
이 지 연
Jiyoun Lee

Professor
School of Biopharmaceutical and Medical Sciences
Sungshin Women's University, Seoul, Korea
Tel: +82-2-920-7281
Email: jlee@sungshin.ac.kr
Web: <http://chembiolab.weebly.com/>

Positions

2023-Present	Professor School of Biopharmaceutical and Medical Sciences Sungshin University, Seoul, Korea
2018-2022	Associate Professor School of Biopharmaceutical and Medical Sciences Department of Global Medical Science Sungshin University, Seoul, Korea
2012-2017	Assistant Professor Department of Global Medical Science Sungshin University, Seoul, Korea
2010-2012	Senior Research Scientist Brain Science Institute, Neuro-Medicine Center Korea Institute of Science and Technology, Seoul, Korea
2007-2010	Postdoctoral Research Fellow Stanford University School of Medicine, CA, USA Department of Pathology Advisor: Prof. Matthew Bogyo
2006-2007	Postdoctoral Research Fellow University of California, Berkeley Department of Chemistry Lawrence Berkeley National Laboratory, CA, USA Advisor: Prof. Christopher J. Chang

Education

2001-2006	Ph.D. in Bioinorganic Chemistry Department of Chemistry, Northwestern University, IL, USA Advisor: Prof. Thomas J. Meade
1998-2000	M.S. in Medicinal Chemistry Department of Pharmacy, Seoul National University Advisor: Prof. Jeewoo Lee
1994-1998	B.S. in Pharmacy Department of Pharmacy, Seoul National University

Research Interests

Chemical biology offers a distinctive methodology for investigating biological systems through the utilization of synthetic small molecules. In contrast to conventional biological approaches that rely on immunochemistry and genetic engineering, small-molecule chemical tools offer the advantage of effortless delivery and precise modification, rendering them exceptionally versatile and adaptable methodologies. Our research is primarily focused on the development of chemical probes that can identify and characterize proteases that are implicated in age-related diseases. We will further develop these methodologies to generate potential therapeutic agents and diagnostic approaches for age-related vascular diseases and neurodegenerative disorders.

Publications (*co-corresponding authors)

