001

Korean Neurological Association (KNA), Prize of the Best Scientific Presentation for Neurology Resident 1998

Membership in professional societies:

Corresponding Member of the American Epilepsy Society (AES), 2001 ~

Regular Active Member of the Society for Neuroscience (SFN), 2001 ~

Regular Active Member of the Organization of Human Brain Mapping (OHBM), 2010 ~

Active Member of the Korean Sleep Research Society (KSRS), 2003 ~

Active Member of the Korean Epilepsy Society (KES), 2000 ~

Member of the Korean Neurological Association (KNA), 1999 ~

Member of the Korean Human Brain Mapping (KHBM), 2003 ~

Title and Summary of dissertation or thesis:

Ph.D. thesis: Role of substance P on electrophysiological mechanism of circadian rhythm in suprachiasmatic nucleus of rat

Summary: The retinohypothalamic tract (RHT) is a neural pathway through which photic time cues are delivered directly to the mammalian circadian pacemaker in the suprachiasmatic nucleus (SCN).

Although the excitatory amino acid glutamate is the primary neurotransmitter in the RHT, other substances such as substance P (SP) also have been suggested to play a role. The present study tested the hypothesis that SP participates in retinohypothalamic transmission and selectively modulates either N-methyl-D-aspartate (NMDA) or non-NMDA receptor-mediated neurotransmission. The SP antagonist L-703,606 depressed the excitatory postsynaptic current (EPSC) evoked by optic nerve stimulation in SCN

neurons in rat hypothalamic slices. The SP antagonist also had a similar depressive effect on the NMDA and non-NMDA receptor-mediated components of the EPSC. These results suggest that SP is an excitatory neuromodulator contributing to the expression of both the NMDA and non-NMDA receptor-mediated components of retinohypothalamic transmission. This study aims to elucidate an important neuromodulatory control mechanism of the RHT via SP-related neurotransmission involving the circadian rhythm control to entrain the external time cue, most importantly 24-hour light-dark cycle.

M.S. thesis: The effects of peripheral leukocytes on the hippocampal neuronal changes after global ischemia with reperfusion and the unilateral hemispheric infarction

Summary: The participation of activated leukocytes and subsequent production of chemical mediators has been well accepted in the pathophysiology of hypoxic-ischemic injury. This study was performed to see the effects of leukocytes on hippocampal neuronal damage in transient global ischemia induced by 10-min occlusion of bilateral common carotid arteries (CCAs) with reperfusion for various times, and in complete unilateral ischemia induced by 24-hr ligation of left CCA. Leukopenia was induced by intraperitoneal injection of cyclophosphamide for 4 days. The results showed that hippocampal neuronal damages were worse at 6-hr reperfusion in leukopenic experimental group than in the control group. In comparison, 24-hr and 3-day reperfusion leukopenic groups showed less numbers of damaged neurons and milder changes. The 5-day reperfusion group showed inconsistent changes. Unilateral CCA occlusion showed extensive infarction in 83.3% of gerbils in the control group, compared to 25% of gerbils in the experimental group ($p < 0.05$). These results strongly suggest that the number of peripheral leukocytes were closely related to the development of delayed neuronal damage of hippocampus in transient global ischemia and the incidence of infarction induced by 24-hr unilateral CCA ligation. This study aims to investigate the possibility of inflammation mediated by peripheral leukocytes as a pathophysiologic mechanism in hippocampal neuronal injury after transient global ischemia induced by occlusion of bilateral common carotid arteries.

Present and Previous Training/Employment or References:

Visiting Professor, 02/2010 -05/2011, Department of Neurology, Yale University School of Medicine, New Haven, CT, USA, HAL BLUMENFELD, M.D., Ph.D.; Departments of Radiology, Neurosurgery, and Biomedical Engineering, Yale University School of Medicine, New Haven, CT, USA, R. TODD CONSTABLE, Ph.D.

Professor/Associate & Assistant Professor, 09/2003 -present, Department of Neurology, Ewha Womans University School of Medicine, Seoul, Korea, BYUNG-IN MOON, M.D., Ph.D.

Clinical fellow & Special volunteer, 07/2002 -08/2003, Clinical Epilepsy Section, NINDS, Bethesda, MD, USA, WILLIAM H. THEODORE, M.D.

Postdoctoral fellow, 07/2001- 06/2002, Epilepsy Center, Dept. of Neurology, Johns Hopkins University School of Medicine, Baltimore, MD, USA, RONALD P. LESSER, M.D.

Clinical associate, 03/2000-06/2001, Dept. of Neurology, Ewha Womans University School of Medicine, Seoul, Korea, KYUNG GYU CHOI, M.D., Ph.D.

Clinical fellow, 03/1999-02/2001, Epilepsy and Sleep Disorder Program, Dept. of Neurology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea, SEUNG BONG HONG, M.D., Ph.D.

Residency, 03/1995-02/1999, Neurology, Ewha Womans University Hospital School of Medicine, Seoul, Korea, KYUNG GYU CHOI, M.D., Ph.D.

