

# Curriculum Vitae Nayoung Ha (Ph.D)

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Chung Nam National University Hospital, Biomedical Research Institute  
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## ■ Research Interests

- Development of Vaccine / Diagnostic tools
- Immune response against infectious disease (Innate/Adaptive Immunity, Memory T cells)
- NHPs(Non-Human Primates) Immunology

## ■ Professional Education

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Aug/2015 Ph.D, Seoul National University College of Medicine

Dep.Biomedical Science (Seoul, Republic of Korea)

Thesis : Immunization with an Autotransporter Protein of *Orientia tsutsugamushi* Provides Protective.  
Immunity against Scrub Typhus

Feb/2011 M.S, Seoul National University College of Medicine

Dep.Biomedical Science (Seoul, Republic of Korea)

Thesis : An Autotransporter Protein from *Orientia tsutsugamushi* Mediates Adherence to Nonphagocytic.  
Host Cells

Feb/2009 B.S, Konyang University

Dep.Clinical Laboratory Science (Daejeon, Republic of Korea)

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## ■ Technical Experience

- Primary and Cell line culture (Primary -Human T cell, Mouse DCs, MΦ)
- Molecular Tech -DNA, RNA, Recombinant proteins purification (GST, His tagged), Western blot,  
Pull-down assay RT/qPCR, ELISA, IFA, IHC, FACS, ELISPOT, Confocal Microscope
- In vivo / Ex vivo – Animal (Mouse), NHPs) infection model
- BSL-3(Biosafety level-3) / ABSL-3(Animal biosafety level-3) experienced

## ■ Certification

: Medical Technologist (Clinical Laboratory Science, Domestic)

## ■ Teaching Experience

- Lecturer (03/2015 – 02/2017)

Daejeon Health Institute of Technology College (Daejeon, Republic of Korea)

Dep. Clinical Laboratory Science

Lecture: General Microbiology, General Microbiology experiments (6 hours / week)

## ■ Research Experience

- (Aug/2015 – Sep/2017)

**Postdoctoral Fellow, Seoul National University (Republic of Korea)-Prof.Nam-Hyuk Cho**

- Project 1. Development of biodegradable microneedle patch vaccine for scrub typhus
  - : Evaluation of microneedle-mediated transdermal drug/vaccine delivery system (Mouse/ Nonhuman primate model)
  - : Evaluation of immunogenicity using human patient's PBMCs and Plasma
- Project 2. Isolation and culture of SFTS (Severe Fever with Thrombocytopenia Syndrome) virus and examination of antigenicity in mouse infection model
  - : Isolation and culture of SFTS virus from Haemaphysalis longicornis mites and human patients
  - : Identification of novel vaccine candidate (Epitope mapping)

- (Oct/2017- Sep/2019)

**Postdoctoral Scholar, Stanford University (US)- Prof. Bali Pulendran**

- Project 1. Adjuvanting a malaria vaccine to induce robust and durable protective immunity
  - : Analysis the magnitude, durability and quality of antibody response by R21 antigen (Non-human primate model)
- Project 2. Analysis the innate immune response in lymph node after the vaccination
  - : Analysis the gene signature after the vaccination
  - : Analysis the innate memory cells

- (Dec/2019- June/2021)

**Research Professor, Seoul National University (Republic of Korea)**

- Project 1.
  - : Evaluation of the Scrub typhus vaccine efficacy in NHPs model
- Project 2.
  - : Comparative analysis of innate immune responses in different species (Human, NHPs, Rodents)

## ■ Reference

1. Nam-Hyuk Cho (PhD, Professor)

Department of Biomedical Science (Seoul National University College of Medicine)

Email: [chonh@snu.ac.kr](mailto:chonh@snu.ac.kr) Office: +82-2-740-8392 Fax: +82-2-743-0881

2. Bali Pulendran (PhD, Professor)

Institute for Immunity, Transplantation and Infection (Stanford University, US)

Email : [bpulandran@stanford.edu](mailto:bpulandran@stanford.edu) Office: +1-650-725-1792

3. Ik-Sang Kim (MD/PhD)

Department of Microbiology and Immunology (Seoul National University College of Medicine)

Email: [molecule@snu.ac.kr](mailto:molecule@snu.ac.kr)

