

# Sang-Jun Ha, Ph.D.

## Associate Professor

System Immunology Laboratory  
Department of Biochemistry  
College of Life Science & Biotechnology  
Yonsei University

Address: 50 Yonsei-ro, Science Research Center Bldg. Rm S423  
Seodaemun-gu, Seoul 120-749, Korea  
Phone: +82-2-2123-2696  
Email: sjha@yonsei.ac.kr



### Educational Background

1992 – 1996 B.S., Department of Biochemistry, Yonsei University, Seoul, Korea  
1996 – 1998 M.S., Department of Life Science, POSTECH, Pohang, Korea  
1998 – 2001 Ph.D., Division of Molecular and Life Sciences, POSTECH, Pohang, Korea

### Professional Career

2001 – 2004 Post-doctoral fellow, POSTECH, Pohang, Korea  
2004 – 2007 Post-doctoral fellow, Emory University School of Medicine, Atlanta, US  
2007 – 2009 Research Associate, Emory University School of Medicine, Atlanta, US  
2009 – 2014 Assistant Professor, Yonsei University, Seoul, Korea  
2014 – Present Associate Professor, Yonsei University, Seoul, Korea  
2016 – Present Vice Dean, College of Life Science and Biotechnology, Yonsei University, Seoul, Korea

### Awards & Scholarships

2003 Young Scientist Award, Korean Society for Biochemistry and Molecular Biology, Korea  
2003 FIMSA/ASI Travel Award, Australian Society of Immunology, Australia  
2007 Keystone Symposia Scholarship, National Cancer Institute, US  
2009 TJ Park Junior Faculty Fellowship, POSCO TJ Park Foundation, Korea  
2013 Next Generation Frontier Research Scientist, Korean Academy of Science and Technology, Korea  
2017 Young Scientist, Young Korean Academy of Science and Technology (Y-KAST), Korea

### Memberships & Society Activities

2009 – Present Operation Member, Korean Dendritic Cell Academic Society  
2009 – 2014 Operation Member, Vaccine Research Group of the Korean Association of Immunologists  
2011 – 2012 Scientific Program Committee Member, The 12th International Symposium on Dendritic Cells  
2011 – Present Editorial Committee Member, Korean Society of Biochemistry and Molecular Biology  
2012 – 2013 Scientific Program Committee Member, The 3rd CSI/JSI/KAI Joint Symposium on Immunology  
2012 – 2013 Education Committee Member, Korean Society of Biochemistry and Molecular Biology  
2013 – Present Editorial Committee Member, Korean Association of Immunologists  
2013 – 2014 Award Selection Committee Member, Korean Society for Molecular and Cellular Biology  
2014 – 2015 International Cooperation Committee Member, Korean Association of Immunologists  
2015 – Present Head of the International Cooperation Committee, Korean Association of Immunologists  
2015 – Present Executive Board Member, Korean Association of Immunologists  
2015 – Present Regular Member, American Association of Immunologists  
2016 – Present Scientific Committee Member, Korean Cancer Association  
2017 – Present Editorial Committee Member, Korean Society for Molecular and Cellular Biology  
2017 – Present Member, Young Korean Academy of Science and Technology (Y-KAST)

### Journal Editorial Board

2011 – Present BMB Reports, Editorial Board Member, Korean Society of Biochemistry and Molecular Biology  
2013 – Present Immune Network, Editorial Board Member, Korean Association of Immunologists  
2015 – Present International Journal of Cancer Immunology & Immunotherapy, Editorial Board Member, Graphy Publications  
2017 – Present Frontiers in Immunology, Topic Editor, Frontiers Media