Editorial Activities:

Epilepsy Research, Editorial Board Member, 09/2009 ~ 2020

Journal of Epilepsy Research, Editor-in-chief, 09/2016 - 2020

Reviewer Invitations:

Journal of Neurology, Neurosurgery, and Psychiatry
 Neuroimage
 Human Brain Mapping
 Epilepsia
 Journal of Stroke
 Brain Research Bulletin
 Brain Research
 Epilepsy Research
 Ewha Medical Journal
 PLoS One
 Sleep and Breathing
 Journal of Clinical Medicine
 Journal of Clinical Neurology
 Journal of Clinical Neuroscience
 Journal of Epilepsy Research
 Journal of Neuroimaging
 Journal of Sleep Medicine

Publications

International Scientific Journals (Selected)

- 1) Kim YG, An HM, Kim GE, [Lee HW](#), Yang NR. Higher Risk of Mental Illness in Patients With Diagnosed and Untreated Unruptured Intracranial Aneurysm: Findings From a Nationwide Cohort Study. *Stroke* **2024**;55:2295-2304.
- 2) Park J, Kim MH, [Lee HW](#). Clinical outcomes and systemic complications related to severity and etiology of status epilepticus using common data model. *Neurocrit Care* **2024**;40:1116-1126. <https://doi.org/10.1007/s12028-023-01889-w>.
- 3) Chun MY, An HM, Lee HA, Hwang SE, Chung S, Kim NY, [Lee HW](#). Clinical characteristics of seizure recurrence and epilepsy development in patients with alcohol-related seizures. *Alcoholism – Clinical and Experimental Research (Hoboken)* **2024**, 48(11):2113-2125. doi: 10.1111/acer.15449.
- 4) Julia W. Y. Kam JWY, Badhwar AP, Borghesani V, Lee KJ, Noble S, Raamana PR, Ratnanather T, Tan DGH, Oestreich LKL, [Lee HW](#), Marzetti L, Nakua H, Rippon G, Olsen R, Uddin LQ, Yanes JA, Tzovara A. Creating Diverse and Inclusive Scientific Practices for Research Datasets and Dissemination. *Imaging Neuroscience* **2024**;Vol. 2:1-14. https://doi.org/10.1162/imag_a_00216.
- 5) Hwang SE, Shin DW, An HM, [Lee HW](#). Retention rates and successful treatment with antiseizure medications in newly-diagnosed epilepsy patients. *Yonsei Medical Journal* **2024 Feb**;65(2):89-97. <https://doi.org/10.3349/ymj.2022.0539>
- 6) Kang C, An S, Kim HJ, Maithreyee D, Hwang S, [Lee HW](#). Age-integrated artificial intelligence framework for sleep stage classification and obstructive sleep apnea screening. *Frontiers in Neuroscience*. **2023**; **17**, 1059186
- 7) Kang JH, Kim YJ, Yang JS, Chung SW, Hwang SE, Oh UR, [Lee HW](#). EEG Feature Engineering for Machine Learning-Based CPAP Titration Optimization in Obstructive Sleep Apnea. *International Journal of Advanced Smart Convergence*. 2023, 12(3): 89-103. <http://dx.doi.org/10.7236/IJASC.2023.12.3.89>.
- 8) Kim HJ, Kim REY, Kim S, Lee SK, [Lee HW](#), Shin C. Advanced chronotype in midlife as a predictor of accelerated brain aging: a population-based longitudinal cohort study. *Sleep*. 2023;46(6): zsad108. <https://doi.org/10.1093/sleep/zsad108>.
- 9) Kim HJ, Kim REY, Kim S, Lee SK, [Lee HW](#), Shin C. In response to the Letter to the Editor regarding “Earlier chronotype in midlife as a predictor of accelerated brain aging: a population-based longitudinal cohort study.” *Sleep*. 2023;46(10): zsad212. <https://doi.org/10.1093/sleep/zsad212>.
- 10) Kim HS, Seo HG, Jhee JH, Park CH, [Lee HW](#), Park B, Kim BG. Machine learning-assisted quantitative mapping of intracortical axonal plasticity following a focal cortical stroke in rodents. *Exp Neurol* **2023**;32(3):170-180.
- 11) Kim SH, Cho EJ, Kim YJ, Kim SE and [Lee HW](#). How Does the Brain Allow the Eyes to See? *Front Young Minds* **2023**, 11:732405. doi: 10.3389/frym.2023.732405.
- 12) [Hyang Woon Lee](#). Chapter 27. Sex/Gender differences in sleep physiology and sleep disorders. *In*.

