Seung-Chul Choi

Research Assistant Scientist
Department of Pathology, Immunology and Laboratory Medicine
College of Medicine, University of Florida
Gainesville, Florida, USA

ACARDEMIC EDUCTION

1992 – 1999† (Bachelor of Science) Department of Microbiology, Jeonju University, Korea.
2000 – 2002 (Master of Science) Division of Biological Science, Chonbuk National University, Korea.
2003 – 2007 (Doctor of Philosophy) Division of Biological Science, Chonbuk National University, Korea

† This includes a period of a mandatory military service in Republic of Korea Army (Aug. 1993 – Oct. 1995)

RESERARCH EXPERIENCE

Oct/1998 – Aug/1999 Visiting Researcher, Microbiology Section, Hannah Research Institute, UK
Apr/2000 – Sep/2007 Researcher, Korea Research Institute of Bioscience and Biotechnology (KRIBB), Korea
Oct/2007 – Sep/2013 Visiting Fellow, Laboratory of Immunogenetics, National Institute of Health (NIH), USA
Sep/2013 – Sep/2017 Postdoctoral Associate, Department of Pathology, Immunology and Laboratory Medicine, College of Medicine, University of Florida, USA
Sep/2017 – Research Assistant Scientist, Department of Pathology, Immunology and Laboratory Medicine, College of Medicine, University of Florida, USA

SOCIETY MEMBERSHIPS/ACTIVITIES

2000 – 2007 Member, Korean Association of Immunologists
2010 – Member, American Association of Immunologists
2016 –2018 Member, Society for Leukocyte Biology

AWARDS AND OTHER SCIENTIFIC RECOGNITIONS

2002 – 2003 Recipient of post-master fellowship award from Korea Science and Engineering Foundation (KOSEF), Korea
2006 Award winning poster at Annual Conference of Korean Association of Immunologists, Seoul, Korea
2007 – 2013 Recipient of visiting fellow award from NIH, USA
2014 Travel Award at American Association of Immunologists (AAI) Annual Meeting
2015 Travel Award at American Association of Immunologists (AAI) Annual Meeting
2016 Trainee Abstract Award at American Association of Immunologists (AAI) Annual Meeting
2017 Travel Award at American Association of Immunologists (AAI) Annual Meeting

INVITED TALKS

2006 Expression and Function of N-myc Downstream Regulated Gene 2 (NDRG2) in Human Monocyte-derived Dendritic Cells
Annual Conference of Korean Association of Immunologists, Seoul, Korea
2014 Overexpression of Pbx1-d, a novel splice isoform of Pbx1, changes the portion of follicular CD4 T cell populations and impairs regulatory T cell homeostasis
American Association of Immunologists (AAI) Annual Meeting, Pittsburgh, PA
2015 Overexpression of Pbx1-d, a novel splice isoform of Pbx1, in CD4+ T cells promotes follicular helper T cell

differentiation
American Association of Immunologists (AAI) Annual Meeting, New Orleans, LA

2016 The lupus susceptibility gene Pbx1 regulates the balance between follicular helper T cell and regulatory T cell differentiation
Keystone Symposia (T Follicular Helper Cells and Germinal Center), Monterey, CA

2016 Effect of metabolic inhibitors on follicular helper T cells in lupus mice
3rd Immune Metabolism Retreat, University of Florida, Gainesville, FL

2016 Metabolic inhibitors eliminate the expansion of autoimmune follicular helper T cells but not that induced by T-dependent-immunization in lupus mice
American Association of Immunologists (AAI) Annual Meeting, Seattle, WA

2017 Gut dysbiosis contributes to autoimmune pathogenesis in lupus-prone mice
American Association of Immunologists (AAI) Annual Meeting, Washington, D.C.

2019 Pbx1-d, a novel splice isoform of Pbx1 associated with lupus susceptibility, regulates regulatory T cell plasticity
American Association of Immunologists (AAI) Annual Meeting, San Diego, CA

2020 Autoreactive B cells have a specific metabolic response during humoral responses
American Association of Immunologists (AAI) Annual Meeting, Honolulu, HI

RESEARCH SUPPORT

Ongoing Research Support

- R01 AI128901 Morel (PI) 12/01/2016-11/31/2021 10% effort
  National Institutes of Health $1,677,500 total
  Targeting follicular helper CD4 T cells in SLE
  The goal of the proposal is to prove the hypothesis that the elimination of lupus Tfh cells through glucose inhibition represents a safe therapeutic approach. We propose to test this hypothesis by characterizing lupus Tfh cells relative to Tfh cells induced by immunization in mouse models and cells obtained from lupus patients.
  Role: PostDoc