1. Kim, E.J.; Lee, Y.; Ryu, J.; Kim, H.; Park, J.; **Lee J.** "Cell-penetrating peptides for therapeutic applications: emerging design strategies and future directions" *Org. Biomol. Chem.* **2026**, *24*, 1938-1964.
2. Kim, E.J.; Jeon, H.B.; Kang, M.J.*; **Lee, J.*** "Dynamic imaging of lipid droplets in cells and tissues by using dioxaborine barbiturate-based fluorogenic probes" *Anal. Chem.* **2024**, *96*, 8356-8364.
3. Wallach et al. "AI is a viable alternative to high throughput screening: a 318-target study" *Sci. Rep.* **2024**, *14*, 7526
4. Park, J.E.**; **Lee, J.****; Ok, S.; Byun, S.; Yoon, S.E.; Kim, Y.J.; Kang, M.J. "Wg/Wnt1 and Erasp link ER stress to proapoptotic signaling in an autosomal dominant retinitis pigmentosa model" *Exp. Mol. Med.* **2023**, *55*, 1544-1555 (**co-first authors)
5. Song, D.**; Lee, J.Y.**; Park, E.C.; Choi, N.E.; Nam, H.Y.; Seo, J.*; **Lee, J.*** "Structure-activity relationship analysis of activity-based probes targeting HTRA family of serine proteases" *Bioorg. Med. Chem. Lett.* **2023**, *87*, 129259 (**co-first authors)
6. Choi, N.E.; Kim, E.J.; **Lee, J.** "A fluorescent molecular rotor for the *in situ* imaging of latent fingerprints" *RSC Adv.* **2022**, *12*, 33180-33186
7. Kim, S.**; Lee, J.Y.**; Choi, J.; Nam, H.Y.; Seo, J.*; **Lee, J.*** "Structure-activity relationship of mitochondria-targeting peptoids" *Pept. Sci.* **2022**, *114*, e24239. (**co-first authors)
8. Manh, N.V.; Hoang, V.; Ngo, V.T.H.; Ann, J.; Jang, T-H.; Ha, J-H.; Song, J.Y.; Ha, H-J.; Kim, H.; Kim, Y-H.; **Lee, J.**; Lee, J. "Discovery of highly potent human glutaminyl cyclase (QC) inhibitors as anti-Alzheimer's agents by the combination of pharmacophore-based and structure-based design" *Eur. J. Med. Chem.* **2021**, *226*, 113819.
9. Kim, T.H.; Morshed, M.N.; Londhe, A.M.; Lim, J.W.; Jung, S.Y.; Yang, H.; Cho, S.; Cho, S.J.; Hwang, H.; Lim, S.M.; Lee, J.Y.; **Lee J***, Pae AN* "The translocator protein ligands as mitochondrial functional modulators for the potential anti-Alzheimer agents" *J. Enzyme Inhib. Med. Chem.* **2021**, *36*, 831-846.
10. Choi, N.E.; Lee, J.Y.; Park, E.C.; Lee, J.H.; **Lee, J.** "Recent advances in organelle-targeted fluorescent probes" *Molecules* **2021**, *26*, 217.
11. Nam, H.Y.; Choi, J.; Kumar, S.D.; Nielsen, J.E.; Kyeong, M.; Wang, S.; Kang, D.; Lee, Y.; **Lee, J**; Yoon, M.H.; Hong, S.; Lund, R; Jenssen, H.; Shin, S.Y.; Seo, J. "Helicity modulation improves the selectivity of antimicrobial peptoids" *ACS Infect. Dis.* **2020**, *6*, 2732-2744.
12. Nam, H.Y.**; Song, D.**; Eo, J.**; Choi, N.E.; Hong, J.A.; Hong, K.T.; Lee, J.S.; Seo, J.*; **Lee, J.*** "Activity-based probes for the high temperature requirement A serine proteases" *ACS Chem. Biol.* **2020**, *15*, 2346-2354. (**co-first authors)
13. Kim, S.; Nam, H.Y.; **Lee, J.***; Seo, J.* "Mitochondria-targeting peptides and peptidomimetics: recent progress and design principles" *Biochemistry* **2020**, *59*, 270-284.
14. Lim, J.W.; **Lee, J.***; Pae, A.N.* "Mitochondrial dysfunction and Alzheimer's disease: Prospects for therapeutic intervention" *BMB Rep.* **2020**, *53*, 47-55.
15. Hoang, V.H.; Ngo, V.T.H.; Cui, M.; Manh, N.V.; Tran, P.T.; Ann, J.; Ha, H.J.; Kim, H.; Choi, K.; Kim, Y.H.; Chang, H.; Macalino, S.J.Y.; **Lee, J.**; Choi, S.; Lee, J. "Discovery of Conformationally Restricted Human Glutaminyl Cyclase Inhibitors as Potent Anti-Alzheimer's Agents by Structure-Based Design." *J. Med. Chem.* **2019**, *62*, 8011-8027
16. Yoon, S.; Kim, S.E.; Kim, J.H.; Yoon, I.; Tran, P.T.; Ann, J.; Kim, C.; Byun, W.S.; Lee, S.; Kim, S.; **Lee, J***; Lee, J.* "Structure-activity relationship of leucyladenylate sulfamate analogues as leucyl-tRNA synthetase (LRS)-targeting inhibitors of Mammalian target of rapamycin complex 1 (mTORC1)" *Bioorg. Med. Chem.* **2019**, *27*, 1099-1109.
17. Elkamhawy, A.; Park, J.E.; Hassan, A.H.E.; Pae, A.N.; **Lee, J.**; Paik, S.; Park, B.G.; Roh, E.J. "Pyrazinyl ureas revisited: 1-(3-(Benzyloxy)pyrazin-2-yl)-3-(3,4-dichlorophenyl)urea, a new blocker of A β -induced mPTP opening for Alzheimer's disease." *Eur. J. Med. Chem.* **2018**, *157*, 268-278.

