YE-JI BANG, Ph.D.

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EDUCATION

2009 - 2014	Ph.D.	College of Agriculture and Life Science, Seoul National University, South Korea - *Research Area: Microbiology, Biochemistry* - *Thesis Advisor: Dr. Sang Ho Choi*
2005 - 2009	B.S.	College of Agriculture and Life Science, Seoul National University, South Korea - *Major: Food Science and Biotechnology* - *Graduated summa cum laude*

POSITIONS

2020 - present	Instructor	Department of Immunology, University of Texas Southwestern Medical Center
2015 - 2020	Postdoctoral fellow	Howard Hughes Medical Institute; Department of Immunology, University of Texas Southwestern Medical Center (Dr. Lora V. Hooper)
2014 - 2015	Postdoctoral fellow	Center for Food Safety and Toxicology, Seoul National University, South Korea (Dr. Sang Ho Choi)

HONORS

Awards

2018	Excellence in Research Presentation Award from Immunology Research Symposium
2017	Research Fellows Award from Crohn's and Colitis Foundation of America
2013	Best Oral Presentation Award from the Microbiological Society of Korea
2012	Best Poster Presentation Award from the Korean Society for Microbiology and Biotechnology
2011	Best Poster Presentation Award from the Microbiological Society of Korea
2009	Best Poster Presentation Award from the Korean Society for Microbiology and Biotechnology
2009	Alumni Association Award from Seoul National University Alumni Association

Scholarships and Fellowships

2017-2020	Research Fellows Award from Crohn's and Colitis Foundation of America
2009-2013	Brain Korea 21 Fellowship, South Korea
2009-2010	National Research Fellowship for Science and Engineering, South Korea
2009	Sangcheon Scholarship from Sangcheon Foundation, South Korea
2008	Superior Academic Performance Scholarship, Seoul National University
2007	Eminence Scholarship, Seoul National University
2006	Korea Scholarship Foundation Scholarship, Korea
2006	Superior Academic Performance Scholarship, Seoul National University
2005	Merit-based Scholarship, Seoul National University

PUBLICATIONS

1. **Bang, Y-J.**, Hu, Z., Li, Y., Gattu, S., Ruhn, K.A., Raj, P., Herz, J., and Hooper, L.V. 2021. Serum amyloid A delivers retinol to intestinal myeloid cells to promote adaptive immunity. *Science* 373:eabf9232.
2. Hu, Z.*, **Bang, Y-J.***, Ruhn, K.A., and Hooper, L.V. 2019. Molecular basis of retinol binding by serum amyloid A during infection. *Proc. Natl. Acad. Sci. USA*. 116(38):19077-19082. (* equal contribution)
3. Gattu, S., **Bang, Y-J.**, Pendse, M., Dende, C., Chara, A. L., Harris, T. A., Wang, Y., Ruhn, K.A., Kuang, Z., Sockanathan, S., and Hooper, L. V. 2019. Epithelial retinoic acid receptor β regulates serum amyloid A expression and vitamin A-dependent intestinal immunity. *Proc. Natl. Acad. Sci. USA*. 116(22):10911-10916.
4. Lee, Z-W., Kim, B.S., Jang, K.K., **Bang, Y-J.**, Kim, S., Ha, N-C., Jung, Y.H., Lee, H.J., Han, H.J., Kim, J-S., Kim, J., Sahu, P.K., Jeong, L.S., Kim, M.H., and Choi, S.H. 2019. Small-molecule inhibitor of HlyU attenuates virulence of *Vibrio* species. *Scientific Reports*. 9:4346.
5. Kim, B. S., Jang, S. Y., **Bang, Y-J.**, Hwang, J., Koo, Y., Jang, K. K., Lim, D., Kim, M. H., and Choi, S. H. 2018. QStatin, a selective inhibitor of quorum sensing in *Vibrio* species. *mBio*. 9 (1), e02262-17.
6. Jo, I., Kim, D., **Bang, Y-J.**, Ahn, J., Choi, S. H., and Ha, N.-C. 2017. The hydrogen peroxide hypersensitivity of OxyR2 in *Vibrio vulnificus* depends on conformational constraints. *J. Biol. Chem*. 292:7223-7232.
7. **Bang, Y-J.**, Lee, Z.-W., Kim, D., Jo, I.-S., Ha, N.-C., and Choi, S. H. 2016. OxyR2 Functions as a three-state redox switch to tightly regulate production of Prx2, a peroxiredoxin of *Vibrio vulnificus. J. Biol. Chem.* 291:16038-16047.
8. Lim. J. G., **Bang, Y-J.**, and Choi, S. H. 2014. Characterization of the *Vibrio vulnificus* 1-Cys Peroxiredoxin Prx3 and regulation of its expression by the Fe-S cluster regulator IscR in response to oxidative stress and iron starvation. *J. Biol. Chem*. 289:36263-36274.
9. Kim, S. Y.*****, **Bang, Y-J. ***, Kim, D., Lim, J. G., Oh, M. H., and Choi, S. H. 2014. Distinct characteristics of OxyR2, a new OxyR-type regulator, ensuring expression of Peroxiredoxin 2 detoxifying low levels of hydrogen peroxide in *Vibrio vulnificus*. *Mol. Microbiol*. 93:992-1009. (*equal contribution)
10. **Bang, Y-J.***, Oh, M. H.*, and Choi, S. H. 2012. Distinct characteristics of two 2-Cys peroxiredoxins of *Vibrio vulnificus* suggesting differential roles in detoxifying oxidative stress. *J. Biol. Chem*. 287:42516-42524. (* equal contribution)