4. Myung-Sik Choi (MD/PhD)

Department of Microbiology and Immunology (Seoul National University College of Medicine)

Email: [myung@snu.ac.kr](mailto:myung@snu.ac.kr)

## ■ Patent

1. A composition and a kit for detecting specific antibodies for *Orientia tsutsugamushi*

: Domestic patent (KR 10-2013-0003528), Inventor

2. Vaccine composition (ScaA protein) for *Orientia tsutsugamushi*

: Domestic patent (KR 10-2014-0049126), International, Inventor

3. A method and a kit for identification of serotype of *Orientia tsutsugamushi*

: Domestic patent (KR 10-2015-0132145), Inventor

4. Zinc oxide binding peptide, complex comprising the peptide, and pharmaceutical composition comprising the complex

: Domestic patent (KR 10-2016-0132779), International, Inventor

5. Novel recombinant protein antigens of *Orientia tsutsugamushi* and the vaccine composition using the same

: Domestic patent (KR 10-2016-0176031), International, Inventor

6. Epitope antigens of TSA56 antigens of *Orientia tsutsugamushi* and the use there of

: Domestic patent(120170149836), International (Revised)

## ■ Grants

National Research Foundation of Korea(NRF) grant funded by the Korea government

(2020.03 – 2022.02 , \$80,000 / yr) - Ongoing

## ■ Publications (2011-Presents)

• **Published articles :1 Correspondence(\*), 11 First-author (Underlined) , 10 collaboration, 1 Book chapter**

23. Dong-Min Kim , Yuri Kim, Jun-Won Seo , Jooyeon Lee , Uni Park , Na-Young Ha , Jaemoon Koh, Hyoree Park , Jae-Won Lee , Hyo-Jin Ro, Na Ra Yun , Da Young Kim , Sung Ho Yoon , Yong Sub Na , Do Sik Moon , Choon-Mee Kim , Kyeongseok Jeon , Jun-Gu Kang , Na-Yoon Jang , Hyeongseok Jeong , Jungok Kim , Shinhyea Cheon , Kyung Mok Sohn , Jae Youg Moon , Sungmin Kym , Seung Ro Han , Myung-Shin Lee , Hyun-Je Kim , Woong-Yang Park , Ji-Yeob Choi , Hyun-Woo Shin , Hye-Young Kim , Chung-Hyun Cho , Yoon Kyung Jeon , Yeon-Sook Kim , Nam-Hyuk Cho

Enhanced eosinophil-mediated inflammation associated with antibody and complement-dependent pneumonic insults in critical COVID-19 Cell Reports. 2021 Oct 5;37(1):109798.doi: 10.1016/j.celrep.2021.109798

22. Yen Thi Hai Nguyen , Chaewon Kim , Yuri Kim , Kyeongseok Jeon , Hong-Il Kim , Na-Young Ha \* , NamHyuk Cho

The *Orientia tsutsugamushi* ScaB Autotransporter Protein Is Required for Adhesion and Invasion of Mammalian Cells. Front Microbiol . 2021 Feb 4;12:626298. doi: 10.3389/fmicb.2021.626298

21. Aye Marlar Win, Yen Thi Hai Nguyen, Yuri Kim, Na Young Ha, Jun Gu Kang, Hongil Kim, Bo San, Okkar Kyaw, Wah Win Htike, Dong Ok Choi, Keun Hwa Lee, Nam Hyuk Cho

Genotypic heterogeneity of *Orientia tsutsugamushi* in scrub typhus patients and thrombocytopenia syndrome coinfection, Myanmar. Emerg Infect Dis. 2020 Aug; 26(8): 1878–1881

20. Ha NY, Kin HI, Kim G, Min CK, Kim Y, Yen NTH, Choi MS, Cho NH

Immunization with a recombinant antigen composed of conserved blocks from TSA56 provides broad genotype protection against scrub typhus. Emerg Microbes Infect.2019;8(1):946-958

19. Keun-Dol Yook, Navoung Ha

Effect of *Scutellaria scordifolia* Fisch.ex Schrank Extracts on Biofilm formation and Activation of *Klebsiella pneumoniae*. Korean J Clin Lab Sci.2018;50(4):438-443(100.5)