18. Yoon, S.; Zuo, D.; Kim, J.H.; Yoon, I.; Ann, J.; Kim, S.E.; Cho, D.; Kim, W.K.; Lee, S.; **Lee, J.**; Kim, S.; Lee, J. "Discovery of novel leucyladenylate sulfamate surrogates as leucyl-tRNA synthetase (LRS)-targeted mammalian target of rapamycin complex 1 (mTORC1) inhibitors." *Bioorg. Med. Chem.* **2018**, *26*, 4073-4079.
19. Ngo, V.T.H.; Hoang, V.; Tran, P.; Van Manh N.; Ann, J.; Kim, E.; Cui, M.; Choi, S.; **Lee, J.**; Kim, H.; Ha, H.; Choi, K.; Kim, Y.; Lee, J. "Structure-activity relationship investigation of Phe-Arg mimetic region of human glutamyl cyclase inhibitors" *Bioorg. Med. Chem.* **2018**, *26*, 3133-3144
20. Nam, H.Y.; Hong, J.A.; Choi, J.; Shin, S.; Cho, S.K.; Seo, J.*; **Lee, J.*** "Mitochondria-targeting peptoids" *Bioconjugate Chem.* **2018**, *29*, 1669-1676.
21. Hong, J.A.; Kim, M.J.; Eoh, J.; **Lee, J.** "A turn-on fluorescent probe for live cell imaging of biothiols" *Bull. Kor. Chem. Soc.* **2018**, *39*, 425-426.
22. Ngo, V.T.H.; Hoang, V.; Tran, P.; Ann, J.; Cui, M.; Park, G.; Choi, S.; **Lee, J.**; Kim, H.; Ha, H.; Choi, K.; Kim, Y.; Lee, J. "Potent human glutamyl cyclase inhibitors as potential anti-Alzheimer's agents: Structure-activity relationship study of Arg-mimetic region" *Bioorg. Med. Chem. Lett.* **2018**, *26*, 1035-1049.
23. Kim, S.M.; Lee, M.; Lee, S.Y.; Lee, S.M.; Kim, E.J.; Kim, J.S.; Ann, J.; **Lee, J.**; Lee, J. "Synthesis and biological evaluation of 3-(2-aminoethyl) uracil derivatives as gonadotropin-releasing hormone (GnRH) receptor antagonists" *Eur. J. Med. Chem.* **2018**, *145*, 413-424.
24. Elkamhawy, A.; Park, J.E.; Hassan, A.H.; Pae, A.N.; **Lee, J.**; Park, B.G.; Roh, E.J. "Synthesis and evaluation of 2-(3-arylsureido)pyridines and 2-(3-arylsureido)pyrazines as potential modulators of A β -induced mitochondrial dysfunction in Alzheimer's disease." *Eur. J. Med. Chem.* **2018**, *144*, 529-543.
25. **Lee, J.**; Kang, D.; Choi, J.; Huang, W.; Wadmen, M.; Barron, A.E.; Seo, J. "Effect of side chain hydrophobicity and cationic charge on antimicrobial activity and cytotoxicity of helical peptoids" *Bioorg. Med. Chem. Lett.* **2018**, *28*, 170-173.
26. Ha, H.; Kang, D.W.; Kim, H.M.; Kang, J.M.; Ann, J.; Hyun, H.J.; Lee, J.H.; Kim, S.H.; Kim, H.; Choi, K.; Hong, H.S.; Kim, Y.H.; Jo, D.G.; **Lee, J.**; Lee, J. "Discovery of an Orally Bioavailable Benzofuran Analogue that Serves as a β -amyloid Aggregation Inhibitor for the Potential Treatment of Alzheimer's Disease." *J. Med. Chem.* **2018**, *61*, 396-402.
27. Park, J.E.; Elkamhawy, A.; Hassan, A.H.; Pae, A.N.; **Lee, J.**; Paik, S.; Park, B.G.; Roh, E.J. "Synthesis and evaluation of new pyridyl/pyrazinyl thiourea derivatives: Neuroprotection against amyloid- β -induced toxicity." *Eur. J. Med. Chem.* **2017**, *141*, 322-334.
28. Kim, T.H.; Son, W.S.; Morshed, M.N.; Londhe, A.M.; Jung, S.Y.; Park, J.; Park, W.K.; Lim, S.M.; Park, K.D.; Cho, S.J.; Jeong, K.S.; **Lee, J.***; Pae, A.N.* "Discovery of thienopyrrolotriazine derivatives to protect mitochondrial function against A β -induced neurotoxicity." *Eur. J. Med. Chem.* **2017**, *141*, 240-256.
29. Hong, J.A.; Choi, N.E.; La, Y.K.; Nam, H.Y.; Seo, J.; **Lee, J.** "Development of a smart activity-based probe to detect subcellular activity of asparaginyl endopeptidase in living cells." *Org. Biomol. Chem.* **2017**, *15*, 8018-8022.
30. Park, I.; Viswanath, A.N.I.; Park, B.G.; Jung, S. Y.; Park, K. D.; No, K. T.; **Lee, J.**; Pae, A.N. "Discovery of Non-Peptidic Small Molecule Inhibitors of Cyclophilin D as Neuroprotective Agents in A β -induced Mitochondrial Dysfunction" *J. Comput. Aided Mol. Des.* **2017**, *31*, 929-941.
31. Yoon, S.; Kim, J.H.; Koh, Y.; Tran, P.T.; Ann, J.; Yoon, I.; Jang, J.; Kim, W.; Lee, S.; **Lee, J.**; Kim, S.; Lee, J. "Discovery of simplified leucyladenylate sulfamates as novel leucyl-tRNA synthetase (LRS)-targeted mammalian target of rapamycin complex 1 (mTORC1) inhibitors" *Bioorg. Med. Chem.* **2017**, *25*, 4145-4152
32. Elkamhawy, A.; Park, J.E.; Hassan, A.H.; Ra, H.; Pae, A.N.; **Lee, J.**; Park, B.G.; Paik, S.; Do, J.; Park, J.H.; Park, K.D.; Moon, B.; Park, W.K.; Cho, H.; Jeong, D.Y.; Roh, E.J. "Design, synthesis, biological evaluation and molecular modelling of 2-(2-aryloxyphenyl)-

