

CURRICULUM VITAE



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Educations:

- 1983-1987** B.Sc. (Life Sciences)
Korea University, Seoul, Korea
- 1987-1989** M.Sc. (Biochemistry).
Korea University, Seoul, Korea.
- 1996-2001** Ph.D. (Immunology)
Weizmann Institute of Science, Rehovot, Israel.

Positions:

- 1991-1996** Senior Research Scientist,
Biotechnology Lab, Research Center of Chong Kun Dang (CKD) Pharmaceutical
Company, Seoul, Korea.
- 2001-2003** Postdoctoral Research Fellow,
Harvard Medical School (Prof. Anjana Rao's Lab)
Subject: Functional Genomics in Immune System
- 2004- 2011** Assistant Professor- Associate Professor
School of Life Sciences, Gwangju Institute of Science and Technology
- 2012- 2013** Professor
School of Life Sciences, Gwangju Institute of Science and Technology
- 2014- 2018** Group leader, Acting Director (2014-2018)
Academy of Immunology and Microbiology, Institute for Basic Science (IBS) at
POSTECH campus.
- 2014- Present** Professor
Division of Integrative Biosciences and Biotechnology, Department of Life
Sciences, Pohang University of Science and Technology (POSTECH)

Awards and Honors

- Yang-Young fellowship for B.Sc studies (1983-1987, Korea)
Ko-Chon fellowship for Ph.D studies (1996-2001, Korea)
Sam Cohen Windhook Scholarship (1996-2001, Israel)
The Theodore R. and Edlyn Racoosin Scholarship Fund (1996-2001, Israel)
CRI Irvington Postdoctoral Fellowships, Cancer Research Institute (2001-2003),
Young Investigator Award (The Society of Biological Research (SBR), 2003,
USA)
Top 100 achievements of national R&D (2011, Korean government)

Professional Activities

1. 2002~ 2010: KOSEN Expert (The Global network of Korean Scientist and Engineers)
2. 2004~ 2015: Active member of New York Acad Sci, USA
3. 2004~ Present: Active member of Korean Society of Molecular Biology
4. 2004~ Present: Active Member of Biochemical Society of Korea
5. 2005~ Present: Active member of The American Association of Immunologists, USA
6. 2005~ Present: Active member and Board of Directors of The Korean Association of Immunologists
7. 2008~ Present: Active member of American Society of Biochemistry and Molecular Biology, USA
8. 2015~ Present President, International Scientific Conference on Probiotics and Prebiotics (IPC)
9. 2017, 2019 Scientific advisory member, Du Pont Nutrition & Health
10. 2018~ Present: Board of Directors, Pharmabiotic Research Institute; European non-profit organization focused on Microbiotic Medicinal Products.

Editorial boards and Peer review activities

1. 2015~ present: Beneficial Microbes; ISSN: 1876-2891)
2. 2018- present Review editor, Frontiers in Immunology
3. 2011~ 2018: World Journal of Immunology; ISSN 2219-2824.
4. 2018~2021: World Journal of Biochemistry; ISSN 1949-8454
3. 2004~ present: Ad hoc reviewer:
External reviewer for Journal of Immunology, Nucleic Acid Research, Scientific Reports, Biomaterials, Bioorganic & Medicinal Chemistry Microbiome, Plos ONE, Journal of Nutrition, Nutrition, Biochemical and Biophysical Research Communications, European Journal of Allergy and Clinical immunology, International journal of nutrition and metabolism, Journal of Neuroimmunology, Molecular Nutrition and Food, Journal of functional food, Israel science foundation, Research Czech Science Foundation, Dutch Arthritis Association, etc

Research area:

Immune regulation and tolerance at the cellular and molecular level

- Role of Ets1 transcription factors in immune regulation and tolerance
- Molecular mechanism of *IL-10* gene regulation in immune cells
- Reprogramming of immune system by tailored probiotics strains
- Mechanism of probiotics-mediated immune regulation and tolerance
- Characterization of molecular identity of immune-regulatory component of probiotics
- Development of probiotics as pharmabiotics for allergy, autoimmunity and cancer

➤ **Short Biography**

I have completed Ph.D. in 2000 at the Department of Immunology, Weizmann Institute of Science where I studied the development of antigen-specific immunotherapy to treat autoimmunity using an experimental myasthenia gravis as a model. I then completed postdoctoral training in 2003 at the Harvard Medical School where I have worked on epigenetic regulation of cytokine gene expression in CD4+ T cells. I have started my own lab as an independent principal investigator in 2004 at the Department of Life Science in the Gwangju Institute of Science and Technology (GIST) and was promoted as a full professor in 2012. Since 2014, I have worked as a Professor in the Division of Integrative Biosciences and Biotechnology/Department of Life Sciences, Pohang University of Science and Technology (POSTECH), KOREA.

I have published > 110 articles in peer reviewed journals and obtained 13 patents. Currently I serve as the president of International Scientific Conference on Probiotics and Prebiotics (IPC) and serve as a member of editor board of several journals. My main research interest is to investigate how our immune system maintains immune homeostasis by balancing between immunity and tolerance. My group have actively investigated the role of transcription factors (Ets1, NFAT1) and gut microbiome in differentiation of immune cells in health and disease. Recently my group identified probiotic strains and characterized functional effector molecules and their mechanism of action in inducing regulatory T cells. Our finding provides a novel paradigm of pharmabiotic research to develop microorganism and their medicinal products as therapeutic or preventive modalities for allergic disorders, autoimmune diseases and cancers. Moreover, my group also have investigated how genetic factor and altered gut microbiome cooperatively involved in development of autoimmune disease and tried to prove whether defined immunomodulatory probiotics could be employed as therapeutic agent. My research will provide a close link between basic science and translational approach to treat hyper-immune responses resulting in autoimmune and allergic disorders.