- R01 AI045050-17 Morel (PI) 6/20/2018-5/31/2023 20% effort
  National Institutes of Health $2,808,667 total
  Characterization of SLE-susceptibility loci on mouse chromosome 1
  The project proposes to functionally characterize the Sle1 cluster of SLE-susceptibility genes, including Sle1a1 and Sle1c2 in T cells. The discovery of the Pbx1 lupus susceptibility gene was achieved in this project. We are continuing to investigate the role of Pbx1 in T cells and there is no overlap with the current proposal.
  Role: Co-Investigator

- R01 AI143313-01 Morel (PI) 01/11/2019-12/31/2023 40% effort
  National Institutes of Health $2,239,417 total
  Gut dysbiosis and tryptophan metabolism in lupus
  The goals of this proposal are to use a mouse model as well as samples collected from lupus patients to test the hypothesis that gut bacteria contribute to lupus by their utilization of tryptophan, an essential amino acid whose derivative metabolites activate immune cells.
  Role: Co-Investigator

Completed Research Support

- 513739TIL Morel (PI) 07/01/2016-06/30/2019
  Alliance for Lupus Research
  Targeting follicular helper CD4 T cells in SLE
  We propose the hypothesis that the elimination of lupus Tfh cells through glucose inhibition represents a safe

therapeutic approach. We propose to test this hypothesis by characterizing lupus Tfh cells relative to Tfh cells induced by immunization in mouse models and cells obtained from lupus patients.
Role: PostDoc

- R21 AI122338 Morel (PI) 01/04/2016-12/31/2018
  National Institutes of Health
  Gut dysbiosis induces lupus
  The goal of this project was to study how gut microbes contribute to disease in a mouse model of lupus. We have obtained preliminary data showing that mice with lupus have distinct gut microbes, which are sufficient to induce disease manifestation when transferred in healthy mice.
  Role: PostDoc

- R01 AI045050-17 Morel (PI) 05/01/2013-04/30/2018
  National Institutes of Health
  Characterization of SLE-susceptibility loci on mouse chromosome 1
  The project proposes to functionally characterize the *Sle1* cluster of SLE-susceptibility genes, including *Sle1a1* and *Sle1c2* in T cells. The discovery of the Pbx1 lupus susceptibility gene was achieved in this project. We are continuing to investigate the role of Pbx1 in T cells and there is no overlap with the current proposal.
  Role: PostDoc

- Experimental Pathology Innovative Grants Choi (PI) 10/01/2015 to 06/30/2016
  University of Florida
  Role of intrathymic B cells in T cell tolerance in the lupus-prone NZM2410-derived B6.*Sle1b* mice.
  The project is to investigate the role of intrathymic B cells in central T cell tolerance in B6.*Sle1b* mice for understanding for the hyper-activated B6.*Sle1b* thymic B cells in the negative selection of autoreactive CD4 single positive cells.
  Role: PI

- Experimental Pathology Innovative Grants Choi (PI) 10/01/2014 to 06/30/2015
  University of Florida
  MicroRNAs regulation of germinal center response in the lupus-prone NZM2410 mouse model.
  The project is to investigate the role of microRNAs in lupus T and B cells in NZM2410 mouse model for understanding of the molecular mechanism of systemic lupus erythematosus (SLE).
  Role: PI

PUBLICATIONS

List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/1zYWcrMOP-M5j/bibliography/public/

Peer-Review Articles

1. Kim KD, **Choi SC**, Kim A, Choe YK, Choe IS, and Lim JS. Dendritic cell-tumor cell co-culturing vaccine can induce antitumor immunity through both NK and CTL interaction. ***International Immunopharmacology*** 1(12): 2117-2129 (2001)
2. Williams AG, **Choi SC** and Banks JM. Variability of the species and strain phenotype composition of the non-starter lactic acid bacterial population of cheddar cheese manufactured in a commercial creamery. ***Food Research International*** 35(5): 483-493 (2002)
3. Kim A, Kim KD, **SC Choi**, MJ Jeong MJ, Lee HG, Choe YK, Paik SG and Lim JS. IL-12 production and subsequent natural killer cell activation by necrotic tumor cell-loaded dendritic cells in therapeutic vaccinations. ***Immune***

Network 3(3): 188-200 (2003)