1,4-dihydroisoquinolin-3(2H)-ones: A novel class of TSPO ligands modulating amyloid- β -induced mPTP opening" *Eur. J. Pharm. Sci.* **2017**, *104*, 366-381.

33. Hoang, V.; Tran, P.; Cui, M.; Ngo, V.T.H.; Park, J.; Choi, S.; **Lee, J.**; Choi, K.; Cho, H.; Kim, H.; Ha, H.; Hong, H.; Kim, Y.; Lee, J. "Discovery of Potent Human Glutaminyl Cyclase Inhibitors as Anti-Alzheimer's Agent Based on Rational Design" *J. Med. Chem.* **2017**, *60*, 2573-2590.
34. Elkamhawy, A.; Park, J.E.; Hassan, A.H.; Ra, H.; Pae, A.N.; **Lee, J.**; Park, B.G.; Moon, B.; Park, H.M.; Roh, E.J. "Discovery of 1-(3-(benzyloxy)pyridin-2-yl)-3-(2-(piperazin-1-yl)ethyl)urea: A new modulator for amyloid beta-induced mitochondrial dysfunction" *Eur. J. Med. Chem.* **2017**, *128*, 56-69
35. Kim, T.H.; Yang, H. Y.; Park, B. G.; Jung, S. Y.; Park, J.; Park, K. D.; Min, S.J.; Tae, J.; Yang, H.; Cho, S.; Song, H.; Mook-Jung, I.; **Lee, J.***; Pae, A.N.* "Discovery of Benzimidazole Derivatives as Modulators of Mitochondrial Function: A Potential Treatment for Alzheimer's Disease" *Eur. J. Med. Chem.* **2017**, *125*, 1172-1192.
36. Yoon, S.; Kim, J.H.; Kim, S.; Jang, J.; Kim, S.; Moon, H.; Kim, W.; Lee, S.; **Lee, J.**; Kim, S.; Lee, J. "Discovery of leucyladenylate sulfamates as novel leucyl-tRNA (LRS)-targeted mTORC1 inhibitors" *J. Med. Chem.* **2016**, *59*, 10322-10328.
37. Kim, S.M.; Lee, M.; Lee, S.Y.; Park, S.E.; Lee, S.M.; Kim, E.J.; Han, M.Y.; Yoo, T.; Ann, J.; Yoon, S.; **Lee, J.**; Lee, J. "Discovery of an orally bioavailable gonadotropin-releasing hormone (GnRH) receptor antagonist" *J. Med. Chem.* **2016**, *59*, 9150-9172.
38. La, Y.; Hong, J.; Jeong, E.; **Lee, J.** "A 1, 8-naphthalimide-based chemosensor for dual-mode sensing: Colorimetric and fluorometric detection of multiple analytes" *RSC Adv.* **2016**, *6*, 84908-84105.
39. Yoon, S.; Kim, J.H.; Yoon, I.; Kim, C.; Kim, S.; Koh, Y.; Jeong, S.J.; **Lee, J.**; Kim, S.; Lee, J. "Discovery of (S)-4-Isobutyloxazolidin-2-one as a Novel Leucyl-tRNA Synthetase (LRS)-targeted mTORC1 Inhibitor" *Bioorg. Med. Chem. Lett.* **2016**, *26*, 3038-3041.
40. **Lee, J.** "Mitochondrial drug targets in neurodegenerative diseases" *Bioorg. Med. Chem. Lett.* **2016**, *26*, 714-720
41. Lee, H.R.; Farhanullah; Lee, J.; Jajoo, R.; Kong, S.Y.; Shin, J.Y.; Kim, J.O.; **Lee, J.**; Lee J.; Kim, H.J. "Discovery of a Small Molecule that Enhances Astrocytogenesis by Activation of STAT3, SMAD1/5/8, and ERK1/2 via Induction of Cytokines in Neural Stem Cells." *ACS Chem. Neurosci.* **2016**, *7*, 90-99
42. Cho, N.C.; Cha, J.H.; Kim, H.; Kwak, J.; Kim, D.; Seo, S.H.; Shin, J.S.; Kim, T.; Park, K.D.; **Lee, J.**; No, K.T.; Kim, Y.K.; Lee, K.T.; Pae, A.N. "Discovery of 2-aryloxy-4-aminoquinazoline derivatives as novel protease-activated receptor 2 (PAR2) antagonists." *Bioorg. Med. Chem.* **2015**, *23*, 7717-7727
43. Choi, K.; Lim, K.S.; Shin, J.; Kim, S.H.; Suh, Y.G.; Hong, H.S.; Kim, H.; Ha, H.J.; Kim, Y.H.; **Lee, J.**; Lee, J. "6-Phenoxy-2-phenylbenzoxazoles, novel inhibitors of receptor for advanced glycation end products (RAGE)." *Bioorg. Med. Chem.* **2015**, *23*, 4919-4035
44. La, Y.; Choi, N. E.; Chung, S.; **Lee, J.** "Thiophene-substituted Aza-BODIPYs as Near-Infrared Fluorophores" *Bull. Kor. Chem. Soc.*, **2015**, *36*, 1747-1748
45. **Lee, J.**; Huang, W.; Broering, J.M.; Barron, A.E.; Seo, J. "Prostate tumor specific peptide-peptoid hybrid prodrugs" *Bioorg. Med. Chem. Lett.* **2015**, *25*, 2849-2952
46. Nam, M.; Kim, T.; Kwak, J.; Seo, S.H.; Ko, M.K.; Lim, E.J.; Min, S.J.; Cho, Y.S.; Keum, G.; Baek, D.J.; **Lee, J.***; Pae, A.N.* "Discovery and biological evaluation of tetrahydrothieno[2,3-c]pyridine derivatives as selective metabotropic glutamate receptor 1 antagonists for the potential treatment of neuropathic pain" *Eur. J. Med. Chem.* **2015**, *97*, 245-258
47. Cho, G.H.; Kim, T.; Son, W.S.; Seo, S.H.; Min, S.J.; Cho, Y.S.; Keum, G.; Jeong, K.S.; Koh, H.Y.; **Lee, J.***; Pae, A.N.* "Synthesis and biological evaluation of aryl isoxazole derivatives as metabotropic glutamate receptor 1 antagonists: a potential treatment for neuropathic pain" *Bioorg. Med. Chem. Lett.* **2015**, *25*, 1324-1328