➤ **Researcher IDs:**

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➤ **Publications**

A. Peer-reviewed journals

1. Barchan D, Souroujon MC, **Im SH**, Antozzi C and Fuchs S. Antigen-Specific Modulation of Experimental Myasthenia Gravis: Nasal Tolerization with Recombinant Fragments of the Human Acetylcholine Receptor α -subunit. ***Proc Natl Acad Sci U S A***. 1999. 96: 8086-8091.
2. **Im SH**, Barchan D, Fuchs S and Souroujon M.C. Suppression of Ongoing Experimental Myasthenia by Oral Treatment with an Acetylcholine Receptor Recombinant Fragment. ***J Clin Invest*** 1999. 104:1723-30. Comment in: J Clin Invest 1999 104(12):1667
3. Venkatesh N, **Im SH**, Balass M, Katchalsky-Katzir E and Fuchs S Prevention of Passively Transferred Experimental Autoimmune Myasthenia Gravis by a Phage Library-Derived Cyclic Peptide. ***Proc Natl Acad Sci U S A***. 2000. 97: 761-766
4. **Im SH**, Barchan D, Souroujon M.C and Fuchs S. Role of Tolerogen Conformation in Induction of Oral Tolerance in Experimental Autoimmune Myasthenia Gravis. ***J Immunol***. 2000. 165: 3599-3605
5. **Im SH**, Barchan D, Fuchs S and Souroujon M.C. Mechanism of Nasal Tolerance Induced by a Recombinant Fragment of Acetylcholine Receptor for Treatment of Experimental Masthenia Gravis. ***J Neuroimmunol***. 2000. 111(1-2): 161-168
6. **Im SH**, Barchan D, Mati P.K., Sara Fuchs S and Souroujon M.C. Blockade of CD40 Ligand Suppresses Chronic Experimental Myasthenia Gravis by Down-Regulation of Th1 Differentiation and Up-Regulation of CTLA-4. ***J Immunol***. 2001. 166: 6893-6898
7. **Im SH**, Barchan D, Mati P.K., Souroujon M.C and Fuchs S. Suppression of Experimental Myasthenia, a B cell-Mediated Autoimmune Disease by Blockade of IL-18. ***Faseb J***. 2001. 15: 2140-2148.
8. **Im SH**, Kim SH, Venkatesh N, Dinarello CA, Fuchs S and Souroujon M.C. Rat IL-18 binding protein: Cloning and Characterization. ***J interferon Cytokine Res***. 2002. 22:321-328
9. **Im SH**, Barchan D, Feferman T, Raveh L, Souroujon MC and Fuchs S. Protective molecular mimicry in experimentl autoimmune myasthenia gravis. ***J Neuroimmunol***. 2002. 126: 99-106

10. Macian F, Gracia-Cozar F, **Im SH**, Horton HF, Byrne MC and Rao A. Transcriptional mechanism underlying lymphocyte tolerance. *Cell*. 2002. 109: 709-731
11. Maiti PK, **Im SH**, Souroujon MC and Fuchs S. A monoclonal antibody specific for rat IL-18BP and its application in determining serum IL-18BP. *Immunol Lett*. 2003. 85: 65-70.
12. Stassen MH, Meng F, Melgert E, Machiels BM, **Im SH**, Fuchs S, Gerritsen AF, van Dijk MA, van de Winkel JG, De Baets MH. Experimental autoimmune myasthenia gravis in mice expressing human immunoglobulin loci. *J Neuroimmunol*. 2003.135: 56-61
13. Feferman T, **Im SH**, Fuchs S, Souroujon MC. Breakage of tolerance to hidden cytoplasmic epitopes of the acetylcholine receptor in experimental autoimmune myasthenia gravis. *J Neuroimmunol*. 2003. 140(1-2):153-8.
14. Souroujon MC, Maiti PK, Feferman T, **Im SH**, Fuchs S. Suppression of myasthenia gravis by antigen-specific mucosal tolerance and modulation of cytokines and costimulatory factors. *Ann NY Acad Sci*. 2003. 998: 533-536
15. Feferman T, **Im SH**, Fuchs S, and Souroujon MC. Epitope spreading to hidden cytoplasmic regions of the acetylcholine receptor in experimental autoimmune myasthenia gravis. *Ann NY Acad Sci*. 2003. 998: 388-390
16. Heissmeyer V, Macian F, **Im SH**, Varma R, Feske S, Liu YC, Dustin ML and Rao A. Calcineurin imposes T cell unresponsiveness through targeted proteolysis of signaling proteins. *Nature Immun*. 2004. 5(3):255-65
17. Macián F, **Im SH**, Francisco J García-Cózar F, Rao A. *Curr Opin Immunol*. 2004. T-cell anergy 16(2):209-16.
18. Maiti PK, Feferman T, **Im SH**, Souroujon MC, Fuchs S. Immunosuppression of rat myasthenia gravis by oral administration of a syngeneic acetylcholine receptor fragment. *J Neuroimmunol*. 2004. 152(1-2):112-20.
19. **Im SH***, Hueber A Monticelli S, Kang KH and Rao A. Chromatin-level regulation of the *IL10* gene in T cells. *J Biol Chem*. 2004. Nov 5;279(45):46818-25 (*corresponding author).
20. **Im SH***, and Rao A. Activation and Deactivation of Gene Expression by Ca^{2+} /Calcineurin-NFAT-mediated Signaling. *Mol Cells*. 2004. 18: 1-9 (*corresponding author).

