

Curriculum Vitae

Sung-Min Kim, MD.PhD.

Sep /2017

1. Personal data

Name : Sung-Min Kim

Birth date : 16-September- 1974

Birth place : Seoul, KOREA

Citizenship : Korea

Current address : Department of Neurology, Seoul National University Hospital, Yongon Dong, Seoul, Korea.

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2. Academic training

March 1993 – February 1995: Seoul National University, College of Engineering, Seoul Korea.
Metallurgical engineering

March 1995 – February 1997: Seoul National University, College of Natural Science, Seoul Korea.
Premedical Course

March 1997 – February 2001: Seoul National University, College of Medicine, Seoul Korea.
M.D. course

March, 2001 : M.D degree (Korea)

March 2007: Seoul National University, College of Medicine, Seoul, Korea,
M.S. degree

March 2014: Seoul National University, College of Medicine, Seoul, Korea,
PhD. degree

3. Traineeship

March 2001 – February 2002: Internship, Seoul National University Hospital, Seoul, KOREA

March 2003 – October 2006: Residency, Department of Neurology, Seoul National University
Hospital, Seoul, KOREA

February 2007 – January 2008: Fellowship, Neuromuscular Disorder Division, Department of

Neurology, Seoul National University Hospital, Seoul, KOREA
March 2008 – February 2009: Instructor, Department of Neurology, Kwan-Dong University, Go-Yang, Korea
February 2009 – June 2010: Contract professor, Neuromuscular Disorder Division, Department of Neurology, Seoul National University Hospital, Seoul, KOREA
June 2010 – Aug 2010: Visiting physician, Department of Neurology, University of Chicago Medical Center, Chicago, IL, USA
Sep 2010 – Apr 2011: Contract professor, Department of Neurology, Seoul National University Bundang Hospital, Gyeonggi, KOREA
May 2011- Feb 2017: Assistant professor, Department of Neurology, Seoul National University Hospital, Seoul, KOREA
May 2017- Now : Associative professor, Department of Neurology, Seoul National University Hospital, Seoul, KOREA

4. Current Position

Associative professor, Department of Neurology, Seoul National University Hospital, Seoul, KOREA

Chair, Informatics Committee, Korean Society of Multiple Sclerosis

Chair, Informatics Committee, Korean Society of Clinical Neurophysiology

Academic committee, Korean Neurological Association

Academic committee, Korean Society of Clinical Neurophysiology

Committee for Intraoperative Neurophysiologic Monitoring, Korean Society of Clinical Neurophysiology

5. Board qualification

March 2007 Board of Neurology (Korea)

July 2008 American Board of Electrodiagnostic Medicine (USA)

6. Professional organizations and societies

Korean Medical Association (2001 – Present)

Korean Neurological Association (2003 – Present)

Korean Society of Clinical Neurophysiology (2001-Present)

American Board of Electrodiagnostic Medicine (2008- Present)

Committee for Intraoperative Neurophysiologic Monitoring (2009-Present)

7. Experience in Clinical trials

Phase III, The effect of Yoo's solution in patients with ALS. (2004, May ~ 2007, Apr)

Phase III, Oral Cladribine in Early Multiple Sclerosis: (2009, April ~ 2011, May)

Phase III, A multinational, multicenter, randomized, double-blind, parallel group, placebo-controlled study followed by an active treatment period, to evaluate the efficacy, safety and tolerability of two doses of oral administration of laquinimod in subjects with relapsing remitting multiple sclerosis (RRMS): (2013, April ~ 2014)

Phase III, A Double-masked, Placebo-controlled Study with Open-label Period to Evaluate the Efficacy and Safety of MEDI-551 in Adult Subjects with Neuromyelitis Optica and Neuromyelitis Optica Spectrum Disorders (2015, Jun – present)

Phase III, A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED, MULTI-CENTER TRIAL TO EVALUATE THE SAFETY AND EFFICACY OF ECULIZUMAB IN PATIENTS WITH RELAPSING NEUROMYELITIS OPTICA (NMO) (2015, Feb – present)