## Publications

69. Seo SH, Jang MS, Kim DJ, Kim SM, Oh SC, Jung CR, Park Y, **Ha SJ**, Choi I, Kim TD.  
MicroRNA-150 controls differentiation of intraepithelial lymphocytes via TGF- $\beta$  receptor II regulation.  
**Journal of National Cancer Institute** 2017 [In press]
68. Ban YH, Seo SH, Oh SC, Kim SM, Choi IP, Greenberg PD, Chang J, Kim TD\*, **Ha SJ**\*. (\* equal contribution)  
MiR-150-mediated Foxo1 regulation programs CD8+ T-cell differentiation.  
**Cell Reports** 2017 [In press]
67. Kim HR, Cha YJ, Hong MH, Gandhi M, Levinson S, Jung I, Lee JG, Lee CY, Cho BC\*, **Ha SJ**\*, Shim HS\*. (\* equal contribution)  
Concordance of programmed death-ligand 1 expression between primary and metastatic non-small cell lung cancer by immunohistochemistry and RNA in situ hybridization.  
**Oncotarget** 2017 [In press]
66. Kim TD, Jung HR, Seo SH, Oh SC, Ban Y, Tan X, Kim JM, Lee SH, Koh DS, Jung H, Park YJ, Yoon SR, Doh J, **Ha SJ**, Choi I, Greenberg PD.  
MicroRNA-150 modulates intracellular Ca<sup>2+</sup> levels in naïve CD8+ T cells by targeting TMEM20.  
**Scientific Reports** 2017 Jun 1;7(1):2623
65. Hwanga EH, Kim TH, Park JY, Hong JJ, Kim DH, **Ha SJ**, Yang SJ, Shin SJ, Park JH.  
TLR2 contributes to trigger immune response of pleural mesothelial cells against Mycobacterium bovis BCG and M. tuberculosis infection.  
**Cytokine** 2017 Feb 25;95:80-87
64. Kim HR, **Ha SJ**, Hong MH, Heo SJ, Koh YW, Choi EC, Kim EK, Pyo KH, Jung I, Seo D, Choi J, Cho BC, Yoon SO.  
PD-L1 expression on immune cells, but not on tumor cells, is a favorable prognostic factor for head and neck cancer patients.  
**Scientific Reports** 2016 Nov 14;6:36956
63. Lee BR, Jeong SK, Ahn BC, Lee BJ, Shin SJ\*, Yum JS\*, **Ha SJ**\*. (\* equal contribution)  
Combination of TLR1/2 and TLR3 ligands enhances CD4<sup>+</sup> T cell longevity and antibody responses by modulating type I IFN production.  
**Scientific Reports** 2016 Sep 1;6:32526
62. Kim WS, Kim H, Kwon KW, Im SH, **Ha SJ**\*, Shin SJ\*. (\* equal contribution)  
Cisplatin induces tolerogenic dendritic cells in response to TLR agonists via the abundant production of IL-10, thereby promoting Th2- and Tr1-biased T-cell immunity.  
**Oncotarget** 2016 May 9;7(23):33765-33782
61. Park HJ, Oh JH, **Ha SJ**.  
Phenotypic and functional analysis of activated regulatory T cells isolated from chronic lymphocytic choriomeningitis virus-infected mice.  
**Journal of Visualized Experiments** 2016 Jun 22;112:e54138
60. Lim S, Lee JA, Koo JH, Kang TG, **Ha SJ**, Choi JM.  
Cell type preference of a novel human derived cell-permeable peptide dNP2 and TAT in murine splenic immune cells.  
**PLoS One** 2016 May 17;11(5):e0155689
59. Park HJ, Lee A, Lee JI, Park SH, Yoo S, **Ha SJ**\*, Jung KC\*. (\* equal contribution)  
Effect of IL-4 on the development and function of memory-like CD8 T cells in periphery.  
**Immune Network** 2016 Apr;16(2):126-133
58. Lee IJ, Lee EJ, Park H, Kim W, **Ha SJ**, Shin YK, Seong J.  
Altered biological potential and radioresponse of murine tumors in different microenvironments.  
**Cancer Research and Treatment** 2016 Apr;48(2):727-737
57. Yoo S, **Ha SJ**.  
Generation of tolerogenic dendritic cells and their therapeutic applications.  
**Immune Network** 2016 Feb;16(1):52-56
56. Baek KH, Zhang H, Lee BR, Kwon YG, **Ha SJ**\*, Shin I\*. (\* equal contribution)  
A small molecule inhibitor for ATPase activity of Hsp70 and Hsc70 enhances the immune response to protein antigens.  
**Scientific Reports** 2015 Dec 3;5:17642
55. Park H, Lee S, Shrestha P, Kim J, Park JA, Ko Y, Ban YH, Park DY, **Ha SJ**, Ko GY, Hong VS, Mochizuki N, Kim YM, Lee W, Kwon YG.  
AIMGO2, a novel membrane anchor of PDK1, controls cell survival and angiogenesis via Akt activation.  
**Journal of Cell Biology** 2015 Nov 9;211(3):619-637