21. Kang KH and **Im SH**. Differential Regulation of the IL-10 Gene in Th1 and Th2 T Cells. *Ann NY Acad Sci*. 2005. 1050: 97-107
22. Heissmeyer V, Macian F, Varma R, **Im SH**, Garcia-Cozar F, Horton HF, Byrne MC, Feske S, Venuprasad K, Gu H, Liu YC, Dustin ML, Rao A. A molecular dissection of lymphocyte unresponsiveness induced by sustained calcium signalling. *Novartis Found Symp*. 2005. 267:165-74; discussion 174-9.
23. Kim T, Oh J, Woo JM, Choi E, **Im SH**, Yoo YJ, Kim do H, Nishimura H, Cho C. Expression and relationship of male reproductive ADAMs in mouse. *Biol Reprod*. 2006. Apr;74(4):744-50.
24. Yun K, Choi YD, Nam JH, Park Z, **Im SH**. NF-kappaB regulates Lef1 gene expression in chondrocytes. *Biochem Biophys Res Commun*. 2007 Jun 8;357(3):589-95
25. Choi EY, Park ZY, Choi EJ, Oh HM, Lee S, Choi SC, Lee KM, **Im SH**, Chun JS, Jun CD. Transcriptional regulation of IL-8 by iron chelator in human epithelial cells is independent from NF-kappaB but involves ERK1/2- and p38 kinase-dependent activation of AP-1. *J Cell Biochem*. 2007 Dec 15;102(6):1442-57.
26. Kim S, Sik Kim H, Wook Chung K, Oh SH, Won Yun J, **Im SH**, Lee MK, Kim KW, Lee MS. Essential role for STAT1 in pancreatic {beta}-cell death and autoimmune type 1 diabetes of NOD mice. *Diabetes*. 2007 Jul 9 . 56(10):2561-8
27. Yun KS, **Im SH**. Lef 1 regulates COX-2 transcription in chondrocytes. *Biochemical and Biophysical Research Communications*. 2007.10.11. 364(2):270-275
28. Jung HH, HJ Yi, SK Lee, JY Lee, HJ Jung, ST Yang, YJ Eu, **Im SH***, JI Kim. Structural analysis of Immunotherapeutic peptides for autoimmune myasthenia gravis. *Biochemistry*. 2007.11.25. 46(51):14987-95 (*co-corresponding author).
29. Yun KS, **Im SH**. Transcriptional regulation of MMP13 by Lef1 in chondrocytes. *Biochemical and Biophysical Research Communications*. 2007.11.28. 364(4):1009-14
30. So JS, HK Kwon, CG Lee, HJ Yi, JA Park, SY Lim, KC Hwang, YH Jeon, **Im SH**. Lactobacillus casei suppresses experimental arthritis by down-regulating T helper 1 effector functions. *Mol Immunol*. 2008.02.19. 45(9):2690-2699

31. Kwon HK, JS So, CG Lee, A Sahoo, HJ Yi, JN Park, SY Lim, KC Hwang, CD Jun, JS Chun, **Im SH**. Foxp3 induces IL-4 gene silencing by affecting nuclear translocation of NF κ B and chromatin structure. *Mol Immunol*. 2008.04.18. 45(11):3205-3212
32. Yi HJ , CG Lee, HK Kwon, JS So, Sahoo A, JS Hwang, Jash A, KC Hwang, **Im SH**. Defect in TCR-CD3 ζ signaling mediates T cell hypo-responsiveness mesenteric lymph node. *Mol Immunol*. 2008.7.11. 45(14):3748-3755.
33. So JS, CG Lee, HK Kwon ,HJ Yi, CS Chae, JA Park, KC Hwang, **Im SH**. *Lactobacillus casei* potentiate induction of oral tolerance in experimental arthritis. *Mol Immunol*. 2008.09.18. 46(1):172-180
34. Yi HJ, CS Chae, JS So, ST Tzartos, MC Souroujon, S Fuchs, **Im SH**. Suppression of Experimental Myasthenia Gravis by a B-cell Epitope-Free Recombinant Acetylcholine Receptor. *Mol Immunol*. 2008.09.15. 46(1):192-201
35. Sahoo A , YM Jung, HK Kwon, HJ Yi, S Lee, S Chang, Z Park, KC Hwang, **Im SH**. A novel splicing variant of mouse IL-24 antagonizes IL-24-induced apoptosis. *J Biol Chem*. 2008. 43: 28860-28872.
36. CG Lee, KH Kang, JS So, HK Kwon, JS Son, MK Song, A Sahoo, HJ Yi, KC Hwang, T Matsuyama, K Yui, **Im SH**. A distal cis-regulatory element, CNS-9, controls NFAT1 and IRF4-mediated IL-10 gene activation in T helper cells. *Mol Immunol*. 2009 Feb;46(4):613-21.
37. Kwon HK, Jeon WK, Hwang JS, Lee CG, So JS, Park JA, Ko BS, **Im SH**. Cinnamon extract suppresses tumor progression by modulating angiogenesis and the effector function of CD8(+) T cells. *Cancer Lett*. 2009; 278(2): 174-182
38. Song SW, Chang W, Song BW, Song H, Lim S, Kim HJ, Cha MJ, Choi E, **Im SH**, Chang BC, Chung N, Jang Y, Hwang KC. Integrin-Linked Kinase Is Required in Hypoxic Mesenchymal Stem Cells for Strengthening Cell Adhesion to Ischemic Myocardium. *Stem Cells*. 2009 Jun;27(6):1358-1365
39. Lee CG, Sahoo A, **Im SH**. Epigenetic regulation of cytokine gene expression in T lymphocytes.. *Yonsei Med J*. 2009. 50(3):322-30
40. Yun KS, So JS, Jash A and **Im SH** Lef1 regulates transcription through gene looping. *J Immunol* 2009 Oct 15;183(8):5129-37
41. Thylur RP, Kim YD, Kwon MS, Oh HM, Kwon HK, Kim SH, **Im SH**, Chun JS, Park ZY, Jun CD. Swiprosin-1 is expressed in mast cells and up-regulated