PRESENTATIONS

Invited / selected talks

Oct. 26. 2021	University of Minnesota, Center for Immunology Seminar Series (Virtual) “Microbiota-induced vitamin A transport and its role in the intestinal immunity”
Oct. 22. 2021	Kyung Hee University Department of Biotechnology, Korea (Virtual) “Microbiota-induced vitamin A transport and its role in the intestinal immunity”
Aug. 9. 2021	Inaugural Academic Symposium: Green Technology Institute of Kyungpook National University, Korea (Virtual) “Bacterial regulation of vitamin A transport in the intestine”
July 23. 2021	UTSW-Korean Scientist Association Seminar Series (Virtual) “Intestinal immune regulation by microbiota and vitamin A”
June 24. 2021	Annual Meeting & International Symposium of the Korean Society of Microbiology and Biotechnology, Busan, Korea “Microbiota-induced vitamin A mobilization by serum amyloid A and its role in intestinal immunity”

June 17. 2021 Center for Food Safety and Toxicology, Seoul National University, Seoul, Korea
"Bacterial regulation of vitamin A transport in the intestine"

June 19. 2020 ASM Microbe (American Society for Microbiology General Meeting), Chicago, IL, USA
"Microbiota-induced vitamin A mobilization by serum amyloid A and its role in intestinal immunity" (*Meeting cancelled due to COVID-19*)

Aug. 1. 2019 FASEB Science Research Conferences: The Gastrointestinal Tract XVIII: Integrated Biology of the GI Super-Organ, Steamboat Springs, CO, USA
"Vitamin A transport by serum amyloid A and its role in intestinal immunity"

July 16. 2019 GI Research Conference, UT Southwestern, Dallas, TX, USA
"Molecular mechanism of serum amyloid A-mediated vitamin A transport in the intestine"

June 26. 2015 Annual Meeting & International Symposium, The Korean Society for Microbiology and Biotechnology, Gyeongju, South Korea
"Fine-tuned oxidative stress response in *Vibrio vulnificus*"

May 1. 2013 International Meeting of the Microbiological Society of Korea. Jeonju, South Korea
"Identification and characterization of a novel interaction between two distinct peroxiredoxins, Prx2 and Bcp, of *Vibrio vulnificus*"
(*Selected for the best oral presentation award*)

June 29. 2012 International Symposium & Annual Meeting, The Korean Society for Microbiology and Biotechnology, Busan, South Korea
"Evidence that two 2-Cys peroxiredoxins of *Vibrio vulnificus* have differential roles in defense against oxidative stress"