54. Lee A, Park SP, Park CH, Kang BH, Park SH, **Ha SJ**\*, Jung KC\*. (\* equal contribution)  
IL-4-induced innate CD8<sup>+</sup> T cells control persistent viral infection.  
**PLoS Pathogens** 2015 Oct 9;11(10):e1005193
53. Kim HR, Park HJ, **Ha SJ**.  
PD-1: dual guard for immunopathology.  
**Oncotarget** 2015 Sep 8;6(26):21783-21784
52. Park HJ, Park JS, Jeong YH, Son J, Ban YH, Lee BH, Chen L, Chang J, Chung DH, Choi I, **Ha SJ**.  
PD-1 upregulated on regulatory T cells during chronic virus infection enhances the suppression of CD8<sup>+</sup> T cell immune response via the interaction with PD-L1 expressed on CD8<sup>+</sup> T cells.  
**Journal of Immunology** 2015 Jun 15;194(12):5801-5811
51. Jeong YH, Hur YG, Lee H, Kim S, Cho JE, Chang J, Shin SJ, Lee H, Kang YA, Cho SN, **Ha SJ**.  
Discrimination between active and latent tuberculosis based on the ratio of antigen-specific and mitogen-induced IP-10 production.  
**Journal of Clinical Microbiology** 2015 Feb;53(2):504-510
50. Jang B, Kim HW, Kim JS, Kim WS, Lee BR, Kim S, Kim H, Han SJ, **Ha SJ**, Shin SJ.  
Peptidylarginine deiminase inhibition impairs toll-like receptor agonist-induced functional maturation of dendritic cells, resulting in the loss of T cell proliferative capacity: a partial mechanism with therapeutic potential in inflammatory settings.  
**Journal of Leukocyte Biology** 2015 Feb;97(2):351-362
49. Lee S, Lee TA, Lee E, Kang S, Park A, Song S, Kim N, Yoon JH, Park HJ, **Ha SJ**, Park T, Park B.  
Identification of a novel subnuclear body involved in structure- and sequence-specific cytokine RNA processing.  
**Nature Communications** 2015 Jan 5;6:5791
48. Kim S, Lee H, Kim H, Kim Y, Cho JE, Jin H, Kim DY, **Ha SJ**, Kang YA, Cho SN, Lee H.  
Diagnostic performance of a cytokine and IFN- $\gamma$ -induced chemokine mRNA assay after Mycobacterium tuberculosis-specific antigen stimulation in whole blood from infected individuals.  
**Journal of Molecular Diagnostics** 2015 Jan;17(1):90-99
47. Lee EJ, Park HJ, Lee IJ, Kim WW, **Ha SJ**, Suh YG, Seong J.  
Inhibition of IL-17A suppresses enhanced-tumor growth in low dose pre-irradiated tumor beds.  
**PLoS One** 2014 Sep 2;9(9):e106423
46. Kim MK, Lee A, Hwang YK, Kang CY, **Ha SJ**.  
Enhancing T cell immune responses by B cell-based therapeutic vaccine against chronic virus infection.  
**Immune Network** 2014 Aug;14(4):207-218
45. Shin JI, **Ha SJ**.  
Regulatory T cells: another important target of immune checkpoint in cancer immunotherapy.  
**Nature Reviews Clinical Oncology** 2014 Jun;11(6):307
44. Agrawal V, Maharjan S, Kim K, Kim NJ, Son J, Lee KH, Choi HJ, Rho SS, Ahn S, Won MH, **Ha SJ**, Koh GY, Kim YM, Suh YG, Kwon YG.  
Direct endothelial junction restoration results in significant tumor vascular normalization and metastasis inhibition in mice.  
**Oncotarget** 2014 May;5(9):2761-2777
43. Sung YH, Kim JM, Kim HT, Lee J, Jeon J, Jin Y, Choi JH, Ban YH, **Ha SJ**, Kim CH, Lee HW, Kim JS.  
Highly efficient gene knockout in mice and zebrafish with RNA-guided endonuclease.  
**Genome Research** 2014 Jan;24(1):125-131
42. Jeong YH, Jeon BY, Gu SH, Cho SN, Shin SJ, Chang J, **Ha SJ**.  
Differentiation of antigen-specific T cells with limited functional capacity during *Mycobacterium tuberculosis* infection.  
**Infection and Immunity** 2014 Jan;82(1):132-139
41. Miah MA, Byeon SE, Ahmed MS, Yoon CH, **Ha SJ**, Bae YS.  
Egr2 induced during DC development acts as an intrinsic negative regulator of DC immunogenicity.  
**European Journal of Immunology** 2013 Sep;43(9):2484-2496
40. Lee MS, Park CH, Jeong YH, Kim YJ\*, **Ha SJ**\*. (\* equal contribution)  
Negative regulation of type I IFN expression by OASL1 permits chronic viral infection and CD8<sup>+</sup> T cell exhaustion.  
**PLoS Pathogens** 2013 Jul;9(7):e1003478
39. Rasheed MA, Latner DR, Aubert RD, Gourley T, Spolski R, Davis CW, Langley WA, **Ha SJ**, Ye L, Sarkar S, Kalia V, Konieczny BT, Leonard WJ, Ahmed R.  
Interleukin-21 is a critical cytokine for the generation of virus-specific long-lived plasma cells.