- through the protein kinase C beta I/eta pathway. *J Cell Biochem.* 2009 Oct;108(3):705-715
42. Jeon WK, JHwang JS, Kwon HK, Lee CG, **Im SH**, Ko BS. Development of T-cell Based Reporter Assay System to Identify Immunomodulators from Herbal Medicine. 2009, *J. Korean Soc. Appl. Biol. Chem.* 52(6), 716-719
43. Sahoo A and **Im SH** Interleukin and Interleukin Receptor Diversity: Role of Alternative Splicing. *Int Rev Immunol.* 2010;29(1):77-109
44. Kwon HK, Lee CG, Jae-Seon Soa, Chae CS, Hwang JS, Sahoo A, Nam JH, Rhee JH, Hwang KC, **Im SH**. Generation of regulatory dendritic cells and CD4+Foxp3+ T cells by probiotics administration suppresses immune disorders. *Proc Natl Acad Sci U S A.* 2010 Feb 2;107(5):2159-64. [Commented by J Allergy Clin Immunol . May 2010. Page 953](#)
45. Yun SS, Yoon SY, Song MK, **Im SH**, Kim S, Lee JH, Yang S. Handheld mechanical cell lysis chip with ultra-sharp silicon nano-blade arrays for rapid intracellular protein extraction. *Lab Chip.* 2010 Jun 7;10(11):1442-6
46. Chung HS, Lee JH, Kim H, Lee HJ, Kim SH, Kwon HK, **Im SH**, Bae H. Foxp3 is a novel repressor of microglia activation. *Glia.* 2010 Aug;58(10):1247-56.
47. Kwon HK, Hwang JS, So JS, Lee CG, Sahoo A, Ryu JH, Jeon WK, Ko BS, Im CR, Lee SH, Park ZY and **Im SH**. Cinnamon extract induces tumor cell death through inhibition of NF κ B and AP1. *BMC Cancer.* 2010 Jul 24;10(1):392.
48. Lee CG, Kwon HK, Ryu JH, Kang SJ, Im CR, Li Kim J, **Im SH**. Abalone visceral extract inhibit tumor growth and metastasis by modulating Cox-2 levels and CD8+ T cell activity. *BMC Complement Altern Med.* 2010 Oct 20;10:60.
49. Jash A, Kwon HK, Sahoo A, Lee CG, So JS, Kim J, Oh YK, Kim YB, **Im SH**. Topical application of porcine placenta extract inhibits the progression of experimental contact hypersensitivity. *J Ethnopharmacol.* 2011 Jan 27;133(2):654-62
50. So JS, Song MK, Kwon HK a, Lee CG, Chae CS, Sahoo A, Jash A, Lee SH, Park ZY and **Im SH**. *Lactobacillus casei* enhances type II collagen/glucosamine-mediated suppression of inflammatory responses in experimental osteoarthritis. *Life Sci.* 2011 Feb 14;88(7-8):358-66
51. Son JS, Sahoo A, Chae CS, Hwang JS, Park ZY, **Im SH**. JunB and c-Rel cooperatively enhance Foxp3 expression during induced regulatory T cell differentiation. *Biochem Biophys Res Commun.* 2011 Feb 28; 407: 141-147