48. Elkamhawy, A.; **Lee, J.**; Park, B.G.; Park, I.; Pae, A.N.; Roh, E.J. "Novel quinazoline-urea analogues as modulators for A β -induced mitochondrial dysfunction: Design, synthesis, and molecular docking study." *Eur. J. Med. Chem.* **2014**, *84*, 466-475
49. Choi, M. J.; Thorat, D. A.; Jang, J. W.; Yang, H.; No, E. S.; Kim, S. J.; Lee, J.; Choo, H.; Lee, C. S.; Ko, S.Y.; **Lee, J.**; Nam, G. S.; Pae, A. N. "Synthesis and biological evaluation of aryloxazole derivatives as vascular disrupting agents for cancer therapy" *J. Med. Chem.* **2013**, *56*, 9008-9018
50. Yoon, H.J.; Kong, S.Y.; Cho, Y.; Shin, J.Y.; Jung, S.H. ; **Lee, J.**; Kim, H-J.; Lee, J. "Aminopropyl carbazole analogues as potent enhancers of neurogenesis" *Bioorg. Med. Chem.* **2013**, *21*, 7165-7174
51. Morell, M.; Nguyen, Duc T.; Willis, A.L.; Syed, S.; **Lee, J.**; Deu, E.; Deng, Y.; Xiao, J.; Turk, B.E.; Jessen, J.R.; Weiss, S.J.; Bogoyo, M. "Coupling protein engineering with probe design to inhibit and image matrix metalloproteinases with controlled specificity." *J. Am. Chem. Soc.* **2013**, *135*, 9139-9148
52. Tran, P.T.; Hoang, V.H.; Thorat, S.A.; Kim, S.E.; Ann, J.; Chang, Y.J.; Nam, D.W.; Song, H.; Mook-Jung, I.; **Lee, J.**; Lee, J. "Structure-activity relationship of human glutaminyl cyclase inhibitors having an *N*-(5-methyl-1*H*-imidazol-1-yl)propyl thiourea template" *Bioorg. Med. Chem.* **2013**, *13*, 3821-3830
53. Kang, B.; Chung, S.; Ahn, Y.D.; **Lee, J.**; Seo, J. "Porphyrin-Peptoid Conjugates: Face-to-Face Display of Porphyrins on Peptoid Helices" *Org. Lett.* **2013**, *15*, 1670-1673
54. Yang, H.Y.; Tae, J.; Seo, Y.W.; Kim, Y.J.; Im, H.Y.; Choi, G.D.; Cho, H.; Park, W-K.; Kwon, O.S.; Cho, Y.S.; Ko, M.; Jang, H.; Choi, K.; Kim, C-H.; **Lee, J.***; Pae, A.N.* "Novel pyrimidoazepine analogs as serotonin 5-HT_{2A} and 5-HT_{2C} receptor ligands for the treatment of obesity" *Eur. J. Med. Chem.* **2013**, *63*, 558-569
55. **Lee, J.***; Bogoyo, M.* "Target deconvolution techniques in modern phenotypic profiling" *Curr. Opin. Chem. Biol.* **2013**, *17*, 118-126
56. Kim, Y.S.; Jung, S.H.; Park, B.G.; Ko, M.K.; Jang, H.S.; Choi, K.; Baik, J.H.; **Lee, J.**; Lee, J.K.; Pae, A.N.; Cho, Y.S.; Min, S.J. "Synthesis and evaluation of oxime derivatives as modulators for amyloid beta-induced mitochondrial dysfunction" *Eur. J. Med. Chem.* **2013**, *62*, 71-83
57. Edgington, L.E.; Verdoes, M.; Ortega, A.; Withana, N.P.; **Lee, J.**; Syed, S.; Bachmann, M.H.; Blum, G.; Bogoyo, M. "Functional imaging of legumain in cancer using a new quenched activity-based probe." *J. Am. Chem. Soc.* **2013**, *135*, 174-182
58. Kim, J; **Lee, J.**; Moon, B; Mook-Jung, I; Nam, G; Keum, G; Pae, A.N.; Choo, H. "Pyridyl-urea Derivatives as Blockers of A β -induced mPTP Opening for Alzheimer's Disease" *Bull. Kor. Chem. Soc.* **2012**, *33*, 3887-3889
59. **Lee, J.** "Cobalt (III) Complexes as Novel Matrix Metalloproteinase-9 Inhibitors" *Bull. Kor. Chem. Soc.* **2012**, *33*, 2762-2764
60. Cho, Y.; Kim, M.S.; Kim, H.S.; Ann, J.; **Lee, J.**; Pearce, L.V.; Pavlyukovets, V.A.; Morgan, M.A.; Blumberg, P.M.; Lee, J. "The SAR analysis of TRPV1 agonists with the α -methylated B-region" *Bioorg. Med. Chem. Lett.* **2012**, *22*, 5227-5231.
61. **Lee, J.***; Bogoyo, M.* "Synthesis and evaluation of aza-peptidyl inhibitors of the lysosomal asparaginyl endopeptidase, legumain" *Bioorg. Med. Chem. Lett.* **2012**, *22*, 1340-1343.
62. Ewald, S.E.; Engel, A.; **Lee, J.**; Wang, M.; Bogoyo, M.; Barton, G.M. " Nucleic acid recognition by Toll-like receptors is coupled to processing by cathepsins and asparagine endopeptidase." *J. Exp. Med.* **2011**, *208*, 643-651.
63. **Lee, J.**; Bogoyo, M. "Development of near-infrared fluorophore (NIRF)-labeled activity-based probes for *in vivo* imaging of legumain" *ACS Chem.Biol.* **2010**, *5*, 233-243.
64. Harney, A.S.; **Lee, J.**; Manus, L.M.; Wang, P.; Ballweg, D.M.; LaBonne, C.; Meade, T.J. "Targeted inhibition of Snail family zinc finger transcription factors by oligonucleotide-Co(III) Schiff base conjugate" *Proc. Nat. Acad. Sci.* **2009**, *106*, 13667-13672.