**Journal of Virology** 2013 Jul;87(13):7737-7746

38. Kim HR, Ahn JR, Lee JG, Bang DH, **Ha SJ**, Hong YK, Kim SM, Nam KC, Rha SY, Soo RA, Riely GJ, Kim JH, Cho BC. The impact of cigarette smoking on the frequency of and qualitative differences in KRAS mutations in Korean patients with lung adenocarcinoma.

**Yonsei Medical Journal** 2013 Jul 1;54(4):865-874

37. West EE, Jin HT, Rasheed AU, Penaloza-MacMaster P, **Ha SJ**, Tan WG, Youngblood B, Freeman G, Smith KA, Ahmed R.

PD-L1 blockade synergizes with IL-2 therapy in reinvigorating exhausted T cells.

**Journal of Clinical Investigation** 2013 Jun 3;123(6):2604-2615

36. Lee HW, Choi HJ, **Ha SJ**, Lee KT, Kwon YG.

Recruitment of monocytes/macrophages in different tumor microenvironments.

**Biochimica et Biophysica Acta-Reviews on Cancer** 2013 Apr;1835(2):170-179

35. Kim SH, Shim HS, Cho J, Jeong JH, Kim SM, Hong YK, Sung JH, **Ha SJ**, Kim HR, Chang H, Kim JH, Tania C, Cho BC. A phase I trial of gefitinib and nimotuzumab in patients with advanced non-small cell lung cancer (NSCLC).

**Lung Cancer** 2013 Mar;79(3):270-275

34. Kim HR, Kim DJ, Lee JG, Lim SM, Lee CY, Rha SY, Bae MK, Lee YJ, Kim SH, **Ha SJ**, Soo R, Chung KY, Kim JH, Lee JH, Shim HS, Cho BC.

Fibroblast growth factor receptor 1 gene amplification is associated with poor survival and cigarette smoking dosage in resected squamous cell lung cancer patients.

**Journal of Clinical Oncology** 2013 Feb 20;31(6):731-737

33. Kim SM, Kwon OJ, Hong YK, Kim JH, Solca F, **Ha SJ**, Soo RA, Christensen JG, Cho BC.

Activation of IL-6R/JAK1/STAT3 signaling induces De Novo resistance to irreversible EGFR inhibitors in non-small cell lung cancer with T790M resistance mutation.

**Molecular Cancer Therapeutics** 2012 Oct;11(10):2254-2264

32. Park HJ, Kusnadi A, Lee EJ, Kim WW, Cho BC, Lee IJ, Seong J, **Ha SJ**.

Tumor-infiltrating regulatory T cells delineated by upregulation of PD-1 and inhibitory receptors.

**Cellular Immunology** 2012 Jul-Aug;278(1-2):76-83

31. Jeong HW, Kim JH, **Ha SJ**, Kong YY.

Mind bomb-1 in dendritic cells is specifically required for Notch-mediated T helper type 2 differentiation.

**PLoS One** 2012 Apr;7(4):e36359

30. Lee YJ, Shim HS, Park MS, Kim JH, **Ha SJ**, Kim SH, Cho BC.

High EGFR gene copy number and skin rash as predictive markers for EGFR tyrosine kinase inhibitors in patients with advanced squamous cell lung carcinoma.

**Clinical Cancer Research** 2012 Mar 15;18(6):1760-1768

29. Kim HR, Shim HS, Chung JH, Lee YJ, Hong YK, Rha SY, Kim SH, **Ha SJ**, Kim SK, Chung KY, Soo R, Kim JH, Cho BC.

Distinct clinical features and outcomes in never-smokers with nonsmall cell lung cancer who harbor EGFR or KRAS mutations or ALK rearrangement.