Poster presentation

1. Bang, Y.-J., Z. Hu, Y. Li, K. A. Ruhn, P. Raj, J. Herz, and L. V. Hooper. May 26, 2021. Serum amyloid A delivers retinol to intestinal myeloid cells to promote adaptive immunity. 2021 Immunology Research Symposium (Virtual).
2. Bang, Y.-J., Z. Hu, Y. Li, K. A. Ruhn, J. Herz, and L. V. Hooper. May 18, 2021. Microbiota-induced vitamin A transport by serum amyloid A and its role in intestinal immunity. HHMI Science Meeting: Inflammation, Immunology, and Infectious Disease (Virtual).
3. Bang, Y.-J., Z. Hu, Y. Li, K. A. Ruhn, J. Herz, and L. V. Hooper. May 17, 2021. Microbiota-induced vitamin A transport by serum amyloid A and its role in intestinal immunity. Harvard Chan Microbiome in Public Health Center (HCMPH) symposium (Virtual).
4. Bang, Y.-J., Y. Li, Z. Hu, K. A. Ruhn, and L. V. Hooper. December 4, 2019. Vitamin A transport by serum amyloid A and its role in intestinal immunity. HHMI Science Meeting. Chevy Chase, MD, USA
5. Bang, Y.-J., Y. Li, Z. Hu, K. A. Ruhn, and L. V. Hooper. May 24, 2019. Molecular mechanism and function of serum amyloid A-mediated vitamin A transport in the intestine. 2019 Immunology Research Symposium. Southfork Ranch, Parker, TX, USA
6. Bang, Y.-J., Y. Li, Z. Hu, K. A. Ruhn, and L. V. Hooper. May 2, 2019.Vitmain A transport by serum amyloid A and its role in intestinal immunity. McGarry Symposium. UT Southwestern Medical Center, Dallas, TX, USA
7. Bang, Y.-J., Z. Hu., K. A. Ruhn, and L. V. Hooper. May 25, 2018. Serum amyloid A binds to LDL receptor-related protein 1 (Lrp1) to transport retinol to intestinal dendritic cells. 2018 Immunology Research Symposium. Kimbell Art Center, Fort-worth, TX, USA **(*Received the best presentation award*)**
8. Bang, Y.-J., L. V. Hooper. May 18, 2017. Molecular mechanism of serum amyloid A-mediated retinol transport during infection. McGarry Symposium. UT Southwestern Medical Center, Dallas, TX, USA

9. Bang, Y.-J., L. V. Hooper. May 26, 2017. Molecular mechanism of serum amyloid A-mediated retinol transport during infection. 2017 Immunology Symposium. Kimbell Art Center, Fort-worth, TX, USA
10. Bang, Y.-J., B. S. Kim, B. Kim, and S. H. Choi. Oct. 18-21, 2014. A small-molecule inhibitor of SmcR, a quorum sensing master regulator, in *Vibrio vulnificus*. 5th ASM Conference on Cell-Cell Communication San Antonio, USA.
11. Bang, Y.-J., and S. H. Choi. June 25-27, 2014. Identification of a novel SoxR-regulated transporter, Mfs, conferring resistance to ROS-generating antibiotics, Bleomycin. The Korean Society for Microbiology and Biotechnology 2014 International Symposium & Annual Meeting. Busan, Korea.
12. Bang, Y.-J., and S. H. Choi. Oct 17-18, 2013. Identification and characterization of a new 1-Cys peroxiredoxin, Bcp, of *Vibrio vulnificus*. 2013 International Meeting of the Federation of Korean Microbiological Societies. Seoul, Korea.
13. Bang, Y.-J., and S. H. Choi. July 3-5, 2013. Identification and characterization of Bcp as a novel binding partner of Peroxiredoxin2 in *Vibrio vulnificus*. The Korean Society for Microbiology and Biotechnology 2013 International Symposium & Annual Meeting. Pyeongchang, Korea.
14. Bang, Y.-J., B. Kim, and S. H. Choi. May 19-21, 2013. Identification of a novel interaction between Prx2 and Bcp, two different peroxiredoxins of *Vibrio vulnificus*. 113th General Meeting of American Society for Microbiology. Denver, USA.
15. Bang, Y.-J., M. H. Oh, P.-S. Chang, and S. H. Choi. June 27-29, 2012. Evidence that two 2-Cys peroxiredoxins of *Vibrio vulnificus* have differential roles in defense against oxidative stress. The Korean Society for Microbiology and Biotechnology 2012 International Symposium & Annual Meeting. Busan, Korea. **(*Received the best poster award*)**
16. Bang, Y.-J., M. H. Oh, P-S. Chang, and S. H. Choi. June 16-19, 2012. The roles of two 2-Cys peroxiredoxins in *Vibrio vulnificus*, AhpC1 and AhpC2, in defense against oxidative stress. 112th General Meeting of American Society for Microbiology. San Francisco, USA.
17. Bang, Y.-J., S. Kim, and S. H. Choi. May 21-24, 2011. Identification and characterization of *Vibrio vulnificus* AhpC2, a novel bacterial peroxiredoxin (Prx). 111th General Meeting of American Society for Microbiology. New Orleans, USA.
18. Bang, Y.-J., S. Kim, S.-Y. Kil, and S. H. Choi. May 12-13, 2011. The cellular roles of *Vibrio vulnificus* AhpC2, a novel bacterial peroxiredoxin (Prx). International Meeting of the Microbiological Society of Korea. Gwangju, Korea. **(*Received the best poster award*)**