52. Lim JH, Seo BJ, Kim JE, Chae CS, **Im SH**, Hahn YS, Park YH. Characteristics of immunomodulation by a *Lactobacillus sakei* proBio65 isolated from Kimchi. ***Microbiology and Biotechnology Letters*** 2011. March 39 (3), 313-316.
53. Sahoo A, Lee CG, Jash A, Son JS, Kim G, Kwon HK, So JS, **Im SH**. Stat6 and c-Jun Mediate Th2 Cell-Specific IL-24 Gene Expression. ***J Immunol.*** 2011 Apr 1;186(7):4098-109
54. Kwon HK, Hwang JS, Lee CG, So JS, Sahoo A, Im CR, Jeon WK, Ko BS, Lee SH, Park ZY, **Im SH**. Cinnamon extract suppresses experimental colitis through modulation of the properties of antigen presenting cells. ***World Journal of Gastroenterology*** 2011, 17(8): 976-986
55. Lee CG, Won H, Maeng KE, Kwon HK, So JS, Sahoo A, Lee SH, Park ZY, **Im SH**. IRF4 regulates IL-10 gene expression in CD4+ T cells through differential nuclear translocation. ***Cell Immunol*** 2011, 268: 97-104
56. Choi EJ, Lee S, Hwang JS, **Im SH**, Jun CD, Lee HS, Kim SH. DA-9601 suppresses 2, 4-dinitrochlorobenzene and dust mite extract-induced atopic dermatitis-like skin lesions. ***Int Immunopharmacol.*** 2011. Sep;11(9):1260-4.
57. Lee IH, An S, Yu MK, Kwon HK, **Im SH**, Jon S. Targeted chemoimmunotherapy using drug-loaded aptamer-dendrimer bioconjugates. ***J Control Release.*** 2011. Nov 7; 155(3):435-41.
58. Son JS, Chae CS, Hwang JS, Park ZY, **Im SH**. Enhanced chromatin accessibility and recruitment of JUNB mediate the sustained IL-4 expression in NFAT1 deficient T helper 2 cells. ***PLoS One.*** 2011. 6(7): e22042.
59. Kim HR, Jeon BH, Lee HS, **Im SH**, Araki M, Araki K, Yamamura K, Choi SC, Park DS, Jun CD. IGSF4 is a novel TCR α -chain-interacting protein that enhances TCR-mediated signaling. ***J Exp Med.*** 2011 Nov 21;208(12):2545-60.
60. Jung DW, Kim J, Che ZM, Oh ES, Kim G, Eom SH, **Im SH**, Ha HH, Chang YT, Williams DR, Kim J. A Triazine Compound S06 Inhibits Proinvasive Crosstalk between Carcinoma Cells and Stromal Fibroblasts via Binding to Heat Shock Protein 90. ***Chem Biol.***2011;18(12):1581-90.
61. Lim JH, Seo BJ, Kim JE, Chae CS, **Im SH**, Hahn YS, Park YH. Characteristics of immunomodulation by a *Lactobacillus sakei* proBio65 isolated from Kimchi. ***Korean J. Microbiol. Biotechnol.*** 2011 9; 39(3): 313-316

62. Kim WH, Jung DW, Kim J, **Im SH**, Hwang SY, Williams DR. Small Molecules That Recapitulate the Early Steps of Urodele Amphibian Limb Regeneration and Confer Multipotency. **ACS Chem Biol**. 2012 Apr 20;7(4):732-43
63. Lee CG, Kwon HK, Sahoo A, Won H, So JS, Hwang JS, Chae CS, Kim GC, So HS, Hwang ES, Grenningloh R, Ho IC, **ImSH**. Interaction of Ets-1 with HDAC1 represses IL-10 expression in T helper 1 cells. **J Immunol**. 2012;188(5):2244-253
64. Jash A, Sahoo A, Kim GC, Chae CS, Hwang JS, Kim JE, **ImSH**. Nuclear factor of activated T cells 1 (NFAT1) induced permissive chromatin modification facilitates nuclear Factor- κ B (NF- κ B) mediated interleukin-9 (IL-9) transactivation. **J Biol Chem**. 2012 May 4;287(19):15445-57.
65. Sahoo A, **ImSH**. Molecular Mechanisms Governing IL-24 Gene Expression. **Immune Netw**. 2012 Feb;12(1):1-7
66. Jash A, Yun KS, Sahoo A, So JS, **Im SH**. Looping mediated interaction between the promoter and 3' UTR regulates type II collagen expression in chondrocytes. **PLoS One**. 2012;7(7):e40828.
67. Lee IH, Kwon HK, An S, Kim D, Kim S, Yu MK, Lee JH, Lee TS, **Im SH**, Jon S. Imageable Antigen-Presenting Gold Nanoparticle Vaccines for Effective Cancer Immunotherapy In Vivo. **Angew Chem Int Ed Engl**. 2012 Aug 27;51(35):8800-5
68. Hwang JS, Im CR, **ImSH**. Immune Disorders and Its Correlation with Gut Microbiome. **Immune Netw**. 2012 Aug;12(4):129-38
69. Hwang JS, Kwon HK, Kim JE, Rho J, **Im SH**. Immunomodulatory effect of water soluble extract separated from mycelium of *Phellinus linteus* on experimental atopic dermatitis. **BMC Complement Altern Med**. 2012, Sep 18;12:159
70. Hwang I, Ha D, Bing SJ, Jeon KL, Ahn G, Kim DS, Cho J, Lim J, **Im SH**, Hwang KK, Jee Y. The expression of Foxp3 protein by retroviral vector-mediated gene transfer of Foxp3 in C57BL/6 mice. **Korean J Vet Res**. 2012, Sep 52(3); 183-191.
71. Chae CS, Kwon HK, Hwang JS, **Im SH**. Prophylactic effect of probiotics on the development of experimental autoimmune myasthenia gravis. **PLoS One**. 2012;7(12):e52119.
72. Ji Sun Hwang, Sin-Hyeog Im. Probiotics as an Immune Modulator for Allergic Disorders. **Pediatric Allergy and Respiratory Disease**, 2012, vol. 22, no. 4 DOI: 10.7581 /pard.2012.22.4.325