8. Publications

• SCI(E) rated Journals

- 1) Lee JM, Park HR, Choi YD, **Kim SM**, Jeon B, Kim HJ, Kim DG, Paek SH.. Delayed facial palsy after microvascular decompression for hemifacial spasm: friend or foe J Neurosurg. 2017 Sep 1:1-9.
- 2) **Kim SM (Co-corresponding author)**, Kim SJ, Lee HJ, Kuroda, H, Palace J, Fujihara K. Differential diagnosis of neuromyelitis optica spectrum disorders Ther Adv Neurol Dis 2017 in press
- 3) **Kim SM**, Noh MY, Kim H, Cheon S, Lee KM, Cha E, Park KS, Lee KW, Sung JJ, Kim SH. 25-hydroxycholesterol is involved in the pathogenesis of amyotrophic lateral sclerosis. Oncotarget 2017 Jan 2.. [Epub ahead of print]
- 4) Cha E, Lee KM, Park KD, Park KS, Lee KW, **Kim SM (Co-corresponding author)**, Lee J. Hydroxycholesterol Levels in the Serum and Cerebrospinal Fluid of Patients with Neuromyelitis Optica Revealed by LC-Ag+CIS/MS/MS and LC-ESI/MS/MS with Picolinic Derivatization: Increased Levels and Association with Disability during Acute Attack. *PLoS One*. 2016 Dec 12;11(12):e0167819.
- 5) Yang J, **Kim SM (Co-corresponding author)**, Kim YJ, Cheon SY, Kim B, Jung KC, Park KS. Accuracy of the Fluorescence-Activated Cell Sorting Assay for the Aquaporin-4 Antibody (AQP4-Ab): Comparison with the Commercial AQP4-Ab Assay Kit. *PLoS One*. 2016 Sep 22;11(9):e0162900
- 6) **Kim SM**, Waters P, Woodhall M, Kim YJ, Kim JA, Cheon SY, Lee S, Jo SR, Kim DG, Jung KC, Lee KW, Sung JJ, Park KS. Gender effect on neuromyelitis optica spectrum disorder with aquaporin4-immunoglobulin G. *MSJ* 2016 Oct 19 [Epub ahead of print]

- 7) Kim JS, Cheon SY, Kim SW, Kim Boram, Kim HJ, Park KD, **Kim SM (corresponding author)**
Glycyrrhizic Acid Prevents Astrocyte Death by Neuromyelitis Optica-specific IgG via Inhibition
of C1q Binding *BBRC* 2016 Sep 16;478(2):553-8
- 8) Kim DG, Choi YD, Jin SH, Kim CH, Lee KW, Park KS, Chung CJ, **Kim SM (corresponding author)**. Intraoperative Motor-Evoked Potential Disappearance versus Amplitude-Decrement
Alarm Criteria During Cervical Spinal Surgery: A Long-Term Prognosis. *J Clin Neuro* 2016 Oct
7
- 9) Kim JS, Choi Y, Jin SH, Kim CH, Park CK, **Kim SM (corresponding author)**, Lee KW, Chung
CK, Paek SH. Effect of peripheral nerve tetanic stimulation on the inter-trial variability and
accuracy of transcranial motor evoked potential in brain surgery. *Clinical Neurophysiol* 2016
May;127(5):2208-13
- 10) Ju EJ, Yeon SK, Park JH, Cheon SY, Choi JW, HA T, Jang BK, Kim S, Kang YG, Hwang H, Cho
S, Cheong E, Bahn YS, Pae AN, **Kim SM (Co-corresponding author)**, Park KD. Screening,
Synthesis, and In Vitro Evaluation of Vinyl Sulfones as Inhibitors of Complement-Dependent
Cytotoxicity in Neuromyelitis Optica. *ChemMedChem* 2016 Feb;11(4):377-81
- 11) **Kim SM (Co-corresponding author)**, Woodhall M, Kim JS, Kim SJ, Park KS, Vincent A, Lee
KW, Waters P. Antibody to myelin oligodendrocyte glycoprotein in adults with inflammatory
demyelinating disease of the CNS. *Neurol N2* 2015 Oct 15;2(6):e163.
- 12) Kim CH, Hong JT, Chung CK, Kim JY, **Kim SM**, Lee KW. Intraoperative electrophysiological
monitoring during posterior craniocervical distraction and realignment for congenital
craniocervical anomaly. *Eur Spine J*. 2015 Apr;24(4):671-8
- 13) Kim JE, Hong YH, Lee JH, Ahn SW, **Kim SM**, Park KS, Sung JJ, Lee KW. Pattern difference of
dissociated hand muscle atrophy in amyotrophic lateral sclerosis and variants. *Muscle Nerve*. 2015
Mar;51(3):333-7.
- 14) Park EJ, Park J, Song HS, Kim SJ, Jung KC, **Kim SM**, Cho DG, Kim D, Park KS, Hong S.
Nanovesicle-based platform for the electrophysiological monitoring of aquaporin-4 and the real-