65. **Lee, J.**; Burdette, J.E.; MacRenaris, K.W.; Mustafi, D.; Woodruff, T.K.; Meade, T.J. "Rational design, synthesis, and biological evaluation of progesterone modified MRI contrast agents" *Chem. Biol.* **2007**, *14*, 824-834.
66. **Lee, J.**; Zylka, M.J.; Anderson, D.J.; Burdette, J.E.; Woodruff, T.K.; Meade, T.J. "A Steroid-Conjugated Contrast Agent for Magnetic Resonance Imaging of Cell Signaling." *J. Am. Chem. Soc.* **2005**, *127*, 13164-13166.
67. Lee, J.; Jin, M.; Kang, S-U.; Kim, S.Y.; **Lee, J.**; Shin, M.; Hwang, J.; Cho, S.; Choi, Y-S.; Choi, H-K.; Kim, S-E.; Suh, Y-G.; Lee, Y-S.; Kim, Y-H.; Ha, H-J.; Toth, A.; Pearce, L.V.; Tran, R.; Szabo, T.; Welter, J.D.; Lundberg, D.J.; Wang, Y.; Lazar, J.; Pavlyukovets, V. A.; Morgan, M.A.; Blumberg, P.M. "Analysis of structure-activity relationships for the 'B-region' of *N*-(4-*t*-butylbenzyl)-*N'*-[4-(methylsulfonylamino) benzyl]-thiourea analogues as TRPV1 antagonists." *Bioorg. Med. Chem. Lett.* **2005**, *15*, 4143-4150.
68. Lee, J.; Kim, S.Y.; **Lee, J.**; Kang, M.; Kil, M-J.; Choi, H-K.; Jin, M-K.; Wang, Y.; Toth, A.; Pearce, L.V.; Lundberg, D.J.; Tran, R.; Blumberg, P.M. "Analysis of structure activity relationships with the *N*-(3-acyloxy-2-benzylpropyl)-*N'*-[4-(methylsulfonylamino)benzyl] thiourea template for vanilloid receptor 1 antagonism." *Bioorg. Med. Chem.* **2004**, *12*, 3411-3420.
69. Lee, J.; Kang, S-U.; Choi, H-K.; **Lee, J.**; Lim, J-O.; Kil, M-J.; Jin, M-K.; Kim, K-P.; Sung, J-H.; Chung, S-J; Ha, H-J.; Kim, Y-H.; Pearce, L.V.; Tran, R.; Lundberg, D.J.; Wang, Y.; Toth, A.; Blumberg, P.M. "Analysis of structure activity relationships for the a-region of *N*-(3-acyloxy-2-benzylpropyl)-*N'*-[4-(methylsulfonylamino)benzyl]thiourea analogues as vanilloid receptor antagonists: discovery of an *N*-hydroxythiourea analogue with potent analgesic activity." *Bioorg. Med. Chem. Lett.* **2004**, *14*, 2291-2297.
70. Lee, J.; Kim, S.Y.; Park, S.; Lim, J-O.; Kim, J-M.; Kang, M.; **Lee, J.**; Kang, S-U.; Choi, H-K.; Jin, M-K.; Welter, J.D.; Szabo, T.; Tran, R.; Pearce, L.V.; Toth, A.; Blumberg, P.M. "Structure-activity relationships of simplified resiniferatoxin analogues with potent VR1 agonism elucidates an active conformation of RTX for VR1 binding." *Bioorg. Med. Chem.* **2004**, *12*, 1055-1069.
71. Park, H-G.; Choi, J-Y.; Choi, S-H.; Park, M-K.; Lee, J.; Suh, Y-G.; Cho, H.; Oh, U.; **Lee, J.**; Kang, S-U.; Lee, J.; Kim, H-D.; Park, Y-H.; Jeong, Y.S.; Choi, J. K.; Jew, S-S. "*N*-4-Substituted-benzyl-*N*-*tert*-butylbenzyl thioureas as vanilloid receptor ligands: investigation on the role of methanesulfonamido group in antagonistic activity." *Bioorg. Med. Chem. Lett.* **2004**, *14*, 787-791.
72. Wang, Y.; Toth, A.; Tran, R.; Szabo, T.; Welter, J.D.; Blumberg, P.M.; **Lee, J.**; Kang, S-U.; Lim, J-O.; Lee, J. "High Affinity of Partial Agonists of Vanilloid Receptor." *Mol. Pharmacol.* **2003**, *64*, 325-334.
73. Lee, J.; **Lee, J.**; Kang, M.; Shin, M-Y.; Kim, J-M.; Kang, S-U.; Lim, J-O.; Choi, H-K.; Suh, Y.G.; Park, H-G.; Oh, U.; Kim, H-D.; Park, Y-H.; Ha, H-J.; Kim, Y-H.; Toth, A.; Wang, Y.; Tran, R.; Pearce, L.V.; Lundberg, D.J.; Blumberg, P.M. "*N*-(3-Acyloxy-2-benzylpropyl)-*N'*-[4-(methylsulfonylamino) benzyl] thiourea Analogues: Novel Potent and High Affinity Antagonist and Partial Antagonists of the Vanilloid Receptor." *J. Med. Chem.* **2003**, *46*, 3116-3126.
74. Wang, Y.; Szabo, T.; Welter, J.D.; Toth, A.; Tran, R.; **Lee, J.**; Kang, S-U.; Suh, Y-G.; Blumberg, P.M.; Lee, J. "High Affinity Antagonists of the Vanilloid Receptor." *Mol. Pharmacol.* **2002**, *62*, 947-956.
75. Lee, J.; **Lee, J.**; Kang, M.S.; Kim, K.P.; Chung, S.J.; Blumberg, P.M.; Yi, J.B.; Park, Y.H. "Phenolic Modification as an Approach to Improve the Pharmacology of the 3-Acyloxy-2-benzylpropyl Homovanillic Amides and Thioureas, a Promising Class of Vanilloid Receptor Agonist and Analgesics." *Bioorg. Med. Chem.* **2002**, *10*, 1171-1179.
76. Lee, J.; **Lee, J.**; Szabo, T.; Gonzalez, A.F.; Welter, J.D.; Blumberg, P.M. "*N*-(3-Acyloxy-2-benzylpropyl)-*N*-Dihydroxy Tetrahydrobenzazepine and Tetrahydroisoquinoline Thio-urea Analogues as Vanilloid Receptor Ligands." *Bioorg. Med. Chem.* **2001**, *9*, 1713-1720.