73. Hwang J, Kim JE, Kim HT, Yu YB, **Im SH**. Topical application of Taglisodog-eum inhibits the development of experimental atopic dermatitis. **J Ethnopharmacol**. 2013; 145: 654-62
74. Park SG, Long M, Kang JA, Kim WS, Lee CR, **Im SH**, Strickland I, Schulze-Luehrmann J, Hayden MS, Ghosh S. The Kinase PDK1 Is Essential for B-Cell Receptor Mediated Survival Signaling. **PLoS One**. 2013;8(2):e55378
75. Kwon HK, Kim GC, Kim Y, Hwang W, Jash A, Sahoo A Nam JH, and **Im SH**. Amelioration of experimental autoimmune encephalomyelitis by probiotics mixture is mediated by a shift in T helper cell immune response. **Clinical Immunology**. 2013 Jan 16;146(3):217-227. Commented by MD link: https://www.mdlinx.com/infectious-disease/print-preview.cfm/4412853/probiot_ics-immune-modulation-multiple-sclerosis-experimental
76. Hwang JS, Kim JE, Yu YB and **Im SH**. Modulation of experimental atopic dermatitis by topical application of Gami-Cheongyeul-Sodok-Eum. **BMC Complement Altern Med**. 2013; 13:312
77. Neumann C, Frederik Heinrich F, Neumann K, Junghans V, Mashreghi MF, Jonas Ahlers J, Janke M, Rudolph C, Mockel-Tenbrinck N, Kühl A, Heimesaat M, Esser C, **Im SH**, Radbruch A, Rutz S and Scheffold A. Role of Blimp-1 in programming Th effector cells into IL-10 producers. 2014. **J Exp Med**. 2014;211(9):1807-19
78. Ryu JH, Chae CS, Kwak JS, Oh H, Shin Y, Huh YH, Lee CG, Park YW, Chun CH, Kim YM, **Im SH*** and Chun JS*. *Corresponding author. Hypoxia-Inducible Factor-2 Is an Essential Catabolic Regulator of Inflammatory Rheumatoid Arthritis **Plos Biology**. 2014; 12(6)e1001881.
79. So JS, Kim GC, Song MK, Lee CG, Kim JH, Kim YS, Jun CD and **Im SH**. 6-Methoxyflavone suppresses T cell activation by inhibiting NFAT1 translocation into the nucleus. **J Immunol**, 2014;193(6):2772-83.
80. Hwang JS, Kim GC, Park EB, Kim JE, Chae CS, Hwang W, Lee C, Hwang SM, Wang HS, Jun CD, Rudra D, **Im SH**. NFAT1 and JunB cooperatively regulate the IL-31 gene expression in CD4+ T cells in health and disease. **J Immunol**, 2015; 194(4): 1963-1974.
81. Kim JE, Chae CS, Kim GC, Hwang W, Hwang JS, park SH, Huang SM, Ahn YT, juh CS, Kim Y, Lee SY, park SG, Jun CD, **Im SH**. Lactobacillus helveticus

- suppresses experimental rheumatoid arthritis by reducing inflammatory T cell responses. *J Funct Foods* 2015. 350-362
82. Na BR, Kim HR, Piragyte I, Oh HM, Kwon MS, Akber U, Lee HS, Park DS, Song WK, Park ZY, **Im SH**, Rho MC, Hyun YM, Kim M, Jun CD. TAGLN2 regulates T cell activation by stabilizing the actin cytoskeleton at the immunological synapse. *J Cell Biol*. 2015 Apr 13;209(1):143-62.
83. Jeong JJ, Woo JY, Ahn YT, Shim JH, Huh CS, **Im SH**, Han MJ, Kim DH. The probiotic mixture IRT5 ameliorates age-dependent colitis in rats. *Int Immunopharmacol*. 2015 Jun;26(2):416-22
84. Kim JE, Dinh-Vu HV, Phan TX, Nguyen VH, Park SG, Hong Y, Choy HE, Szardenings M, **Im SH***, Min JJ*. *Corresponding author. Salmonella typhimurium suppresses tumor growth via the pro-inflammatory cytokine interleukin-1 β . *Theranostics*. 2015 5(12) 1328-1342
85. Hong SM, Park CW, Kim SW, Nam YJ, Yu JH, Shin JH, Yun CH, **Im SH**, Kim KT, Sung YC, Choi KY. NAMPT suppresses glucose deprivation-induced oxidative stress by increasing NADPH levels in breast cancer. *Oncogene*. 2016 Jul 7;35(27):3544-54.
86. Kang HJ, **Im SH**. Probiotics as an Immune Modulator. *J Nutr Sci Vitaminol* (Tokyo). 2015;61 Suppl:S103-5. doi: 10.3177/jnsv.61.S103-S105.
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B. Book Chapters and Special Articles

1. Fuchs S, **Im SH**, Barchan D and Souroujon M.C. Antigen-Specific Therapy of Experimental Autoimmune Myasthenia Gravis: Mucosal Tolerance with Recombinant Fragments of the Human Acetylcholine receptor. In: **Myasthenia Gravis**. P Christadoss, ed., Narosa Publishing House, 2000. pp. 172-180.
2. Souroujon M.C, Feferman T, Maiti P.K, **Im SH**, Raveh L, Fuchs S. Immunotherapy of myasthenia gravis: antigen-specific mucosal tolerance and antagonists of key cytokines and co-stimulatory factors. **Cholinergic Mechanisms**. CRC Press. 2004. Sep. 20, pp. 241-244.
3. Kwon HK, Hwang JS, So JS and **Im SH**. Immunological homeostasis and inflammatory immune disorder. **KSMB**. Special article, 2008. 20(1)48
4. Hwang JS, Kwon HK, Lee CG, Jeon WK, Ko BS and **Im SH**. Development of T cell immunomodulators from natural products; Research focus on natural products and body's immune and inflammatory system (Book chapter) 2007 Nova Science Publisher: Chapter 12, pp253-273