- Sex/Gender-specific Medicine* **2023**, Part 13, Chap 27, Springer: In press.
- 13) Kim M, Um HK, Choi H, Lee JS, Kim J, Kim K, Noh E, Han M, **Lee HW**, Choi WI, Lee SH, Lee JR, Lee BH. Stretchable and biocompatible transparent electrodes for multimodal biosignal sensing from exposed skins. *Advanced Electronic Materials* **2023**, 2300075.
 - 14) Kim M, Kim YJ, **Lee HW**, Jung J-C, Oh S. Chrysanthemum Morifolium and its Bioactive Substance Enhanced the Sleep Quality in Rodent Models via Cl- Channel Activation. *Nutrients* **2023**, 15, 1309. <https://doi.org/10.3390/nu15061309>.
 - 15) Kim SE, Kim S, Kim HJ, Kim REY, Kim SA, Shin C, **Lee HW**. CLOCK genetic variants are associated with age-related changes in sleep duration and brain volume. *J. Gerontol. A. Biol. Sci. Med. Sci.* **2022**;77(9):1907-1914. <https://doi.org/10.1093/gerona/glab365>.
 - 16) Kim YG, Kim SE, Lee JH, Hwang SE, Yoo SS, **Lee HW**. Neuromodulation using transcranial focused ultrasound on the bilateral medial prefrontal cortex. *J Clin Med* **2022**;11:3809. doi.org/10.3390/jcm11133809.
 - 17) Park SH, **Lee HW**, Kim GE, Kim EJ. Factors affecting depressive symptoms in children and adolescents with epilepsy. *Journal of the Korean Academy of Child and Adolescent Psychiatry* **2022**;33(4):106~112. <https://doi.org/10.5765/jkacao.229915>
 - 18) Yoo C, **Lee HW**, Kang JW. Transferring structured knowledge in unsupervised domain adaptation of a sleep staging network. *IEEE Journal of Biomedical and Health Informatics* **2022**;26(3):1273~1284.
 - 19) Daeho Ryu, Youjin Lee, Yongseung Lee, Yana Lee, Seoyoung Hwang, Yong-Kweon Kim, Sang Beom Jun, **Hyang Woon Lee**, Chang-Hyeon Ji. Silicon optrode array with monolithically integrated SU-8 waveguide and single LED light source. *J. Neural Engineering.* **2022**;19:046013.
 - 20) Kim HJ, Kim REY, Kim S, Kim SA, Kim SE, Lee SK, **Lee HW**, Shin C. Sex differences in deterioration of sleep properties associated with aging: a 12-year longitudinal cohort study. *Journal of Clinical Sleep Medicine* **2021**;16:12, 1~10, <https://doi.org/10.5664/jcsm.9072>.
 - 21) Hwang, S.; Park, C.-H.; Kim, R.E.-Y.; Kim, H.J.; Choi, Y.S.; Kim, S.-A.; Yoo, J.H.; Chung, K.W.; Choi, B.-O.; Lee, H.W. Cerebellar White Matter Abnormalities in Charcot–Marie–Tooth Disease: A Combined Volumetry and Diffusion Tensor Imaging Analysis. *J.Clin.Med.* **2021**, *10*(21), 4945. <https://doi.org/10.3390/jcm10214945>.
 - 22) Choi GS, Yun JY, Hwang S, Kim SE, Kim JY, Im CH, **Lee HW**. Can corticomuscular coherence differentiate between REM sleep behavior disorder with or without Parkinsonism? *J. Clin. Med.* **2021**, *10*, 5585. doi: [10.3390/jcm10235585](https://doi.org/10.3390/jcm10235585).
 - 23) Yoo S, Won KS, Kim KT, **Lee HW**, Cho YW. Cardiac autonomic dysfunction is associated with severity of REM sleep without atonia in isolated REM sleep behavior disorder. *J. Clin. Med.* **2021**, *10*, 5414. doi: [10.3390/jcm10225414](https://doi.org/10.3390/jcm10225414).
 - 24) Tzovara A, Amarreh I, Borgesani V, Chakravarty MM, DuPre E, Grefkes C, Haugg A, Jollans L, **Lee HW**, Newman SD, Olsen RK, Ratnanater JT, Rippon G, Uddin LQ, Bringas Vega ML, Veldsman M, White T, Badhwar A. Embracing diversity and inclusivity in an academic setting: Insights from the Organization for Human Brain Mapping. *Neuroimage* **2021**;229:117742. <https://doi.org/10.1016/j.neuroimage.2021.117742>.
 - 25) Kim YJ, Jee Y, Park S, Ha EH, Jo I, **Lee HW**, Song MS. Mortality risk within 14 days after COVID-19 diagnosis in dementia patients: A nationwide analysis. *Dementia and Geriatric Cognitive Disorders* **2021**, 50(5):425-436. doi: 10.1159/000519466.
 - 26) Kim REY, Kim HJ, Kim S, Abbott RD, Thomas RJ, Yun CH, **Lee HW**, Shin C. A longitudinal observational population-based study of brain volume associated with change in sleep timing from middle to late life. *Sleep* **2020**; 10.1093: 1-7. Doi: 10.1093/sleep/zsaa223.
 - 27) Park YW, Chi YS, Kim SE, Choi D, Han K, Kim H, Ahn SS, Kim SA, Kim HJ, Lee SK, **Lee HW**. Radiomics features of hippocampal regions in magnetic resonance imaging can differentiate medial temporal lobe epilepsy patients from healthy controls. *Scientific Reports* **2020**;10:10567/ <https://doi.org/10.1938/s41598-020-76283-z>.
 - 28) Ahn S, Kang CW, **Lee HW**. Artificial Intelligence and Computational Approaches for Epilepsy. *J Epi Res* **2020**;10(1):8-17.
 - 29) Kim HJ, Kim J, Lee S, Kim B, Kwon E, Lee JE, Chun MY, Lee CY, Boulier A, Oh S, **Lee HW**. A Double-Blind, Randomized, Placebo-Controlled Crossover Clinical Study of the Effects of Alpha-s1 Casein Hydrolysate on Sleep Disturbance. *Nutrients* **2019**, *11*(7); 1466. doi: 10.3390/nu11071466. PubMed PMID: 31252661.
 - 30) Kang KW, Kim W, Cho YW, Lee SK, Jung KY, Shin W, Kim DW, Kim WJ, **Lee HW**, Kim W, Kim K, Lee SH, Choi SY, Kim MK. Genetic characteristics of non-familial epilepsy. *PeerJ* **2019**; *7*:e8278. doi: 10.7717/peerj.8278. eCollection 2019.
 - 31) Park CH, Choi YS, Kim HJ, Chung HK, Jung AR, Yoo JH, **Lee HW**. Interactive effects of seizure frequency and lateralization on intratemporal effective connectivity in temporal lobe epilepsy. *Epilepsia* **2018**; *59*(1):