77. Lee, J.; **Lee, J.**; Kim, J.; Kim, S.Y.; Chun, M.W.; Cho, H.; Hwang, S.W.; Oh, U.; Park, Y. H.; Marquez, V.E.; Beheshti, M.; Szabo, T.; Blumberg, P.M. "*N*-(3-Acyloxy-2-benzylpropyl)-*N*-(4-hydroxy-3-methoxy benzyl)thiourea Derivatives as Potent Vanilloid Receptor Agonists and Analgesics." *Bioorg. Med. Chem.* **2001**, 9, 19-32.
78. Lee, J.; Park, S.U.; Kim, J.Y.; Kim, J.K.; **Lee, J.**; Oh, U.; Marquez, V.E.; Beheshti, M.; Wang, Q.J.; Modarres, S.; Blumberg, P.M. "*N*-Acyloxy-2-phenalkylpropyl Amides and Esters of Homovanillic Acid as Novel Vanilloid receptor Agonists." *Bioorg. Med. Chem. Lett.* **1999**, 9, 2909-2914.
79. Chun, K.S.; Sohn, Y.; Kim, H.S.; Kim, O.H.; Park, K.K; Lee, J.M.; Lee, J.; **Lee, J.**; Moon, A; Lee, S.S.; Surh, Y.J. "Anti-tumor Promoting Potential of Naturally Occurring Diarylheptanoids Structurally Related to Curcumin." *Mutat. Res.* **1999**, 428, 49-57.
80. Lee, J.; **Lee, J.** "A Facile and Practical Synthesis of Capsazepine, A Vanilloid Receptor Antagonist." *Synthetic Commun.* **1999**, 29, 4127-40.