**Cancer** 2012 Feb 1;118(3):729-739

28. Aubert RD, Kamphorst AO, Sarkar S, Vezys V, **Ha SJ**, Barber DL, Sharpe AH, Freeman GJ, Ahmed R.

Antigen-specific CD4 T-cell help rescues exhausted CD8 T cells during chronic viral infection.

**Proceedings of the National Academy of Sciences of the United States of America** 2011 Dec 27;108(52):21182-21187

27. Jeon BY, Eoh H, **Ha SJ**, Bang H, Kim SC, Sung YC, Cho SN.

Co-immunization of plasmid DNA encoding IL-12 and IL-18 with Bacillus Calmette-Guerin Vaccine against progressive tuberculosis.

**Yonsei Medical Journal** 2011 Nov;52(6):1008-1015

26. Youngblood B, Oestreich KJ, **Ha SJ**, Duraiswamy J, Akondy RS, West EE, Wei Z, Lu P, Austin JW, Riley JL, Boss JM, Ahmed R.

Chronic virus infection enforces demethylation of the locus that encodes PD-1 in antigen-specific CD8<sup>+</sup> T cells.

**Immunity** 2011 Sep 23;35(3):400-412

25. Vezys V, Penaloza-MacMaster P, Barber DL, **Ha SJ**, Konieczny B, Freeman GJ, Mittler RS, Ahmed R.

4-1BB signaling synergizes with programmed death ligand 1 blockade to augment CD8 T cell responses during chronic viral infection.

**Journal of Immunology** 2011 Aug 15;187(4):1634-1642

24. Jin HT, Jeong YH, Park HJ, **Ha SJ**.

Mechanism of T cell exhaustion in a chronic environment.

**BMB Reports** 2011 Apr;44(4):217-231

23. Lee YJ, Kim JH, Kim SK, **Ha SJ**, Mok TS, Mitsudomi T, Cho BC.  
Lung cancer in never smokers: Change of a mindset in the molecular era.

**Lung Cancer** 2011 Apr;72(1):9-15

22. Jin HT, Anderson A, Tan W, West E, **Ha SJ**, Araki K, Freeman G, Kuchroo V, Ahmed R.  
Cooperation of Tim-3 and PD-1 in CD8 T-cell exhaustion during chronic viral infection.

**Proceedings of the National Academy of Sciences of the United States of America** 2010 Aug 17;107(33):14733-14738

21. Mueller SN, Vanguri VK, **Ha SJ**, West EE, Keir ME, Glickman JN, Sharpe AH, Ahmed R.  
PD-L1 has distinct functions in hematopoietic and nonhematopoietic cells in regulating T cell responses during chronic infection in mice.

**Journal of Clinical Investigation** 2010 Jul;120(7):2508-2515

20. Blattman JN, Wherry EJ, **Ha SJ**, van der Most RG, Ahmed R.  
Impact of epitope escape on PD-1 expression and CD8 T cell exhaustion during chronic infection.

**Journal of Virology** 2009 May;83(9):4386-4394

19. Li Q, Skinner PJ, **Ha SJ**, Duan L, Mattila TL, Hage A, White C, Barber DL, O'Mara L, Southern PJ, Reilly CS, Carlis JV, Miller CJ, Ahmed R, Haase AT.

Visualizing antigen-specific and infected cells *in situ* predicts outcome in early viral infection.

**Science** 2009 Mar 27;323(5922):1726-1729

18. Brooks DG, **Ha SJ**, Elsaesser H, Sharpe AH, Freeman GJ, Oldstone MBA.  
IL-10 and PD-L1 operate through distinct pathways to suppress T cell activity during persistent viral infection.

**Proceedings of the National Academy of Sciences of the United States of America** 2008 Dec 23;105(51):20428-20433

17. **Ha SJ**, West EE, Araki K, Smith KA, Ahmed R.  
Manipulating both the inhibitory and stimulatory immune system towards the success of therapeutic vaccination against chronic viral infections.

**Immunological Reviews** 2008 Jun;223(1):317-333

16. **Ha SJ**, Mueller SN, Wherry EJ, Barber DL, Aubert RD, Sharpe AH, Freeman GJ, Ahmed R.  
Enhancing therapeutic vaccination by blocking PD-1-mediated inhibitory signals during chronic infection.