- 215-225.
- 32) Moon J, Choi KH, Park JH, Song TJ, Choi YS, Kim JH, Kim HJ, **Lee HW**. Sympathetic overactivity based on heart-rate variability in patients with obstructive sleep apnea and cerebral small-vessel disease. *J Clin Neurol* 2018;14(3):310-319.
 - 33) Kim HJ, Lee JH, Park CH, Hong HS, Choi YS, Yoo JH, **Lee HW**. Role of Language-Related Functional Connectivity in Patients with Benign Childhood Epilepsy with Centrottemporal Spikes. *J Clin Neurol* 2018;14(1):48-57.
 - 34) Lee BI, No SK, Yi SD, Lee HW, Kim OJ, Kim SH, Kim MK, Kim SE, Kim YS, Kim JM, Lee SJ, Shin DJ, Park SP, Kim YI, Heo K, Cho YW, Cho YJ, Kim YN. Unblinded, randomized multicenter trial comparing lamotrigine and valproate combination with controlled-release carbamazepine monotherapy as initial drug regimen in untreated epilepsy. *Seizure* 2018;55:17-24.
 - 35) Lee M, Park CH, Chung HK, Kim HJ, Choi Y, Yoo JH, Yoon YC, Hong YB, Chung KW, Choi BO, **Lee HW**. Cerebral white matter abnormalities in patients with Charcot-Marie-Tooth disease. *Ann Neurol* 2017;81(1):147-151.
 - 36) Kim H, Choi Y, Joung HY, Choi YS, Kim HJ, Joo Y, Oh JH, Hann HJ, Cho ZH, **Lee HW**. Structural and Functional Alterations at Pre-Epileptic Stage Are Closely Associated with Epileptogenesis in Pilocarpine-induced Epilepsy Model. *Exp Neurobiol* 2017; 26(5): 287-294.
 - 37) Hyun JW, Park JH, Kang BG, Park EY, Park B, Joo J, Kim JK, Kim SH, Jeong JH, **Lee HW**, Park KD, Choi KG, Hwang SH, Gwak HS, Kim HJ. Diagnostic and prognostic values of cerebrospinal fluid CYFRA 21-1 in patients with leptomeningeal carcinomatosis. *Oncotarget* 2017;8(32):53326-53335.
 - 38) Lee J, Park J, Yang S, Kim H, Choi YS, Kim HJ, **Lee HW**, Lee BU. Early Seizure Detection by Applying Frequency-Based Algorithm Derived from the Principal Component Analysis. *Front Neuroinform* 2017;11:52.
 - 39) Mula M, Cavalheiro E, Guekht A, Kanner AM, **Lee HW**, Özkara Ç, Thomson A, Wilson SJ. Educational needs of epileptologists regarding psychiatric comorbidities of the epilepsies: a descriptive quantitative survey. *Epileptic Disord* 2017;19(2):178-185.
 - 40) Ahn S, Jo S, Jun SB, **Lee HW**, Lee S. Prediction of the Seizure Suppression Effect by Electrical Stimulation via a Computational Modeling Approach. *Front Comput Neurosci* 2017 May 29;11:39.
 - 41) Park CH, Choi YS, Jung AR, Chung HK, Kim HJ, Yoo JH, **Lee HW**. Seizure Control and Memory Impairment Are Related to Disrupted Brain Functional Integration in Temporal Lobe Epilepsy. *J Neuropsychiatry Clin Neurosci* 2017;29(4):343-350.
 - 42) Ahn S, Jo S, Jun SB, **Lee HW**, Lee S. Study on the mechanisms of seizure-like events suppression effect by electrical stimulation using a microelectrode array. *Neuroreport* 2017;28(9):471-478.
 - 43) Kim JH, Lee SK, Loesch C, Namgoong K, **Lee HW**, Hong SB; Korean N01367 Study Group. Comparison of levetiracetam and oxcarbazepine monotherapy among Korean patients with newly diagnosed focal epilepsy: A long-term, randomized, open-label trial. *Epilepsia* 2017;58(4):e70-e74.
 - 44) Song TJ, Park JH, Choi KH, Chang Y, Moon J, Kim JH, Choi Y, Kim YJ, **Lee HW**. Moderate-to-severe obstructive sleep apnea is associated with cerebral small vessel disease. *Sleep Med* 2017;30:36-42.
 - 45) Song TJ, Park JH, Choi KH, Kim JH, Choi Y, Chang Y, Kim HJ, Moon J, Kim YJ, **Lee HW**. Is obstructive sleep apnea associated with the presence of intracranial cerebral atherosclerosis? *Sleep Breath* 2017;21(3):639-646.
 - 46) Choi JH, Lee SK, Gil YE, Ryu J, Jung-Choi K, Kim H, Choi JY, Park SA, **Lee HW**, Yun JY. Neurological Complications Resulting from Non-Oral Occupational Methanol Poisoning. *J Korean Med Sci* 2017;32(2):371-376.
 - 47) Ryu J, Lim KH, Ryu DR, **Lee HW**, Yun JY, Kim SW, Kim JH, Jung-Choi K, Kim H. Two cases of methyl alcohol intoxication by sub-chronic inhalation and dermal exposure during aluminum CNC cutting in a small-sized subcontracted factory. *Ann Occup Environ Med* 2016 Nov 15;28:65.
 - 48) Lee J, Song WJ, **Lee HW**, Shin HC. Novel Burst Suppression Segmentation in the Joint Time-Frequency Domain for EEG in Treatment of Status Epilepticus. *Comput Math Methods Med* 2016;2016:2684731.
 - 49) Kim HJ, Park KD, Choi KG, **Lee HW**. Clinical predictors of seizure recurrence after the first post-ischemic stroke seizure. *BMC Neurol* 2016;16(1):212.
 - 50) Choi HY, Kim SE, **Lee HW**, Kim EJ. Social Behavioral Problems and the Health-Related Quality of Life in Children and Adolescents with Epilepsy. *Psychiatry Investig* 2016;13(5):488-495.
 - 51) Ahn S, Jun SB, **Lee HW**, Lee S. Computational modeling of epileptiform activities in medial temporal lobe epilepsy combined with in vitro experiments. *J Comput Neurosci* 2016;41(2):207-223.
 - 52) Park J, Kim HJ, Hyun JW, Kim HJ, Kim TK, Jung AR, **Lee HW**, Park JH, Choi KG, Lee YJ, Yun JY. Acute disseminated encephalomyelitis with tremor as the initial symptom. *Neurology Asia* 2016;21(1):89-91.