Patents

1. **Lee, J.**; Lee, J.Y.; Kang, M.J. "Pharmaceutical composition for the prevention or treatment of degenerative diseases containing HTRA activator as an active ingredient and Screening Method for HTRA activity modulators" PCT Pat. Appl. (**2026**), PCT/KR2024/012593
2. **Lee, J.**; Kim, E.J. "Targeted fluorescent probes for imaging of lipid droplets", Korean Pat. (**2025**), 10-2860033
3. **Lee, J.**; Choi, N.E.; Lee, J.Y. "HTRA targeted tetrapeptide probe containing unnatural amino acids", Korean Pat. Appl. (**2025**), 10-2848239
4. **Lee, J.**; Lee, J.Y.; Kang, M.J. "Pharmaceutical composition for the prevention or treatment of degenerative diseases containing HTRA activator as an active ingredient and Screening Method for HTRA activity modulators" Korean Pat. Appl. (**2023**), 10-2023-0111652
5. **Lee, J.**; Choi, N.E.; Eo, J. "Activity-based tetrapeptide probes for HTRA detection", Korean Pat. (**2021**), 10-2302971
6. **Lee, J.**; Yin, F.; Bogyo, M. "Specific Inhibitors and Active Site Probes for Legumain", U.S. Pat. (**2016**), US 9345789 B2
7. Sukerkar, P.; **Lee, J.**; Woodruff, T.K.; Meade, T.J. "Compositions and Methods Comprising Magnetic Resonance Contrast Agents", U.S. Pat. (**2013**), US 8580231 B2