4. **Choi SC**, Kim KD, Kim JT, Kim JW, Yoon DY, Choe YK, Chang YS, Paik SG and Lim JS. Expression and regulation of NDRG2 (N-myc downstream regulated gene 2) during the differentiation of dendritic cells. ***FEBS Letters*** 553(3): 413-418 (2003)
5. Kim KD, **Choi SC**, Noh YW, Kim JW, Paik SG, Yang Y, Kim KI and Lim JS. Impaired responses of leukemic dendritic cells derived from a human myeloid cell line to LPS stimulation. ***Experimental and Molecular Medicine*** 38(1): 72-84 (2006)
6. Park YP, **Choi SC**, Cho MY, Song EY, Kim JW, Paik SG, Kim YK, Kim JW and Lee HG. Modulation of telomerase activity and human telomerase reverse transcriptase expression by caspases and *Bcl*-2 family proteins in cisplatin-induced cell death. ***Korean Journal of Laboratory Medicine*** 26(4): 287-293 (2006)
7. Kim JT, Cho MY, **Choi SC**, Kim JW, Chae SK, Yoon DY, Kim JW and Lim JS. Prenylated Rab acceptor 1 (PRA1) inhibits TCF/β-catenin signaling by binding to β-catenin. ***Biochemical and Biophysical Research Communications*** 349(1): 200-208 (2006)
8. Park YP, **Choi SC**, Kim JH, Song EY, Kim JW, Yoon DY, Yeom YI, Lim JS, Kim JW, Paik SG and Lee HG. Up-regulation of Mac-2 binding protein by hTERT in gastric cancer. ***International Journal of Cancer*** 120(4): 813-820 (2007)
9. Kim KD, **Choi SC**, Lee ES, Kim A and Lim JS. Inflammatory mediators modulate NK cell-stimulating activity of dendritic cells by inducing development of polarized effector function. ***Immune Network*** 7(3): 133-140 (2007)
10. Han JM, Lee WS, Kim JR, Son J, Nam KH, **Choi SC**, Lim JS and Jeong TS. Effects of diarylheptanoids on the tumor necrosis factor-α-induced expression of adhesion molecules in human umbilical vein endothelial cells. ***Journal of Agricultural and Food Chemistry*** 55(23): 9457-9464 (2007)
11. **Choi SC***, Yoon SR*, Park YP, Song EY, Kim JW, Kim WH, Yang Y, Lim JS and Lee HG. Expression of NDRG2 is related to tumor progression and survival of gastric cancer patients through Fas-mediated cell death. ***Experimental and Molecular Medicine*** 39(6): 705-714 (2007) (*equally contributed)
12. Park MY, **Choi SC**, Lee HS, Kim D, Baek KE, Kim JT, Lim JS, Yeom YI, Chung JW, Kim JW, Myung PK, Lee HG, Kim JW and Song EY. A quantitative analysis of N-myc downstream regulated gene 2 (NDRG 2) in human tissues and cell lysates by reverse-phase protein microarray. ***Clinica Chimica Acta*** 387(1-2): 84-89 (2008)
13. **Choi SC**, Kim KD, Kim JT, Kim JW, Lee HG, Kim JM, Jang YS, Yoon DY, Kim KI, Yang Y, Cho DH and Lim JS. Expression of human NDRG2 by myeloid dendritic cells inhibits down-regulation of activated leukocyte cell adhesion molecule (ALCAM) and contributes to maintenance of T cell stimulatory activity. ***Journal of Leukocyte Biology*** 83(1): 89-98 (2008)
14. Park YP, **Choi SC**, Kim BY, Kim JT, Song EY, Kang SH, Yoon DY, Paik SG, Kim KD, Kim JW and Lee HG. Induction of Mac-2BP by NGF is regulated by the PI3K/Akt /NF-kB dependent pathway. ***BMB reports*** 41(11): 784-789 (2008)
15. Kim YJ, Yoon SY, Kim JT, **Choi SC**, Lim JS, Kim JH, Song EY, Lee HG, Choi I and Kim JW. NDRG2 suppressed cell proliferation through down-regulation of AP-1 activity in human colon carcinoma cells. ***International Journal of Cancer*** 124(1): 7-15 (2009)
16. Kang JW, **Choi SC**, Cho MC, Kim HJ, Kim JW, Lim JS, Kim SH, Han JY and Yoon DY. A proinflammatory cytokine IL-32β promotes the production of an anti-inflammatory cytokine IL-10. ***Immunology*** 128: e532-40 (2009)
17. **Choi SC***, Kim KD*, Kim JT, Oh SS, Yoon SY, Song EY, Lee HG, Choe YK, Choi I, Lim JS†, Kim JW†. NDRG2 is one of novel intrinsic factors for regulation of IL-10 production in human myeloid cell. ***Biochemical and Biophysical Research Communications*** 369(3): 684-690 (2010) (*equally contributed, †corresponding author)
18. Park YP, **Choi SC**, Kiesler P, Gil-Krzewska A, Borrego F, Weck J, Krzewski K, and Coligan JE. Complex regulation of human NKG2D-DAP10 cell surface expression: opposing roles of the γ_c cytokines and TGF-β1. ***Blood*** 118(11): 3019-3027 (2011)
19. **Choi SC***, Simhadri VR*, Tian L*, Gil-Krzewska A, Krzewski K, Borrego F and Coligan JE. Cutting Edge: Mouse CD300f (CMRF-35-Like Molecule-1) recognizes outer membrane-exposed phosphatidylserine and can promote phagocytosis**.** ***Journal of Immunology*** 187(7): 3483-87 (2011) (*equally contributed)
20. Tang X, Tian L, Esteso G, **Choi SC**, Barrow AD, Colonna M, Borrego F and Coligan JE. Leukocyte-associated Ig-