- 53) Lee SA, Kim MJ, **Lee HW**, Heo K, Shin DJ, Song HK, Kim OJ, Kim SO, Lee BI. The effect of recurrent seizures on cognitive, behavioral, and quality-of-life outcomes after 12 months of monotherapy in adults with newly diagnosed or previously untreated partial epilepsy. *Epilepsy Behav* 2015;53:202-208.
- 54) Lee JH, Kim SE, Park CH, Yoo JH, **Lee HW**. Gray and White Matter Volumes and Cognitive Dysfunction in Drug-Naïve Newly Diagnosed Pediatric Epilepsy. *Biomed Res Int* 2015;2015:923861.
- 55) Youn M, Kwon JY, Lee KS, Park JH, **Lee HW**. Gender differences in rapid eye movement-related sleep disordered breathing. *Health* 2015;7:106-111.
- 56) Kim S, Choi YS, Choi K, Lee J, Lee BU, **Lee HW**, Lee S. Performance estimation of an implantable epileptic seizure detector with a low-power on-chip oscillator. *J Biomed Engineering Res* 2015;36:169-176.
- 57) Kim S, Kim S, Lee Y, Hwang S, Kang T, Jun SB, **Lee HW**, Lee S. Development of real-time closed-loop neurostimulation system for epileptic seizure suppression. *J Biomed Engineering Res* 2015;36:95-102.
- 58) Park EK, Park JH, Kim JH, Choi JI, Kim K, Lee H, Yoon H, **Lee HW**. Relationship between nocturia, obstructive sleep apnea, and quality of sleep. *Sleep Med Res* 2015;6(1):28-34.
- 59) Ahn S, Jun SB, **Lee HW**. Computational model of medial temporal lobe epilepsy. *BMC Neuroscience* 2015;16(suppl 1):P144.
- 60) **Lee HW**, Arora J, Papademetris X, Tokoglu F, Negishi M, Scheinost D, Farooque P, Blumenfeld H, Spencer DD, Constable RT. Altered functional connectivity in seizure onset zones revealed by fMRI intrinsic connectivity. *Neurology* 2014;83(24):2269-2277.
- 61) Kim SE, Lee JH, Chung HK, Lim SM, **Lee HW**. Alterations in white matter microstructures and cognitive dysfunction in benign childhood epilepsy with centrotemporal spikes. *European J of Neurol* 2014;21:708-717.
- 62) Kim D, Seo JH, Joo EY, **Lee HW**, Shin WC, Hong SB. Cognitive and psychosocial effects of oxcarbazepine monotherapy in newly diagnosed partial epilepsy. *Clin Neuropharmacol* 2014;37(4):100-107.
- 63) Kim SM, Song JY, Lee C, **Lee HW**, Kim JY, Hong SB, Jung KY. Effect of oxcarbazepine on background EEG activity and cognition in epilepsy. *J Epilepsy Res* 2013;3(1):7-15.
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- 65) Kim DW, Lee SY, Chung SE, Cheong HK, Jung KY; Korean Epilepsy Society. Clinical characteristics of patients with treated epilepsy in Korea: a nationwide epidemiologic study. *Epilepsia* 2014;55(1):67-75.
- 66) **Lee HW**, Youngblood MW, Farooque P, Han X, Jhun S, Chen WC, Goncharova I, Vives K, Spencer DD, Zaveri H, Hirsch LJ, Blumenfeld H. Seizure localization using three-dimensional surface projections of intracranial EEG power. *Neuroimage* 2013;83:616-626.
- 67) Kim SE, Kim WS, Kim BG, Chung D, Jeong J, Lee JS, Tae WS, Hong SB, **Lee HW**. Spatiotemporal dynamics and functional correlates of evoked neural oscillations with different spectral powers in human visual cortex. *Clin Neurophysiol* 2013;124(11):2248-2256.
- 68) Lee M, Kim SE, Kim WS, Han J, Kim HJ, Kim BS, Kim JY, Hong SB, Kim BG, **Lee HW**. Cortico-cortical modulation induced by 1-Hz repetitive transcranial magnetic stimulation of the temporal cortex. *J Clin Neurol* 2013;9(2):75-82.
- 69) Lee M, Kim SE, Kim WS, Lee J, Yoo HK, Park KD, Choi KG, Jeong SY, Kim BG, **Lee HW**. Interaction of motor training and intermittent theta burst stimulation in modulating motor cortical plasticity: influence of BDNF Val66Met polymorphism. *PLoS One* 2013;8(2):e57690.
- 70) Cho YW, Hong SB, Kim DH, Lee HW, Joo EY, Kim JH, Shin WC, Park KH, Han SJ, **Lee HW**. The effect of ropinirole on the quality of life in patients with restless legs syndrome in Korea: an 8-week, multicenter, prospective study. *J Clin Neurol* 2013;9(1):51-56.
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Citation Index