time detection of its antibody. *Biosens Bioelectron.* 2014 May 13;61C:140-146

- 15) Noh MY, Cho KA, Kim H, **Kim SM**, Kim SH. Erythropoietin modulates the immune-inflammatory response of a SOD1G93A transgenic mouse model of amyotrophic lateral sclerosis (ALS). *Neurosci Lett.* 2014 May 10;574C:53-58. doi: 10.1016/j.neulet.2014.05.001. [Epub ahead of print]
- 16) **Kim SM**, Warers P, Woodhall M, Yang JW, Yang H, Kim JE, Sung JJ, Park KS, Lee KW. Characterization of the spectrum of Korean inflammatory demyelinating diseases according to the diagnostic criteria and AQP4-Ab status. *BMC Neurol* 2014 Apr 29;14(1):93 .
- 17) Ahn SW, Jeon GS, Kim MJ, Shon JH, Kim JE, Shin JY, **Kim SM**, Kim SH, Ye IH, Lee KW, Hong YH, Sung JJ. Neuroprotective effects of JGK-263 in transgenic SOD1-G93A mice of amyotrophic lateral sclerosis. *J Neurol Sci.* 2014 May 15;340(1-2):112-6.
- 18) **Kim SM**, Park KS. Need for the upcoming revision of the current diagnostic criteria for NMO. *Multiple sclerosis journal*, 2014 Jan 27.
- 19) **Kim SM**, Park J, Kim SH, Park SY, Kim JY, Sung JJ, Park KS, Lee KW. Factors associated with the time to next attack in neuromyelitis optica: accelerated failure time models with random effects. *PLoS One.* 2013 Dec 16;8(12):e82325.
- 20) **Kim SM**, Kim H, Lee JS, Park KS, Jeon GS, Shon J, Ahn SW, Kim SH, Lee KM, Sung JJ, Lee KW. Intermittent hypoxia can aggravate motor neuronal loss and cognitive dysfunction in ALS mice. *PLoS one*, 2013 Nov 26;8(11):e81808. doi:
- 21) A case of thyrotoxic myopathy with extreme type 2 fiber predominance. Kim TJ, Lee HS, Shin JY, Kim DG, **Kim SM**, Sung JJ, Lee KW. *Exp Neurobiol.* 2013 Sep;22(3):232-4
- 22) Park SH, **Kim SM (corresponding author)**, Sung JJ, Lee KM, Park KS, Kim SY, Nam HW, Lee

KW. Nocturnal hypoxia in ALS is related to cognitive dysfunction and can occur as clusters of desaturations. *PLoS one*, 2013 Sep 18;8(9):e75324