like receptor-1-deficient mice have an altered immune cell phenotype. ***Journal of Immunology*** 188(2): 541-547 (2012)

21. Simhadri VR, Andersen JF, Calvo E, **Choi SC**, Coligan JE, and Borrego F. Human CD300a binds to phosphatidylethanolamine and phosphatidylserine and modulates the phagocytosis of dead cells. ***Blood*** 119(12): 2799-2809 (2012)
22. Kim JT, Kim JW, Kang YH, Kim KD, Lee SJ, **Choi SC**, Kim KS, Chae SK, Kim JW, Lim JS and Lee HG. NDRG2 and PRA1 interact and synergistically inhibit T-cell factor/β-catenin signaling. ***FEBS letter*** 586(22): 3962-3968 (2012)
23. **Choi SC***, Wang H*, Tian L, Murakami Y, Shin DM, Borrego F, Morse HC 3rd† and Coligan JE†. The IgM Fc receptor, FCMR, promotes B cell development and modulates antigen-driven immune responses. ***Journal of Immunology*** 190(3): 987-996 (2013) (*equally contributed, †corresponding author)
    - Manser T. ***F1000Prime Recommendation*** (10.3410/f.717973548.793470166), February 07, 2013
24. Tian L*, **Choi SC***, Murakami Y, Allen J, Morse HC 3rd, Qi CF, Krzewski K and Coligan JE. p85a recruitment by the CD300f phosphatidylserine receptor mediates apoptotic cell clearance required for autoimmunity suppression. ***Nature Communications*** 4:3146 (2014) (*equally contributed)
25. Sang A, Niu H, Cullen J, **Choi SC**, Zheng YY, Wang H, Shlomchik MJ and Morel L. Activation of rheumatoid factor-specific B cells is antigen-dependent and occurs preferentially outside of germinal centers in the lupus-prone NZM2410 mouse model. ***Journal of Immunology*** 193(4):1609-1621 (2014)
26. Yin Y, **Choi SC**, Xu Z, Perry D, Seay H, Croker BP, Sobel ES, Brusko TM, and Morel L. Normalizing $CD4^+$ T Cell Metabolism Reverses Lupus in Mouse Models. ***Science Translational Medicine*** 7: 274ra18 (2015)
    - Mehta MM and Chandel SN. Focus: Targeting metabolism for lupus therapy. ***Science Translational Medicine*** 7: 274fs5 (2015)
    - Torris M. Drugs for Metabolism Could Reverse Lupus. ***Chemical & Engineering News*** (https://www.scientificamerican.com/article/drugs-for-metabolism-could-reverse-lupus/), February 26, 2015
    - Datta S. ***F1000Prime Recommendation*** (10.3410/f.725352924.793503976), February 17 (2015)
27. Sang A, Zheng YY, **Choi SC**, Zeumer L, and Morel L. Genetic and cellular dissection of the activation of AM14 rheumatoid factor B cells in a mouse model of lupus. ***Journal of Leukocyte Biology*** 98(2):209-221 (2015)
28. Yin Y*, **Choi SC***, Xu Z, Zeumer L, Kanda N, Croker BP and Morel L. Glucose oxidation is critical for $CD4^+$ T cell activation in a mouse model of systemic lupus erythematosus. ***Journal of Immunology*** 196(1):80-90 (2016) (*equally contributed)
29. Tian L*, **Choi SC***, Lee HN, Murakami Y, Qi CF, Sengottuvelu M, Krzewskia K, and Coligan JE. Enhanced efferocytosis by dendritic cells underlies memory T cell expansion and susceptibility to autoimmune disease in CD300f-deficient mice. ***Cell Death & Differentiation*** 23(6): 1086-1096 (2016) (*equally contributed)
30. **Choi SC**, Hutchinson TE, Titov AA, Seay H, Li S, Brusko TM, Croker BP, Salek-Ardakani S and Morel L. The lupus susceptibility gene Pbx1 regulates the balance between follicular helper T cell and regulatory T cell differentiation. ***Journal of Immunology*** 197(2):458-469 (2016)
31. Niu Y, Sengupta M, Titov AA, **Choi SC** and Morel L. The Pbx1 lupus susceptibility gene regulates CD44 expression. ***Molecular Immunology*** 85:148-154 (2017)
32. **Choi SC***, Xu Z*, Li W, Yang H, Roopenia DC, Morse HC 3rd and Morel L. Relative contribution of B cells and dendritic cells from lupus-prone mice to $CD4^+$ T cells polarization. ***Journal of Immunology*** 200(9):3087-3099 (2018) (*equally contributed)
33. Abboud G*, **Choi SC***, Kanda N, Zeumer-Spataro L and Morel L. Inhibition of glycolysis reduces disease severity in an autoimmune model of rheumatoid arthritis. ***Frontiers in Immunology*** 9;1973 (2018) (*equally contributed)
34. **Choi SC**, Titov AA, Abboud G, Seay H, Brusko TM, Roopenia DC, Salek-Ardakani S and Morel L. Inhibition of glucose metabolism selectively targets autoreactive follicular helper T cells. ***Nature Communications*** 9(1):4369 (2018)
    - McHugh J. Research Highlight: Targeting autoimmune-specific metabolic processes. ***Nature Reviews Rheumatology*** 14: 686 (2018)
35. Li W, Qu G, **Choi SC**, Cornaby C, Titov AA, Kanda N, Teng X, Wang H and Morel L. Targeting T cell activation and