18. Chan-Ki Min, Hong-Il Kim, Na-Young Ha, Yuri Kim, Eun-Kyung Kwon, Nguyen Thi Hai Yen, Je-In Youn, Yoon Kyung Jeon, Kyung-Soo Inn, Myung-Sik Choi and Nam-Hyuk Cho

A Type I Interferon and IL-10 Induced by *Orientia tsutsugamushi* Infection Suppresses Antigen-Specific T Cells and Their Memory Responses. Front. Immunol. 9:2022. doi: 10.3389/fimmu.2018.02022(24)

17. Chisong Lee, Hongil Kim, Suyong Kim, Shayan F. Lahiji, Na-Young Ha, Huisuk Yang, Geonwoo Kang, Hai Yen Thi Nguyen, Yuri Kim, Myung-Sik Choi, Nam-Hyuk Cho,\* and Hyungil Jung.

Comparative Study of Two Droplet-Based Dissolving Microneedle Fabrication Methods for Skin Vaccination. Adv. Healthcare Mater. 2018, 1701381(24)

16. Na-Young Ha, Yuri Kim, Chan-Ki Min, Hong-Il Kim, Nguyen Thi Hai Yen, Myung-Sik Choi, Jae-Seung Kang, Yeon-Sook Kim and Nam-Hyuk Cho. Longevity of antibody and T-cell responses against outer membrane antigens of *Orientia tsutsugamushi* in scrub typhus patients. Emerging Microbes & Infections (2017) 6, e116; doi:10.1038/emi.2017.106(60)

15. Gwanhun Kim, Na-Young Ha, Chan-Ki Min, Hong-Il Kim, Nguyen Thi Hai Yen, Keun-Hwa Lee , Inbo Oh, Jae-Seung Kang, Myung-Sik Choi, Ik-Sang Kim, Nam-Hyuk Cho. Diversification of *Orientia tsutsugamushi* genotypes by intragenic recombination and their potential expansion in endemic areas PLoS Negl Trop Dis. 2017 Mar 1;11(3):e0005408.(24)(51)



14. [Na-Young Ha](#), Gwanhun Kim, Nam-Hyuk Cho

Book : Rickettsiales (Publisher : Springer, Editor : Sunil Thomas, 2016)

Chapter 17. Epidemiological trends of scrub typhus : Global incidence and vector distribution

13. Jong-Hun Ha, Dong-Hae Lee, Jin-Sik Park, Oh Hyun Cho, Dong-Hoon Kim, **Na-Young Ha**, Nam-Hyuck Cho, Kyu Jam Hwang, Yong-Gon Cho, Hye-Soo Lee, Won Kil Lee, Yoo Chul Lee, Myung-Je Cho, Woo-Kon Lee, Min-Kyoung Shin Isolation and Genetic Characterization of *Orientia tsutsugamushi* from Scrub Typhus Patients in Gyeongsangnam-do, Korea. J.Bacteriology and Virology 2016. Vol. 46(12)

12. [Ha NY](#), Shin HM, Sharma P, Cho HA, Min CK, Kim HI, Yen NTH, Kim IS, Choi MS, Kim YK, Cho NH.

Generation of Protective Immunity Against *Orientia Tsutsugamushi* infection by Immunization with Zinc Oxide Nanoparticle Combined with ScaA Antigen. J Nanobiotechnol (2016) 14:76 DOI 10.1186/s12951-016-0229-2 (51)

11. Min CK, Cheon SH, [Ha NY](#), Sohn KM, Kim Yuri, Aigerim A, Shin HM, Choi JY, Inn KS, Kim JH, Moon JY, Choi MS, Cho NH, Kim YS.

Comparative and Kinetic Analysis of Viral Shedding and Immunological Responses in MERS Patients Representing Abroad Spectrum of Disease Severity. Scientific Reports.2016.May 05; DOI: 10.1038/srep25359(39)

10. Kim Yuri, Cheon SH, Min CK, Sohn KM, Kang YJ, Cha YJ, Kang JI, Han SK, **Ha NY**, Kim GH, Aigerim A, Shin HM, Choi MS, Kim SG, Cho HS, Kim YS, Cho NH.