- 23) **Kim SM**, Kim SH, Seo DW, Lee KW. Intraoperative neurophysiologic monitoring: Basic principles and recent update. *J Korean Med Sci* 2013 Sep;28(9):1261-9
- 24) Jeon GS, Kim JE, Ahn SW, Park KS, Hong YH, Ye IH, Park JS, Kim SH, Lee KW, **Kim SM (corresponding author)**, Sung JJ. Effect of JGK-263 as a new glycogen synthase kinase-3 β inhibitor on extrinsic apoptosis pathway in motor neuronal cells. *Biochem Biophys Res Commun*. 2013 Sep 20;439(2):309-14
- 25) Noh MY, Koh SH, **Kim SM**, Maurice T, Ku SK, Kim SH. Neuroprotective effects of donepezil against A β 42-induced neuronal toxicity are mediated through not only enhancing PP2A activity but also regulating GSK-3 β and nAChRs activity. *J Neurochem*. 2013 Nov;127(4):562-7
- 26) Yang JW, **Kim SM (Corresponding author)**, Kim HJ, Kim JE, Park KS, Kim SH, Lee KW, Sung JJ. Hypolipidemia in patients with amyotrophic lateral sclerosis: a possible gender difference? *J Clin Neurol*. 2013 Apr;9(2):125-9.
- 27) **Kim SM**, Waters P, Woodhall M, Kim JY, Kim JE, Uang JW, Kim JS, Sung JJ, Park KS, Lee KW. Utility of Aquaporin-4 antibody assay in patients with neuromyelitis optica spectrum disorders. *Multiple sclerosis* 2013 Jul;19(8):1060-7.
- 28) Ahn SW, Kim JE, Park KS, Choi WJ, Hong YH, **Kim SM**, Kim SH, Lee KW, Sung JJ. The neuroprotective effect of the GSK-3 β inhibitor and influence on the extrinsic apoptosis in the ALS transgenic mice. *J Neurol Sci*. 2012 Sep 15;320(1-2):1-5

- 29) **Kim SM**, Go, MJ, Sung JJ, Park KS, Lee KW. Painful tonic spasm in neuromyelitis optica: incidence, diagnostic utility, and clinical characteristics. *Arch Neurol*. 2012 Aug;69(8):1026-31.
- 30) Min JH, Hong YH, Sung JJ, **Kim SM**, Lee JB, Lee KW Oral solubilized ursodeoxycholic acid therapy in amyotrophic lateral sclerosis: a randomized cross-over trial. *J Korean Med Sci*. 2012 Feb;27(2):200-6.
- 31) Kim JE, Park SY, Sinn DI, **Kim SM**, Hong YH, Park KS, Sung JJ, Lee KW. Ischemic neuropathy associated with livedoid vasculitis. *J Clin Neurol*. 2011 Dec;7(4):233-6
- 32) **Kim SM**, Yang HR, Park SB, Han SG, Park KW, Yoon SH, H SJ, Kim HJ, Park KS, Lee KW. Pattern-specific changes and discordant prognostic values of individual leg-muscle motor evoked potentials during spinal surgery. *Clinical neurophysiology* 2012 Jul;123(7):1465-70.
- 33) **Kim SM**, Kim JS, Heo YE, Yang HR, Park KS. Cortical oscillopsia without nystagmus, as an isolated symptoms of neuromyelitis optica spectrum disorder with anti-aquaporin 4 antibody. *Multiple sclerosis* 2012 Feb;18(2):244-7.
- 34) **Kim SM**, Shin HW, Han HJ, Park JH. Serially Changing Metonidazole-induced Encephalopathy. *Can J Neurol Sci* 2011 Nov;38(6):921-4.
- 35) Ahn SW, Kim SH, Park BS, Cha JI, **Kim SM**, Sung JJ, Lee KW. Concurrence of Multifocal Motor Neuropathy and Hashimoto's Thyroiditis. *J Clin Neurol*. 2011 Sep;7(3):168-72.
- 36) **Kim SM**, Waters P, Vincent A, Go MJ, Park KS, Sung JJ, Lee KW. Cerebrospinal fluid/serum gradient of IgG (QIgG) is associated with disability at acute attacks of neuromyelitis optica. *J of Neurology* 2011 Dec;258(12):2176-80