RESEARCH SUPPORTS

Research Fellows Award 12/01/2017-11/31/2020
Crohn's & Colitis Foundation of America
Title: Microbiota-induced retinol mobilization by serum amyloid A and its role in immunity and inflammation
Award ID: 509845, *Award amount*: $174,750.00
Role: Principle investigator

National Research Fellowship for Science and Engineering 2009-2010
Korea Student Aid Foundation
Title: Identification and Characterization of AhpR, OxyR-type Regulator
Award ID: S2-2009-000-01908-1, *Award amount*: about $8,000.00
Role: Principle investigator

MEMBERSHIPS

2011 - present	American Society of Microbiology
2017 - present	Crohn's & Colitis Foundation of America
2009 - present	Korean Society for Microbiology and Biotechnology
2009 - present	Microbiological Society of Korea
2015 - present	Korean-American Scientists and Engineers Association

TEACHING / MENTORING

Spring 2013	*Teaching Assistant* Food Hygiene Lab, Seoul National University
Fall 2012	*Teaching Assistant* Food Biochemistry Lab, Seoul National University
2014-2015	*Training / mentoring graduate student (Z-W. Lee)* Sang Ho Choi's lab, Seoul National University
2013	*Supervising B.S. thesis research for undergraduate students (M. Jo, T. Lee, W. Huh)* Food Science and Biotechnology Program, Seoul National University
2009-2011	*Training / mentoring graduate students (S. Kim, D. Kim)* Sang Ho Choi's lab, Seoul National University

LEADERSHIP / OUTREACH ACTIVITIES

2013-2014	*Student representative* Sang Ho Choi's lab, Seoul National University
2012-2013	*President* Graduate Student Association, Department of Food Science and Biotechnology, Seoul National University
2020 - present	*Organizing Committee* Korean Scientist Association, University of Texas Southwestern Medical Center

RESEARCH ACCOMPLISHMENT

The overarching focus of my research has been to understand the biochemical basis of host-microbe interactions. I have explored these interactions from two distinct perspectives using a combination of approaches in biochemistry, molecular biology, microbiology, and immunology. My graduate work focused on microbial responses at the interface of host-microbe interactions and demonstrated how pathogenic bacteria sense and defend against reactive oxygen species to survive within host environment. My postdoctoral research has focused on the host side of the interactions and elucidated the molecular mechanisms by which the host regulates intestinal immunity in response to microbes and nutrients. Thus, my previous research has given me a unique opportunity to explore both sides of the host-microbe interface and to build a foundation for an interdisciplinary independent research program to further understand mechanisms underpinning host-microbe interactions at the intestine.

Molecular characterization of how pathogenic bacteria detoxify reactive oxygen species. As a graduate student, I studied how pathogenic bacteria detoxify reactive oxygen species (ROS) produced by host cells [a-e]. I identified the key antioxidant enzymes, Prx1 and Prx2, that carry out these reactions in *Vibrio* species. I found that these enzymes are functionally optimized for detoxifying distinct ROS concentrations. This allows for efficient ROS removal at various ROS concentrations and likely provides an evolutionary advantage for bacterial survival in the presence of ROS [a]. I further elucidated the molecular mechanisms by which two regulatory proteins, OxyR1 and OxyR2, detect the concentration of ROS and induce the production of antioxidant enzymes that are most effective at detoxifying ROS at a particular concentration [b,d,e]. Altogether, my graduate work established a mechanistic understanding of how pathogenic bacteria defend against oxidative stress to survive within the host. Additionally, I helped to discover new small-molecule inhibitors to attenuate virulence of pathogenic bacteria [f,g].