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Invited Lectures

International Scientific Conferences (Selected)

- 1) **Introduction to Sex/Gender Differences in Brain Function and Neurological Disorders**
Hyang Woon Lee (Ewha Womans University, Korea)
Scientific Session
Organization of Human Brain Mapping 2024
 COEX Convention & Exhibition Hall, Seoul, Korea / Wednesday 26 June 2024
<https://ww6.aievolution.com/hbm2401/index.cfm?do=ev.viewEv&ev=1723>

- 2) **Network Modeling of Seizures and Neuromodulation using Focused Ultrasound**
Hyang Woon Lee (Ewha Womans University, Korea)
Scientific Session
Korean Epilepsy Congress 2024
 Dragon City Hotel, Seoul, Korea / Friday-Saturday 21-22 June 2024
<https://www.epilepsykorea.org/program-details>

- 3) **Semiology and EEG findings in FCD type I vs. type II**
Hyang Woon Lee (Ewha Womans University, Korea)
Scientific Session
Korean Epilepsy Congress 2023
 Dragon City Hotel, Seoul, Korea / Saturday-Sunday 23-24 June 2023
https://www.epilepsykorea.org/2023/sub03/sub02_Scientific.html

- 4) **Preoperative Functional Brain Mapping for Parietal Lobe Epilepsy**
Hyang Woon Lee (Ewha Womans University, Korea)
Scientific Session
Korean Epilepsy Congress 2020
 Swiss Grand Hotel, Seoul, Korea / Saturday-Sunday 7-8 August 2020
<http://www.ilae.org/congresses/25th-korean-epilepsy-congress-kec-2020-synergy-to-challenge>

- 5) **Neuroimaging for Epilepsy Surgery**
Hyang Woon Lee (Ewha Womans University, Korea)
Special Session for Technicians, Trainees, and Other Health-care Workers
Korean Epilepsy Congress 2019
 Seoul Dragon City, Seoul, Korea / Saturday 15 June 2019
http://www.epilepsykorea.org/2019/sub03/sub02_03.html

- 6) **Intermittent fasting and sleep**
Hyang Woon Lee (Ewha Womans University, Korea)
KETO 2018 Jeju
6th Global Symposium on Ketogenic Therapies for Neurological Disorders