lupus autoimmune phenotypes by inhibiting glucose transporters. ***Frontiers in Immunology*** 10;833 (2019)

36. **Choi SC***, Brown J*, Gong MH*, Ge Y, Zadeh M, Li W, Croker BP, Michailidis G, Garrett JT, Mohamadzadeh M† and Morel L†. Microbiota-associated tryptophan catabolism induces autoimmune activation in a mouse model of lupus. ***Science Translational Medicine*** (*equally contributed †corresponding author) (in press)
37. Li W, Elshikha SA, Cornaby C, Teng X, Abboud G, Brown J, Zou X, Zeumer-Spataro L, **Choi SC**, Fredenburg K, Major A and Morel L. T cells expressing the lupus susceptibility allele Pbx1 enhance autoimmunity and atherosclerosis in dyslipidemic mice (Under revision)
38. Cornaby C, Elshikha SA, Teng X, **Choi SC**, Davidson A, and Morel L. Efficacy of the combination of metformin and CTLA4Ig in the (NZB x NZW)F1 mouse model of lupus nephritis. Journal of Immunology (Under review)

Invited Review Articles

1. Li W, Sivakumar R, Titov AA, **Choi SC** and Morel L. Metabolic factors that contribute to lupus pathogenesis. ***Critical Reviews in Immunology*** 36(1):75-98 (2016)
2. **Choi SC**, Titov AA, Li W and Morel L. Immune Metabolism in Systemic Lupus Erythematosus. ***Current Rheumatology Reports*** 18(11):66 (2016)
3. **Choi SC** and Morel L. B cell contribution of the $CD4^+$ T cell inflammatory phenotypes in systemic lupus erythematosus. ***Autoimmunity*** 50(1): 37-41 (2017)
4. **Choi SC** and Morel L. Immune metabolism regulation of the germinal center response. 52(3):348-355 ***Experimental & Molecular Medicine*** (2020)
5. Teng X, Brown J, **Choi SC**, Li W, and Morel L. Metabolic determinants of lupus pathogenesis. ***Immunological Review*** (in press)