**Journal of Experimental Medicine** 2008 Mar 17;205(3):543-555

15. Wherry EJ, **Ha SJ**, Kaech SM, Haining WN, Sarkar S, Kalia V, Subramaniam S, Blattman JN, Barber DL, Ahmed R.  
Molecular signature of CD8<sup>+</sup> T cell exhaustion during chronic viral infection.

**Immunity** 2007 Oct;27(4):670-684

14. **Ha SJ**, Park SH, Kim HJ, Kim SC, Kang HJ, Lee EG, Kwon SG, Kim BM, Lee SH, Kim WB, Sung YC, Cho SN.  
Enhanced immunogenicity and protective efficacy with the use of interleukin-12-encapsulated microspheres plus AS01B in tuberculosis subunit vaccination.

**Infection and Immunity** 2006 Aug;74(8):4954-4959

13. Masopust D\*, **Ha SJ**\*, Vezys V, Ahmed R. (\* equal contribution)  
Stimulation history dictates memory CD8 T cell phenotype: implications for prime-boost vaccination.

**Journal of Immunology** 2006 Jul 15;177(2):831-839

12. **Ha SJ**\*, Jeon BY\*, Youn JI, Kim SC, Cho SN, Sung YC. (\* equal contribution)  
Protective effect of DNA vaccine during chemotherapy on reactivation and reinfection of *Mycobacterium tuberculosis*.

**Gene Therapy** 2005 Apr;12(7):634-638

11. Jin HT, Youn JI, Kim HJ, Lee JB, **Ha SJ**, Koh JS, Sung YC.  
Enhancement of interleukin-12 gene-based tumor immunotherapy by the reduced secretion of p40 subunit and the combination with farnesyltransferase inhibitor.

**Human Gene Therapy** 2005 Mar;16(3):328-338

10. Chang J, Cho JH, Lee SW, Choi SY, **Ha SJ**, Sung YC.  
IL-12 priming during in vitro antigenic stimulation changes properties of CD8 T cells and increases generation of effector and memory cells.

**Journal of Immunology** 2004 Mar 1;172(5):2818-2826

9. **Ha SJ**, Kim DJ, Baek KH, Yun YD, Sung YC.  
IL-23 induces stronger sustained CTL and Th1 immune responses than IL-12 in hepatitis C virus envelope protein 2 DNA immunization.

**Journal of Immunology** 2004 Jan 1;172(1):525-531

8. **Ha SJ**, Jeon BY, Kim SC, Kim DJ, Song MK, Sung YC, Cho SN.

Therapeutic effect of DNA vaccines in combination with chemotherapy in a latent infection model after aerosol infection of mice with *Mycobacterium tuberculosis*.

**Gene Therapy** 2003 Sep;10(18):1592-1599

7. **Ha SJ**\*, Chang J\*, Song MK, Suh YS, Jin HT, Lee CH, Nam GH, Choi G, Choi K, Lee SH, Kim WB, Sung YC. (\* equal contribution)

Engineering N-glycosylation mutations in IL-12 enhances sustained cytotoxic T lymphocyte responses for DNA immunization.

**Nature Biotechnology** 2002 Apr;20(4):381-386

6. Baek KH, **Ha SJ**, Sung YC

A novel function of phosphorothioate oligodeoxynucleotides as chemoattractants for primary macrophages.

**Journal of Immunology** 2001 Sep 1;167(5):2847-2854

5. Suh YS, **Ha SJ**, Lee CH, Sin JM, Sung YC.

Enhancement of VP1-specific immune responses and protection against EMCV-K challenge by co-delivery of IL-12 DNA with VP1 DNA vaccine.

**Vaccine** 2001 Feb 28;19(15-16):1891-1898

4. Lee CH, Choi YH, Yang SH, Lee CW, **Ha SJ**, Sung YC.

Hepatitis C virus core protein inhibits interleukin 12 and nitric oxide production from activated macrophages.

**Virology** 2001 Jan 5;279(1):271-279

3. **Ha SJ**, Lee CH, Lee SB, Kim CM, Jang KL, Shin HS, Sung YC.

A novel function of IL-12p40 as a chemotactic molecule for macrophages.

**Journal of Immunology** 1999 Sep 1;163(5):2902-2908

2. Gwag BJ, Kim EY, Ryu BR, Won SJ, Ko HW, Oh YJ, Cho YG, **Ha SJ**, Sung YC.

A neuron-specific gene transfer by a recombinant defective Sindbis virus.