Parallel Session 3
Ketogenic Therapies and Sleep
 International Convention Center, Jenu, Korea / Sunday 7 October 2018
ICOMES 2017 (International Congress of Obesity and Metabolic Syndrome)

- 7) **Early resolution of obstructive sleep apnea**
Hyang Woon Lee (Ewha Womans University, Korea)
KSSO Session 6 (K)
Health Outcomes after Bariatric/Metabolic Surgery

Chairpersons: Youn-Baik Choi(Chung Hospital, Korea)
Sung Woo Park(Sungkyunkwan University, Korea)
 Room 5 / Saturday 2 September 2017

ICOMES 2017 (International Congress of Obesity and Metabolic Syndrome)
http://aoco2019.icomes.or.kr/register/2017_icomes/program/sub02_05.html

8) BioMag 2016 Seoul

Network dynamics explored by functional connectivity analysis in neurological disorders
 Hyang Woon Lee (Ewha Womans University, Korea)

Session title: **Network Disruption in Brain Disease**
 Room #104, COEX, Jenu, Korea / Monday 3 October 2016

http://www.biomag2016.org/download/program/3-7_Network_Disruption_in_Brain_Disease.pdf

9) Neuroimaging in Epilepsy Diagnosis

Hyang Woon Lee (Ewha Womans University, Korea)

Session title: **Epilepsy**

King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia
 12th Asian & Oceanian Congress of Child Neurology (AOCCN), Riyadh, Saudi Arabia 14-18 September 2013

<https://pdfs.semanticscholar.org/a3b5/eb4711bfc31f30a9cf3e92d36bba6c36e471.pdf>

Report of Funded Projects:

Funding Information (selected): Recent 5 years

- 2020-2025 **Overall Project Title:** Multiscale Epileptic Network study
Funding source: National Research Foundation of Korea (<http://www.nrf.re.kr>), funded by the Basic Science Research Program through the Korean Ministry of Science and Information and Communication Technology (NRF-2020-R1A2C2013216).
Role: Principal Investigator (\ 1,000,000,000 KRW [estimated ~ \$1,000,000])
Description: *This project aims to investigate multiscale epileptic network underlying seizure generation and propagation mechanisms by combining multi-array electrode recording from hippocampal slice and in-vivo animal models, intracranial seizure recordings from epileptic patients, combined with computational modeling of epileptic network.*
- 2022-2025 **Overall Project Title:** AI-based prediction program for cognitive outcome in aging brain based on cognitive-genetic-neuroimaging dataset: a population based prospective study and Education for AI-based research
Funding source: Industrial Strategic Technology Development, funded by the Ministry of Trade, Industry, and Energy (ITECH) of Korea (<http://itech.keit.re.kr>),
Role: Co-Investigator for the overall and 1st part specific projects (\ 1,000,000,000 KRW [estimated ~ \$1,000,000])
Description: *This project aims to develop an automated aid program for early prediction and brain aging through AI-based deep learning algorithm based on clinical evaluation according to age, educational level, laboratory tests, neuropsychological tests, and brain magnetic resonance imaging (MRI) data analysis from a large population-based prospective database.*

- 2022-2029 **Overall Project Title:** Enterprise Rising Bio Core Facility Construction Project
Funding source: National Research Foundation of Korea (<http://www.nrf.re.kr>), funded by the Bio-Medical Techniques Development Research Program through the Korean Ministry of Science and Information and Communication Technology.
Role: Co-Investigator, Core Leader (\ 10,125,000,000 KRW [estimated ~ \$10,125,000])
Description: *This project aims to develop an ER (Enterprise Rising) Leading the global bio market through efficient growth of founders through support for bio-core infrastructure and commercialization and improvement of excellence at our own university hospital.*
- 2019-2023 **Overall Project Title:** AI-inspired Neuromodulation System to Promote Sleep-Cognition (Specific Project, 1st Part: Human Application of Sleep Control-Cognition Promoting Ultrasound Neuromodulation Targeting Sleep Control Brain Circuits)
Funding source: National Research Foundation (NRF) of Korea (<http://www.nrf.re.kr>), funded by the Convergent Technology R & D Program for Human Augmentation through the Korean Ministry of Science and Information and Communication Technology (NRF-2019-M3C1B8090803).
Role: Principal Investigator for the overall and 1st part specific projects (\ 3,480,000,000 KRW [estimated ~ \$3,480,000])
Description: *This project aims to develop a focused ultrasound neuromodulation technique that targets sleep control brain circuits that can be applicable for humans. This study will combine Artificial Intelligence, Neuroscience, Biotechnology, and Computing to develop a neuromodulation device that will control the brain circuits in order to maximize the cognitive and physical capacity of each individual. The device will modify brain activities to improve sleep quality or improve focus during the day.*
- 2017-2020 **Project Title:** Connectome-based Epileptic Neural Network Study
Funding source: National Research Foundation (NRF) of Korea (<http://www.nrf.re.kr>), funded by the Basic Science Research Program through the Korean Ministry of Science and Information and Communication Technology (NRF-2017-R1A2A2A05069647).
Role: Principal Investigator (\ 356,089,000 [estimated ~ \$297,000])
Description: *This project aims to investigate the spatiotemporal neural network mechanism for seizure generation and propagation based on connectome theory.*
- 2021-2030 **Project Title:** The Efficacy and Safety of Cenobamate as an Add-on Therapy for Patients with Intractable Partial Epilepsy
Funding source: Double-blind, Placebo-controlled, Multinational Antiepileptic Drug Trial of Cenobamate funded by the IQVIA through the SK Life Science Co. Ltd.
Role: Co-Investigator (\ 1,526,597,336 KRW [estimated ~ \$1,500,000])
Description: *This project aims to investigate the clinical efficacy and safety of Cenobamate as an add-on antiepileptic drug treatment for patients with intractable partial epilepsy who had been treated with more than two antiepileptic drugs for longer than at least two years since the diagnosis of epilepsy.*
- 2016-2026 **Project Title:** The Efficacy and the Quality of Sleep, Emotions, and the Quality of Life in Patients with Vagal Nerve Stimulation Therapy
Funding source: Open-labelled Multicenter Trial initiated by Samsung Medical Center, funded by the Dongsan Hearing Co., Ltd (Korea) jointed with the LivaNova, Ltd.
Role: Co-Investigator (\ 17,250,000 KRW [estimated ~ \$110,000])