Spread of Mutant Middle East Respiratory Syndrome Coronavirus with Reduced Affinity to Human CD26 during the South Korean Outbreak. mBio.2016.March 1. Volume 7 Issue 2; e00019-16(18)

9. [S Bang](#), CK Min, **NY Ha**, MS Choi, IS Kim, YS Kim.

Inhibition of eukaryotic translation by tetratricopeptide-repeat proteins of *Orientia tsutsugamushi*. Journal of Microbiology (2016) Vol. 54, No. 2, pp. 136–144 DOI 10.1007/s12275-016-5599-5(26)

8. Park SW, [Ha NY](#), Ryu BY, Bang JH, Song HY, Kim YR, Kim GH, Oh MD, Cho NH, Lee JK.

Urbanization of Scrub typhus disease in South Korea. PLoS Negl Trop Dis. 2015 May 22;9(5):e0003814. (54)

7. [Ha NY](#), Sharma P, Kim G, Kim Y, Min CK, Choi MS, Kim IS, Cho NH.

Immunization with an Autotransporter Protein of *Orientia tsutsugamushi* Provides Protective Immunity against Scrub Typhus. PLoS Negl Trop Dis. 2015 Mar 13;9(3):e0003585.(66)

6. Min CK, Kwon YJ, **Ha NY**, Cho BA, Kim JM, Kwon EK, Kim YS, Choi MS, Kim IS, Cho NH.

Multiple *Orientia tsutsugamushi* ankyrin repeat proteins interact with SCF1 ubiquitin ligase complex and eukaryotic elongation factor 1a. PLOS ONE. 2014 Aug 28; 9(8):e105652.

5. [Ha NY](#), Choi MS, Cho NH.

Molecular Characterization of sca Genes Found in *Orientia tsutsugamushi* Genome. J. Bacteriology and Virology 2013. Vol. 43, No. 2 p.155 – 158

4. Ko Y, Choi JH, **Ha NY**, Kim IS, Cho NH, Choi MS.

Active Escape of *Orientia tsutsugamushi* from Cellular Autophagy. Infect Immun. 2013 Feb;81(2):552-559.

3. Choi JH, Cheong TC, **Ha NY**, Ko Y, Cho CH, Jeon JH, So I, Kim IK, Choi MS, Kim IS, Cho NH.

*Orientia tsutsugamushi* Subverts Dendritic Cell Functions by Escaping from Autophagy and Impairing Their Migration. PLoS Negl Trop Dis. 2013 Jan;7(1):e1981.

2. [Ha NY](#), Kim Y, Choi JH, Choi MS, Kim IS, Kim YS, Cho NH

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Institute for Immunity, Transplantation and Infection (Stanford University, US)

Email : [bpulandran@stanford.edu](mailto:bpulandran@stanford.edu) Office: +1-650-725-1792

3. Ik-Sang Kim (MD/PhD)

Department of Microbiology and Immunology (Seoul National University College of Medicine)

Email: [molecule@snu.ac.kr](mailto:molecule@snu.ac.kr)

4. Myung-Sik Choi (MD/PhD)

Department of Microbiology and Immunology (Seoul National University College of Medicine)

Email: [myung@snu.ac.kr](mailto:myung@snu.ac.kr)

## ■ Patent

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: Domestic patent (KR 10-2013-0003528), Inventor

2. Vaccine composition (ScaA protein) for *Orientia tsutsugamushi*

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3. A method and a kit for identification of serotype of *Orientia tsutsugamushi*

: Domestic patent (KR 10-2015-0132145), Inventor

4. Zinc oxide binding peptide, complex comprising the peptide, and pharmaceutical composition comprising the complex

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National Research Foundation of Korea(NRF) grant funded by the Korea government

(2020.03 – 2022.02 , \$80,000 / yr) - Ongoing



## ■ Publications (2011-Presents)

• **Published articles :1 Correspondence(\*), 11 First-author (Underlined) , 10 collaboration, 1 Book chapter**