a. **Bang, Y.-J**.*, Oh, M. H.*, and Choi, S. H. 2012. *J. Biol. Chem*. 287:42516-42524. (* equal contribution)
b. Kim, S. Y.*, **Bang, Y-J.***, Kim, D., Lim, J. G., Oh, M. H., and Choi, S. H. 2014. *Mol. Microbiol*. 93:992-1009. (*equal contribution)
c. Lim. J. G., **Bang, Y-J.,** and Choi, S. H. 2014. *J. Biol. Chem*. 289:36263-36274.
d. **Bang, Y.-J.,** Z.-W. Lee, D. Kim, I.-S. Jo, N.-C. Ha, and S. H. Choi. 2016. *J. Biol. Chem*. 291:16038-16047.
e. Jo, I., Kim, D., **Bang, Y-J.,** Ahn, J., Choi, S. H., and Ha, N.-C. 2017. *J. Biol. Chem*. 292:7223-7232.
f. Kim, B. S., Jang, S. Y., **Bang, Y-J.,** Hwang, J., Koo, Y., Jang, K. K., Lim, D., Kim, M. H., and Choi, S. H. 2018. *mBio*. 9 (1), e02262-17.
g. Lee, Z-W., Kim, B.S., Jang, K.K., **Bang, Y-J.,** Kim, S., Ha, N-C., Jung, Y.H., Lee, H.J., Han, H.J., Kim, J-S., Kim, J., Sahu, P.K., Jeong, L.S., Kim, M.H., and Choi, S.H. 2019. *Scientific Reports*. 9:4346.

Identifying how vitamin A is mobilized to the immune system. My postdoctoral studies focused on understanding how dietary vitamin A and the microbiota converge to regulate immunity. Vitamin A is a lipid-soluble nutrient that is essential for the development of many aspects of innate and adaptive immunity, particularly in the intestine, but the mechanisms by which vitamin A is delivered to the immune system have been a mystery. In the intestine, vitamin A is converted into retinol, which is essential for intestinal adaptive immune development. Intestinal myeloid cells are central to this process by enzymatically converting retinol to its biologically active form, retinoic acid (RA), and delivering RA to developing immune cells. However, it was previously unknown how RA-producing myeloid cells acquire retinol for RA production.

I have answered this question by studying serum amyloid A (SAA) proteins. Just before I joined the Hooper lab, other lab members had identified SAAs as retinol binding proteins that produced in the intestinal epithelium under the control of both the microbiota and vitamin A. I began my postdoctoral project by helping to illuminate how intestinal epithelial cells sense dietary vitamin A status, finding that the epithelial transcription factor retinoic acid receptor b plays a key role by activating SAA expression [c]. I also uncovered the molecular and structural basis for retinol binding and transport by SAA proteins during infection [b].

During my postdoctoral work, my major contribution was to delineate the molecular mechanism by which SAAs mobilize retinol from the intestinal epithelium to intestinal myeloid cells. Using a variety of biochemical and cell biological approaches, I discovered that LDL receptor-related protein 1 (LRP1) facilitates the endocytic uptake of SAA–retinol complex by myeloid cells and thus controls the ability of myeloid cells to promote intestinal adaptive immunity [a]. Altogether, my findings have identified the SAA-LRP1 interaction as a molecular mechanism that is essential for vitamin A-dependent intestinal immunity. Because SAA expression is regulated by the microbiota, my findings have also provided important insights into how the microbiota and the host diet converge to shape immunity.

a. **Bang, Y-J.**, Hu, Z., Li, Y., Gattu, S., Ruhn, K.A., Raj, P., Herz, J., and Hooper, L.V. 2021. *Science* 373:eabf9232.
b. Hu, Z.*, **Bang, Y-J.***, Ruhn, K.A., and Hooper, L.V. 2019. *Proc. Natl. Acad. Sci. USA.* 116(38):19077-19082. (* equal contribution)
c. Gattu, S., **Bang, Y-J.**, Pendse, M., Dende, C., Chara, A. L., Harris, T. A., Wang, Y., Ruhn, K.A., Kuang, Z., Sockanathan, S., and Hooper, L. V. 2019. *Proc. Natl. Acad. Sci. USA*. 116(22):10911-10916.