Description: *This project aims to investigate the clinical efficacy and the influences of vagal nerve stimulation (VNS) therapy on the overall quality of life including seizure controls, the influence on sleep and emotions in patients with intractable epilepsy treated by the implantation of VNS device.*

Patents (Selected): two international (PCT) and four domestic patent applications and two patent registrations

1) Real-time Early Seizure Detection Method

International Patent Application Number : **PCT/KR2018/000014**

Domestic Patent Application / Registration Numbers : **KR 10-2017-0000335 / KR 10-1887182**

Summary: The Real-time Early Seizure Detection Method aims to create a way to continuously monitor the EEG of epileptic patients in order to detect early seizure and give acute closed loop neuromodulation treatment to stop seizures. The treatment method that is currently used is regular medication in order to inhibit Ictal EEG regardless of the patient's state of EEG activities or resection of seizure focus on brain cortex when medication proves ineffective. This current practice interferes with daily activity and carries the risks of adverse events such as cognitive decline, drowsiness, imbalance, memory decline from side effects of medication or loss of cognitive function in the removed area from the resection.

2) Early Seizure Detection Algorithm using Principal Component Analysis

Domestic Patent Application / Registration Numbers: **KR 10-2017-0011142 / KR-10-1978905**

Summary: This early seizure detection algorithms aims to develop a unique way to detect seizures as early as possible by using the Principal Component Analysis (PCA) based algorithm.

3) Epilepsy Monitoring Device and Treatment System

United States Patent Application Number: **17/595,638**

International Patent Application Number: **PCT/KR2020/005957**

Domestic Patent Application / Registration Numbers: **KR 10-2019-0059123 /KR1022659010000**

Summary: This Epilepsy Monitoring Device and Treatment System aims to develop a combined closed loop system for both diagnosis and treatment for epilepsy patients, especially with drug-refractory intractable epilepsy. The ultimate goal of this device is for detecting seizures and giving acute closed loop neuromodulation treatment to stop seizures acutely. The treatment method that is currently used is regular medication in order to inhibit Ictal EEG regardless of the patient's state of EEG activities or resection of seizure focus on brain cortex when medication proves ineffective. This current practice interferes with daily activity and carries the risks of adverse events such as cognitive decline, drowsiness, imbalance, memory decline from side effects of medication or loss of cognitive function in the removed area from the resection. Real-time Early Seizure Detection Method's purpose is to avoid these adverse effects of current methods and instead use Artificial Intelligence to monitor EEG activities and in the event of seizure provide acute closed loop neuromodulation, a brain stimulation treatment, to stop the seizure and still allow patients to continue everyday activity without risks of adverse events from the medication.

4) AI-based non-invasive neuromodulation system and method for sleep-cognitive promotion

United States Patent Application Number: **17/311,244**

International Patent Application Number: **PCT/KR2020/000021**

Domestic Patent Application / Registration Numbers: **KR 10-2019-0042193 /KR 10-2211647**

Summary: This AI-based non-invasive neuromodulation system and method aims to develop real-time sleep stage detection based on multiple biosignals from brain (EEG), heart (ECG), and muscles (EMG), and to control sleep-wake stages appropriately. The non-invasive neural control device will be used instead of the insertion electrodes into brain invasively, and to improve the cognitive-emotional function (e.g. strengthening memory or reducing memory deterioration due to aging, and reduce anxiety levels by appropriate sleep control. This technique is intended to improve cognitive function and emotion such as strengthening memory or reducing memory deterioration due to aging process, as well as to reduce anxiety levels for mood stabilization. This device can control the sleep phases precisely by stimulating the sleep-related brain circuits by using the non-invasive neuromodulation device, such as focused ultrasound.