**Molecular Brain Research** 1998 Dec 10;63(1):53-61

1. **Ha SJ**, Lee SB, Kim CM, Shin HS, Sung YC.

Rapid recruitment of macrophages in interleukin-12-mediated tumour regression.

**Immunology** 1998 Sep;95(1):156-163

## Patents

17. Shin SJ, **Ha SJ**, Kwon KW, Lee A.  
Adjuvant and vaccine composition comprising STING agonist.  
Korea / Application No. 10-2017-0033933
16. Song JS, Kim BS, **Ha SJ**, Son J.  
Pharmaceutical composition for preventing or treating inflammatory disease, autoimmune disease, or combination thereof and method using the same.  
Korea / Application No. 10-2017-0011143
15. Ahmed R, Amara R, Freeman G, Sharpe A, Barber D, Wherry EJ, **Ha SJ**.  
Compositions and methods for the treatment of infections and tumors.  
US / Application No. 13/436,492
14. Shin SJ, Cha SB, **Ha SJ**, Kang TG.  
Animal model forming necrotic granuloma for study of Tuberculosis and method of producing the same.  
Korea / Application No. 10-2015-0055952 / Registration No. 10-1735499
13. **Ha SJ**, Jeong YH, Cho SN, Kang YA.  
Method for enhanced diagnosis of tuberculosis.  
Korea / Application No. 10-2014-0049487 / Registration No. 10-1590324
12. Sung YC, Cho SN, **Ha SJ**, Jeon BY, Kim SC, Kim DJ, Song MK.  
Therapeutic TB DNA vaccine and its components.  
Korea / Application No. 2003-0009875 / Registration No. 0517058
11. Sung YC, **Ha SJ**, Kim DJ, Jin HT.  
Optimal eukaryotic expression vector.  
Korea / Application No. 2003-0028080
10. Jin HT, Lee JB, **Ha SJ**, Bae DG, Chae CB, Sung YC,  
Anti-cancer components containing anti-angiogenic peptide and recombinant expression plasmid encoding mutant IL-12 gene.  
Korea / Application No. 2003-0029530
9. Sung YC, Lee SH, **Ha SJ**, Song MK, Chang J.  
Genes of IL-12p40 subunit mutated for improving the activity of IL-12 and use thereof for DNA vaccine adjuvant.  
EU / Application No. 01914236.3 / Registration No. 1268759
8. Sung YC, Lee SH, **Ha SJ**, Song MK, Chang J.  
Genes of IL-12p40 subunit mutated for improving the activity of IL-12 and use thereof for DNA vaccine adjuvant.  
US / Application No. 10/221.975 / Registration No. 7,253,151
7. Sung YC, Lee SH, **Ha SJ**, Song MK, Chang J.  
Genes of IL-12p40 subunit mutated for improving the activity of IL-12 and use thereof for DNA vaccine adjuvant.  
Australia / Application No. 2001239581 / Registration No. 2001239581
6. Sung YC, Lee SH, **Ha SJ**, Song MK, Chang J.  
Genes of IL-12p40 subunit mutated for improving the activity of IL-12 and use thereof for DNA vaccine adjuvant.  
China / Application No. 01808499.0 / Registration No. 1281748
5. Sung YC, Lee SH, **Ha SJ**, Song MK, Chang J.  
Genes of IL-12p40 subunit mutated for improving the activity of IL-12 and use thereof for DNA vaccine adjuvant.  
Canada / Application No. 2,402,213
4. Sung YC, Lee SH, **Ha SJ**, Song MK, Chang J.  
Genes of IL-12p40 subunit mutated for improving the activity of IL-12 and use thereof for DNA vaccine adjuvant.  
Japan / Application No. 2001-567286
3. Sung YC, Lee SH, **Ha SJ**, Song MK, Chang J.  
Genes of IL-12p40 subunit mutated for improving the activity of IL-12 and use thereof for DNA vaccine adjuvant.  
PCT / Application No. PCT/KR01/00408
2. Sung YC, Lee SH, **Ha SJ**, Song MK, Chang J.  
Genes of IL-12p40 subunit mutated for improving the activity of IL-12 and use thereof for DNA vaccine adjuvant.  
Korea / Application No. 2001-0012987 / Registration No. 0399728
1. Sung YC, Gwag BJ, **Ha SJ**, Kim EY.  
Recombinant defective Sindbis virus for transfer of foreign gene into neuron cell.  
Korea / Application No. 1997-0033053