- 37) Ahn SW, Kim SH, Kim JE, **Kim SM**, Kim SH, Sung JJ, Lee KW, Hong YH. Frontal Assessment Battery to Evaluate Frontal Lobe Dysfunction in ALS Patients. *Can J Neurol Sci.* 2011 Mar;38(2):242-6.
- 38) **Kim SM**, Kim HJ, Kim JE, Park KS, Sung JJ, Kim SH, Lee KW. Amyotrophic lateral sclerosis is associated with hypolipidemia at the presymptomatic stage in mice. *PLoS one* 2011 Mar 30;6(3):e17893.
- 39) **Kim SM**, Park KS, Nam HW, Ahn SW, Kim SH, Sung JJ, Lee KW. Capnography for assessing nocturnal hypoventilation and predicting compliance with subsequent noninvasive ventilation in patients with ALS. *PLoS one* 2011 Mar 25;6(3):e17985.
- 40) Kim JE, **Kim SM**, Ahn SW, Lim BC, Chae JH, Hong YH, Park KS, Sung JJ, Lee KW. Brain abnormalities in neuromyelitis optica. *J Neurol Sci.* 2011 Mar 15;302(1-2):43-8.
- 41) Ahn SW, Kim SH, Kim JE, **Kim SM**, Kim SH, Park KW, Sung JJ, Lee KW, Hong YH. Reproducibility of the motor unit number index (MUNIX) in normal controls and ALS patients. *Muscle Nerve.* 2010 Nov;42(5):808-13
- 42) Kim JS, Park YH, **Kim SM (Corresponding author)**, Kim SH, Park KS, Sung JJ, Lee KW. A case of chronic progressive myelopathy. *Multiple sclerosis* 2010 ; 16:1255-7
- 43) **Kim SM**, Lee JS, Kim SH, Kim HJ, Kim MH, Lee KM, Hong YH, Park KS, Sung JJ, Lee KW. Novel compound heterozygous mutations of the SPG11 gene in Korean families with hereditary spastic paraplegia with thin corpus callosum. *J Neuro* 2009 Oct;256(10):1714-8

- 44) Kim SH, **Kim SM**, Vincent A, Ahn SW, Hong YH, Park KS, Sung JJ, Lee KW. Clinical characteristics, prognosis, and seropositivity to the anti-aquaporin-4 antibody in Korean patients with longitudinally extensive transverse myelitis. *J Neurol*. 2010;257: 920-5
- 45) Ahn SW, Kim SH, Oh DH, **Kim SM**, Park KS, Hong YH, Kwon OS, Sung JJ, Lee KW. Motor unit number estimation in evaluating disease progression in patients with amyotrophic lateral sclerosis. *J Korean Med Sci*. 2010 Sep;25(9):1359-63.
- 46) Park JH, **Kim SM**, Shin HW, An SJ. Hypertensive brainstem encephalopathy involving deep supratentorial regions: does only blood pressure matter? *Neurol Int*. 2010 Jun 21;2(1):e9
- 47) **Kim SM**, Waters P, Vincent A, Kim, SY, Hong YH, Min, JH, Kim, HJ, Sung, JJ, Lee, KW. Sjögren's syndrome myelopathy: Spinal cord involvement in Sjögren's syndrome might be a manifestation of neuromyelitis optica. *Multiple sclerosis* 2009 Sep;15(9):1062-8.
- 48) **Kim SM**, Lee KM, Hong YH, Park KS, Yang JH, Nam HW, Sung JJ, Lee KW. Relation between cognitive dysfunction and reduced vital capacity in ALS. *J Neurol Neurosurg Psychiatry*. 2007;78:1387-1389.
- 49) Park JH, Hong YH, Kim HJ, **Kim SM**, Kim MJ, Park KS, Sung JJ, Lee KW. Pyruvate slows disease progression in a G93A SOD1 mutant transgenic mouse model. *Neurosci Lett* 2007;413:265-9.
- 50) Lee SH, **Kim SM**, Yoon BW, Roh JK. Cortico-subcortical distribution of microbleeds is different between hypertension and cerebral amyloid angiopathy. *J Neurol Sci*. 2007;258:111-114.

51) Hong YH, Sung JJ, **Kim SM**, Park KS, Lee KW, Chang KH, Song IC. Diffusion Tensor Tractography-based Analysis of the Pyramidal Tract in Patients with Amyotrophic Lateral Sclerosis. *J Neuroimaging*. 2008 Jul;18(3):282-7.

52) Kim SH, Jun DC, Park JS, Heo JH, **Kim SM**, Kim JH, Paek SH, Kim MH. Primary Diffuse Leptomeningeal Gliomatosis: Report of a Case Presenting with Chronic Meningitis *Journal of clinical neurology* 2006;2:202-205.