23. Dong-Min Kim , Yuri Kim, Jun-Won Seo , Jooyeon Lee , Uni Park , Na-Young Ha , Jaemoon Koh, Hyoree Park , Jae-Won Lee , Hyo-Jin Ro, Na Ra Yun , Da Young Kim , Sung Ho Yoon , Yong Sub Na , Do Sik Moon , Choon-Mee Kim , Kyeongseok Jeon , Jun-Gu Kang , Na-Yoon Jang , Hyeongseok Jeong , Jungok Kim , Shinhyea Cheon , Kyung Mok Sohn , Jae Youg Moon , Sungmin Kym , Seung Ro Han , Myung-Shin Lee , Hyun-Je Kim , Woong-Yang Park , Ji-Yeob Choi , Hyun-Woo Shin , Hye-Young Kim , Chung-Hyun Cho , Yoon Kyung Jeon , Yeon-Sook Kim , Nam-Hyuk Cho

Enhanced eosinophil-mediated inflammation associated with antibody and complement-dependent pneumonic insults in critical COVID-19 Cell Reports. 2021 Oct 5;37(1):109798.doi: 10.1016/j.celrep.2021.109798

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Immunization with a recombinant antigen composed of conserved blocks from TSA56 provides broad genotype protection against scrub typhus. Emerg Microbes Infect.2019;8(1):946-958

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Comparative Study of Two Droplet-Based Dissolving Microneedle Fabrication Methods for Skin Vaccination. Adv. Healthcare Mater. 2018, 1701381(24)

16. Na-Young Ha, Yuri Kim, Chan-Ki Min, Hong-Il Kim, Nguyen Thi Hai Yen, Myung-Sik Choi, Jae-Seung Kang, Yeon-Sook Kim and Nam-Hyuk Cho. Longevity of antibody and T-cell responses against outer membrane antigens of *Orientia tsutsugamushi* in scrub typhus patients. Emerging Microbes & Infections (2017) 6, e116; doi:10.1038/emi.2017.106(60)

15. Gwanhun Kim, Na-Young Ha, Chan-Ki Min, Hong-Il Kim, Nguyen Thi Hai Yen, Keun-Hwa Lee , Inbo Oh, Jae-Seung Kang, Myung-Sik Choi, Ik-Sang Kim, Nam-Hyuk Cho. Diversification of *Orientia tsutsugamushi* genotypes by intragenic recombination and their potential expansion in endemic areas PLoS Negl Trop Dis. 2017 Mar 1;11(3):e0005408.(24)(51)



14. [Na-Young Ha](#), Gwanhun Kim, Nam-Hyuk Cho

Book : Rickettsiales (Publisher : Springer, Editor : Sunil Thomas, 2016)

Chapter 17. Epidemiological trends of scrub typhus : Global incidence and vector distribution

13. Jong-Hun Ha, Dong-Hae Lee, Jin-Sik Park, Oh Hyun Cho, Dong-Hoon Kim, **Na-Young Ha**, Nam-Hyuck Cho, Kyu Jam Hwang, Yong-Gon Cho, Hye-Soo Lee, Won Kil Lee, Yoo Chul Lee, Myung-Je Cho, Woo-Kon Lee, Min-Kyoung Shin Isolation and Genetic Characterization of *Orientia tsutsugamushi* from Scrub Typhus Patients in Gyeongsangnam-do, Korea. J.Bacteriology and Virology 2016. Vol. 46(12)

12. [Ha NY](#), Shin HM, Sharma P, Cho HA, Min CK, Kim HI, Yen NTH, Kim IS, Choi MS, Kim YK, Cho NH.

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10. Kim Yuri, Cheon SH, Min CK, Sohn KM, Kang YJ, Cha YJ, Kang JI, Han SK, **Ha NY**, Kim GH, Aigerim A, Shin HM, Choi MS, Kim SG, Cho HS, Kim YS, Cho NH.

Spread of Mutant Middle East Respiratory Syndrome Coronavirus with Reduced Affinity to Human CD26 during the South Korean Outbreak. mBio.2016.March 1. Volume 7 Issue 2; e00019-16(18)

9. S Bang, CK Min, **NY Ha**, MS Choi, IS Kim, YS Kim.

Inhibition of eukaryotic translation by tetratricopeptide-repeat proteins of *Orientia tsutsugamushi*. Journal of Microbiology (2016) Vol. 54, No. 2, pp. 136–144 DOI 10.1007/s12275-016-5599-5(26)

8. Park SW, [Ha NY](#), Ryu BY, Bang JH, Song HY, Kim YR, Kim GH, Oh MD, Cho NH, Lee JK.

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