C. Patents

1. Recombinant acetylcholine receptors and their derivatives recognized for the treatment of myasthenia gravis. Patent No. 10-071902 (2007). Registered in Korea
2. A screening system for immune modulator using recombinant plasmid containing conserved noncoding sequences of cytokines. Patent No. 10-0850846 (2007). Registered in Korea
3. Probiotics composition for preventing or treating Th1 types immune disorders, 10-2008-0027564, Registered in Korea
4. Probiotics composition for preventing or treating Th2 types immune disorders, 10-2008-0027563, Registered in Korea

5. The composition comprising extract of cinnamon Cassia Bark for improving normal flora and enhancing immune response. Registered in USA (11916189; US20090028840), Europe (EP1945234), China (200680036238.3), Japan (100065215) and Korea (10-0842053).
6. Compositions for preventing or treating arthritis comprising lactic acid bacteria and collagen as active ingredients. 10-0866911. Registered in Korea (2008).
7. Compositions for preventing or treating arthritis comprising lactic acid bacteria and collagen as active ingredients. 10-0804051. Registered in Korea (2008)
8. Composition comprising extract of cinnamomum cassia bark for improving normal flora and enhancing immune response. KO; Byoung Seob; JEON; Won Kyung; IM; Sin-Hyeog; KWON; Ho-Keun; HWANG; Ji-Sun; KWON; Dae Young. US20110052644; US20090317498; WO2007049917; WO2007035057
9. Recombinant chimeric acetylcholine receptors and their derivatives recognized by CD4 T cells of myasthenic patients for the treatment of myasthenia gravis. USA. Patent No.7,777,003 (2010) (US20070072264, 2007)
10. Composition for preventing or treating arthritis comprising lactic acid bacteria and collagen as active ingredients. European patent 1945234 (2012)/ duration of the patent is until Sep.22, 2026.
11. Pharmaceutical Composition for Preventing or Treating Allergic Diseases and Method of Screening the Same. 1012216490000 (2013.01.07), Registered in Korea.
12. Compositions for Preventing, Improving or Treating Myasthenia Gravis. 10-1275227. Registered in Korea (June 10, 2013).
13. Immunosuppressor Comprising Flavone-typed Compounds and Compositions for Preventing or Treating Immune Diseases. 1014069710000. Registered in Korea (June 05, 2014).
14. Cell Surface Polysaccharides of *Bifidobacterium* Inducing Functional Regulatory T Cells. Patent application No.: 10-2017-0075079 (June 14, 2017), Korea; PCT/KR2018/006700

Invited Lectures at International Conferences (2010-2019)

2019

- Asian Pancreas and Islet Transplantation Association (APITA 2019), Plenary speaker, “Modulation of host immunity by rationally selected probiotics”, Feb. 21-23, 2019, Seoul, Korea.
- The Korean Society for transplantation, Plenary speaker, “Modulation of host immunity by rationally selected probiotics”, March. 15-16, 2019, Daejeon, Korea.
- International Scientific Conference on Probiotics and Prebiotics, Keynote speaker, “How to Develop Probiotics as Immunomodulatory Pharmabiotics?”, June 17-20, 2019, Prague, Czech Republic.
- International Conference on Food Factors (ICoFF2019), Invited speaker. December 1-5, 2019, Kobe, Japan
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2018

- Innovation of Functional Foods in Asia (IFFA2018), “Mining of probiotics strains for immune modulation.”, Jan. 22-24, 2018, Phayao, Thailand.
- Pharmabiotics 2018, Interactive Session: Internationalisation of Regulatory Issues for Pharmabiotics: “What Needs to be Done? (Moderator)”; “How to Develop Probiotics as Immune-modulatory Pharmabiotics?”, March 14-15, 2018, Paris, France
- 24th International Union of Biochemistry and Molecular Biology (IUBMB). Modulation of host immunity by targeting microbiome. June 4-8, 2018, Seoul, Korea
- International Scientific Conference on Probiotics and Prebiotics, “How to Develop Probiotics as Immune-modulatory Pharmabiotics?”, June 18-21, 2018, Budapest, Hungary.
- AFOB Summer Forum 2018 (Asian Federation Of biotechnology), Keynote speaker, “Probiotics and pharmabiotics: current status and future prospects.”, August. 22-24, 2018, Incheon, Korea
- International Dairy Federation 2018, Invited speaker, “How to Develop Probiotics as an Evidence-based Functional Medicine?”, October. 15-18, 2018, Daejeon, Korea

2017

- Taiwan Association for Lactic Acid Bacteria Annual Symposium, Plenary speaker, “Reprogramming of the Immune System by Rationally Selected Probiotics.”, 17 November 2017, Taichung, Taiwan.
- Rationally selected probiotics as an immunomodulator; effector molecules and modes of actions. 18, Aug 2017, Japanese Dairy Science Association, Towada, Aomori Prefecture, Japan.
- The 9th Asian Conference on Lactic Acid Bacteria, Plenary speaker, “Rationally Selected Probiotics as an Immune Modulator”, 3-5 July 2017, Gwangju, Korea
- International Scientific Conference on Probiotics and Prebiotics, “Rationally Selected Probiotics as an Immune Modulator; How does it work?”, June 19-22, 2017, Budapest, Hungary.