• **Non-SCI rated Journals**

Yang JW, **Kim SM (corresponding author)** Systemic Autoimmunity and Idiopathic Inflammatory Demyelinating Diseases of the Central Nervous System (IIDDs) *Journal of Multiple Sclerosis* 2013; 4(1):1-5.

Kim SH, **Kim SM**, Ahn SW, Hong YH, Park KS, Sung JJ, Lee KW. Quantitative Sensory Test: Normal Range in Korean Adults and Application to Diabetic Polyneuropathy. . *J Korean Society for Clinical Neurophysiology* 2010;12:21-26.

Kim SH, Ahn SW, Park BS, Shin JW, **Kim SM**, Lee KW. Neurosarcoidosis Presenting as Spinal Nerve Root Pain of Trunk. *J Korean Neurol Assoc* 2010; 28(2):119-121.

Yang HJ, Kim JS, Kim JE, Ahn SW, Kim SM, Sung JJ, Lee KW. Isolated Injury of the Axillary Nerve Branch to Teres Minor Muscle Following After Traumatic Posterior Instability of Shoulder. *J Korean Neurol Assoc* 2010; 28(4):319-322.

Ahn SW, Kim SH, Kim SY, **Kim SM**, Sung JJ, Lee KW. Adult Sandhoff Disease Presenting as Motor Neuron Disease Phenotype. . *J Korean Society for Clinical Neurophysiology* 2009;11;74-77.

Sung JJ, Kim HJ, **Kim SM**, Min JH, Hong YH, Park KS, Kim MH, Lee SH, Ho WK, Lee KW.

Selective Cytotoxic mechanism of Homocysteine to Motor Neuronal Cells Expressing the Mutant Cu,Zn-superoxide Dismutase. *J Korean Neurol Assoc* 2006;24:66-76.

Shin CW, Kim SH, Cho SY, Chang JY, Kim SM, Lee KW. Steroid Unresponsive Neuromyelitis Optica Improved With Plasmapheresis *J Korean Neurol Assoc* 2009; 27 (4) : 417~420.

Cha JI, Kim SM, Kim SH, Ahn SW, Sung JJ, Lee KW. Recurrent Myelitis in Crohn's Disease. *J Korean Neurol Assoc* 2009;27(4):413-416.

Kim HY, Kim SM, Park JH, Cho JY. Throtoxic Periodic Paralysis without Hypokalemia. *J Korean Society for Clinical Neurophysiology* 2008;10:119-122.

Ryu WS, Kim SY, Kim SM, Kim SH, Hong YH, Sung JJ, Lee KW. A Case of Demyelinating Polyneuropathy in Sjogren's Syndrome *J Korean Society for Clinical Neurophysiology* 2008;10:58-61.

Kim HK, Kim SM, Kim NH, Hong YH, Sung JJ, Gheeyoung Choe, Seong-Ho Park, Kwang-Woo Lee, Kyung Seok Park. A Case of Childhood-onset Form of Nemaline Myopathy. *J Korean Society for Clinical Neurophysiology* 2006;8:98-101.

Kim SM, Kim HK, Kim BJ, Lee YS. Progression or Regression of Middle Cerebral Artery Stenosis: a Long-term Follow-up Study with Transcranial Doppler Ultrasonography. *J Korean Neurol Assoc* 2006;24:435-439.

Kim SM, Kim JM, Kim HJ, Kim SH, Sung JJ, Park KS, Hong YH. A Case of Limited Form of Wegener's Granulomatosis Involving CNS. *J Korean Neurol Assoc* 2006;24:589-593.

Kim SM, Kim MJ, Cha JI, Sung JJ, Lee KW, A Case of Chiasmatic Optic Neuritis with Bitemporal Hemianopsia in Multiple Sclerosis *J Korean Society for Clinical Neurophysiology* 2006;8:199-201.

BIBLIOGRAPHY(BOOK OR CHAPTER)

Sung Min Kim. EMG for intraoperative neurophysiologic monitoring. In: KSCN. *Guideline*

for neurophysiologic studies. Seoul: KSCN, 2004;29-33.