2016

- The 2nd Microbiome R&D and Business Collaboration Congress & Probiotics Congress: Asia, Keynote speaker, “Rationally Selected Probiotics as an Immune Modulator for Hyper-immune Disorders”, Kuala Lumpur, Malaysia
- KCLAM-AAALAC International Conference - Plenary speaker, Rationally probiotics as an immune modulator for hyper-immune disorders, 2-3 June 2016, Seoul, Korea
- International Scientific Conference on Probiotics and Prebiotics, “Probiotics for Hyper-Immune Disorders: Selection and Mode-of-action”, June 20-23, 2016, Budapest, Hungary.
- The 3rd Asian Fermented Foods on Probiotic-prebiotic: Bioactive ingredients for functional products; Rationally Selected Probiotics as an Immune Modulator. 28th - 29th July 2016, Bangkok, Thailand
- The 5th Asian Federation of lactic acid bacteria (AFSLAB); Keynote speaker, Probiotics as an Immune Modulator. 28th - 30th November 2016, Taipei, Taiwan
- The 45th Japanese Society for Immunology; Capsular polysaccharide of Bifidobacterium bifidum induces functional regulatory cells. 5th - 7th December 2016, Okinawa, Japan.

2015

- The 6th International Conference on Food factors, November 22-25, 2015, Seoul, Korea
- International Mouse Phenotyping Consortium - Infrafrontier Seoul Meeting, Probiotics as an immune modulator for hyper-immune disorders, 14-15th September 2015, Seoul, Korea
- ACN2015/12th Asian Congress of Nutrition, “Probiotics as an immune modulator”, 14-18 May, 2015, Yokohana, Japan
- International Scientific Conference Probiotics and Prebiotics; “Development of regulatory T cells by commensal probiotics”, June 20-23, 2015, Budapest, Hungary,
- The 8th Asian conference on lactic acid bacteria; Rationally selected probiotics as an immune modulator for hyper-immune disorders. 8th - 10th July 2015, Bangkok, Thailand
- FASEB Autoimmunity Conference; “Development of regulatory T cells by commensal probiotics”, July 26-31, 2015, in Eaglewood Resort, IL, USA

2014

- XVIII International Symposium on Gnotobiology, “Alteration of gut microbiota by probiotics administration modulates hyper-immune disorders”, Russia, Saint-Petersburg
- International Scientific Conference Probiotics and Prebiotics; Keynote speaker, “Modulation of Gut Immunity by Probiotics Ameliorates Hyper-immune Disorders”, Hungary, Budapest
- International Meeting of the Microbiological Society of Korea; “Probiotics as an Immune Modulator for Hyper-immune Disorders”, Daegu, Korea.
- KAIST-INSERM-IBS Joint Symposium on Cancer, Inflammation and Epigenetics; “Tailored probiotics for hyper-immune disorders”, Daejeon, Korea.

2013

- KMB's 40th anniversary 2013 International symposium and annual meeting, “Immunomodulatory effects of probiotics”, Pyeongchang, Korea
- KAPARD-KAAACI West Pacific Allergy Symposium Joint International Congress; Plenary speaker, “Tailored Probiotics for Allergic Disorders”, Seoul, Korea

- 100th American Association of Immunologists. "Role of NFAT1 transcription factor in experimental myasthenia gravis", Honolulu, Hawaii, USA
- Keystone Symposium, "Immunomodulation of neural autoimmune disorders with probiotics", Taos, New Mexico, USA.
- International Scientific Conference Probiotics and Prebiotics; Keynote speaker, "Modulation of Non-mucosal immune disorders with probiotics", Kosice, Slovakia
- Probiotics and their applications, International Scientific Conference Probiotics and Prebiotics, "Modulation of neuronal autoimmune disorders with probiotics", Hanoi, Vietnam
- BIT's 1st Annual World Congress of Nutrition & Health-2013. "Tailored Probiotics to Treat Diverse Hyper-Immune Disorders", Dalian, China. October 12-14, 2013

2012

- International Scientific Conference Probiotics and Prebiotics; Keynote speaker, "Immunomodulation of Allergic Immune Disorders with IRT5 Probiotics", Kosice, Slovakia
- International Symposium of Probiotics Prebiotics in Pediatrics, "Modulation of allergic skin disorders with IRT5 Probiotics; Therapeutic applications and elucidation of its working mechanism", Istanbul, Turkey
- The 7th Annual meeting of the Japanese Association for Food Immunology (JAFI 2011), "Probiotics as an immune modulator targeting diverse immune disorders", Tokyo, Japan.

2011

- International Scientific Conference Probiotics and Prebiotics; Keynote speaker, "Crosstalk of Probiotic Bacteria with Intestinal Dendritic Cells Affects Host Immune System", Kosice, Slovakia
- Keystone Symposium, "IRT5 generates tolerogenic DCs and Foxp3+ regulatory T cells suppress inflammatory immune disorders", Vancouver, Canada.

2010

- International Scientific Conference Probiotics and Prebiotics; Keynote speaker, "Probiotics as an Immune Modulator-Mechanism of Action and Therapeutic Applications", Kosice, Slovakia