Sung Min Kim. Neuromyelitis optica and other demyelinating disease. In: Textbook of Neurology. Seoul: Department of Neurology, Seoul National University, College of Medicine, 2013: 649-658

Sung Min Kim, Demyelinating disease of the CNS. In: Neuro-ophthalmology, Seoul: KoreanNeuro-Ophthalmology Society, 2017

9. GRANTS (ROLE: Principal or Co- Investigator)

- 1) **Grant No. A091226, Korean Ministry for health welfare and family affairs funds. [2009-2010]**
 - **PI: Sung-Min Kim**
 - TITLE: SPG11 mutations in hereditary spastic paraplegia patients with thin corpus callosum.

- 2) **Grant No. A102044, Korean Ministry for health welfare and family affairs funds. [2010-2011]**
 - **PI: Sung-Min Kim**
 - TITLE: Capnography for assessing nocturnal hypoventilation and predicting compliance with subsequent NIV in patients with amyotrophic lateral sclerosis.

- 3) **Grant No. 2010-0024351, Korean National Research foundation fund. [Sep. 2010-Aug. 2015]**
 - **PI: Sung-Min Kim**
 - TITLE: Hydroxycholesterol as a biomarker for disease progression and treatment target in ALS.

- 4) **Grant No. A121118 Korean Ministry for health welfare and family affairs Funds [2012 - 2015] PI: Sung-Min Kim**
 - TITLE: Development of anti-aquaporin4 autoantibody binding inhibitor as a treatment candidate of neuromyelitis optica (NMO).

- 5) **Grant No. 2014R1A1A2055741, Korean National Research foundation fund. [Nov. 2014- Apr. 2017] PI: Sung-Min Kim**
 - TITLE: Development for the neuro-regeneration and neuro-protection target of the neuromyelitis optica, by modulating the sex hormone receptors in the central nervous system,

- 6) **Grant No. HI17C0335, Korean Ministry for health welfare and family affairs Funds. [Apr. 2017- Dec. 2018]**
 - **PI: Sung-Min Kim**
 - TITLE: Developing an optimized assay protocol for the anti-myelin oligodendrocyte glycoprotein (MOG) antibody as a disease-specific biomarker, establishing its domestic technology, and evaluating its accuracy in a large cohort of patients.

- 7) **Grant No. HI17C0789, Korean Ministry for health welfare and family affairs**

Funds. [Apr. 2017- Dec. 2019]

- **PI: Sung-Min Kim**
 - TITLE: Activation and CNS-migration of the B lymphocyte through the role of Epstein B virus inducible gene 2 in multiple sclerosis: novel pathogenesis and treatment target
- 8) **Grant No. 2017R1D1A1B03031490, Korean National Research foundation fund. [Jun. 2017- May. 2020] PI: Sung-Min Kim TITLE: Epstein B virus inducible gene2 (EBI2) in the pathogenesis of the neuromyelitis optica spectrum disorder with aquaporin-4 IgG.**
- 9) **Grant No. 2010-0024457, Korean National Research foundation fund. [2010-2015]**
- **Co-investigator: Sung-Min Kim**
 - TITLE: Development of prognostic factor and investigation for disease mechanism with cell based flow cytometric antibody assay and cytokine assay in patients with neuromyelitis optica.
 - Key Personnel: Kyung Seok Park (Dept. Neurology, Seoul Natl Univ.)
- 10) **Grant No. 1320120011 (2012-0150) Korean Ministry for health welfare and family affairs funds. . [2009-2014]**
- **Co-investigator: Sung-Min Kim**
 - TITLE: The effect of glycogen synthase kinase-3 inhibitor on cortical neuron of amyotrophic lateral sclerosis model
 - Key Personnel: Seung-Hyun Kim (Dept. Neurology, Han Yang Univ..)
- 11) **Grant No. 800-20110047 Seoul National University, College of Medicine Research Fund. [2011 - 2012]**
- **Co-investigator: Sung-Min Kim**
 - TITLE: The effect of aquaporin-4 antibody on volume-sensitive ion channels: a novel hypothesis for neuromyelitis optica
 - Key Personnel: Kyung Seok Park (Dept. Neurology, Seoul Natl Univ.)

