

## Heeseon An, Ph. D.

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### PROFESSIONAL EXPERIENCE

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- Assistant Member**, Chemical Biology Program, Sloan Kettering Institute for Cancer Research, Memorial Sloan Kettering Cancer Center (MSKCC) 2021-present
- Assistant Professor**, Tri-Institutional Training Program in Chemical Biology, Sloan Kettering Institute, Cornell University, and the Rockefeller University. 2021-present
- Assistant Professor**, Pharmacology Program, Weill Graduate School of Medical Sciences of Cornell University. 2021-present
- Assistant Professor**, Gerstner Sloan Kettering Graduate School of Biomedical Sciences, MSKCC. 2021-present
- Researcher**, Skincare product development team (emulsion chemistry), Amorepacific R&D Center, South Korea 2008-2011

### EDUCATION

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- Postdoctoral Fellow**, Department of Cell Biology, Harvard Medical School, USA 2016-2020  
Advisor: Professor J. Wade Harper
- Ph.D. in Chemistry**, Department of Chemistry, Northwestern University, USA 2011-2015  
Advisor: Professor Alexander V. Statsyuk
- M.S. in Chemistry**, Department of Chemistry, Seoul National University, South Korea 2006-2008  
Advisor: Professor Seung Bum Park
- B.S. in Chemistry**, Department of Chemistry, Seoul National University, South Korea 2001-2006  
Advisor: Professor Seung Bum Park

### PUBLICATIONS

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*Independent (\*: corresponding author, #: co-first author)*

1. Barin, E., Darge, N., Nambiar, D., Becker, T., Beckmann, R., Ordureau, A., **An, H.**\* (2024) Rapid degradation of ribosomal proteins, Ribo-DART, determines the role of r-proteins after ribosome biogenesis. *Under review.*
2. Yi, S.A., Sepic, S., Schulman, B.A., Ordureau, A., **An, H.**\* (2024) mTORC1-CTLH E3 Ligase Regulates the Degradation of HMG-CoA Synthase 1 through the Pro/N-Degron Pathway. *Molecular Cell*. 84, 1–19.
3. Jordan, V.N.; Ordureau, A.; **An, H.**\* (2023) Identifying E3 Ligase Substrates With Quantitative Degradation Proteomics. *Chembiochem*, 24(16), e202300108.
4. Kim, M.; Chen, C.; Yaari, Z.; Frederiksen, R.; Randall, E.; Wollowitz, J.; Cupo, C.; Wu, X.; Shah, J.; Worroll, D.; Lagenbacher, R.E.; Goerzen, D.; Li, Y.M.; **An, H.**; Wang, Y.; Heller, D.A. (2023) Nanosensor-based monitoring of autophagy-associated lysosomal acidification in vivo. *Nat. Chem. Biol.* 19, 1488-1457.

Post-doctoral, PhD, and master trainings

5. Fiesel, F.C.; Fričová, D.; Hayes, C.S.; Coban, M.A.; Hudec, R.; Bredenberg, J.M.; Broadway, B.J.; Markham, B.N.; Yan, T.; Boneski, P.K.; Fiorino, G.; Watzlawik, J.O.; Hou, X.; McCarty, A.M.; Lewis-Tuffin, L.J.; Zhong, J.; Madden, B.J.; Ordureau, A.; **An, H.**; Puschmann, A.; Wszolek, Z.K.; Ross, O.A.; Harper, J.W.; Caulfield, T.R.; Springer, W. (2023) Substitution of PINK1 Gly411 modulates substrate receptivity and turnover. *Autophagy*, 19, 1711-1732.
6. Ordureau, A.; Kraus, F.; Zhang, J.; **An, H.**; Park, S.; Ahfeldt, T.; Paulo, J.A.; Harper, J.W. (2021) Temporal Proteomics during Neurogenesis Reveals Large-scale Proteome and Organelle Remodeling via Selective Autophagy. *Molecular Cell*, 81 (24), 5082-5098.
7. Garshott, D.M.; **An, H.**; Sundaramoorthy, E.; Leonard, M.; Vicary, A.; Harper, J.W.; Bennett, E.J.; (2021) iRQC, a Surveillance Pathway for 40S Ribosomal Quality Control during mRNA Translation Initiation. *Cell Report*, 36 (9), 109642.
8. **An, H.**.; Ordureau, A. #; Koerner, M.; Paulo, J.A.; Harper, J.W. (2020) Systematic Quantitative Analysis of Ribosome Inventory During Nutrient Stress. *Nature*, 583, 303-309.
9. Ordureau, A.; Paulo, J.A.; Zhang, J.; **An, H.**; Swatek, K.N.; Cannon, J.R.; Wan, Q.; Komander, D.; Harper J.W. (2020) Global Landscape and Dynamics of Parkin and USP30-dependent Ubiquitylomes in iNeurons during Mitophagic Signaling. *Molecular Cell*, 77, 1124-1142.
10. **An, H.**; Harper, J.W. (2020) Ribosome Abundance Control Via the Ubiquitin-Proteasome System and Autophagy. *J. Mol. Biol.* 432, 170-184, review article.
11. **An, H.**; Ordureau, A.; Paulo, J.A.; Shoemaker, C.J.; Denic, V.; Harper, J.W. (2019) TEX264 Is an Endoplasmic Reticulum-Resident ATG8-Interacting Protein Critical for ER Remodeling during Nutrient Stress, *Molecular Cell*, 74, 891-908.
12. **An, H.**; Harper, J.W. (2018) Systematic Analysis of Ribophagy in Human Cells Reveals Bystander Flux During Selective Autophagy, *Nat. Cell Biol.*, 20, 135-143.
13. Juenemann, K.; Jansen, A.H.P.; van Riel, L.; Merx, R.; Mulder, M.P.C.; **An, H.**; Statsyuk, A.; Kirstein, J.; Ovaas, H.; Reits, E.A. (2018) Dynamic recruitment of ubiquitin to mutant huntingtin inclusion bodies. *Sci. Rep.*, 8, 1405.
14. Misra, M.; Kuhn, M.; Lobel, M.; **An, H.**; Statsyuk, A.V.; Sotriffer, C.; Schindelin, H. (2017) Dissecting the Specificity of Adenosyl Sulfamate Inhibitors Targeting the Ubiquitin-Activating Enzyme, *Structure*, 25, 1120-1129.
15. **An, H.**; Statsyuk, A.V. (2016) Facile Synthesis of Covalent Probes to Capture Enzymatic Intermediates during E1 Enzyme Catalysis, *Chem. Comm.*, 52, 2477-2480.
16. **An, H.**; Statsyuk, A.V. (2015) An Inhibitor of Ubiquitin Conjugation and Aggresome Formation. *Chem. Sci.* 6, 5235-5245.
17. **An, H.**; Krist, D.; Statsyuk, A.V. (2014) Crosstalk between Kinases and Nedd4 family Ubiquitin Ligases. *Mol. BioSyst.*, 10, 1643-1657, review article.

18. **An, H.**; Statsyuk, A.V. (2013) Development of Activity-Based Probes for Ubiquitin and Ubiquitin-Like Protein Signaling Pathways. *J. Am. Chem. Soc.*, 135 (45), 16948-16962.
19. Koh, M.; Park, J.; **An, H.**; Park, S.B. (2011) Ratiometric analysis of zidovudine (ZDV) incorporation by reverse transcriptases or polymerases via bio-orthogonal click chemistry. *Chem. Comm.*, 47, 7614-7616.
20. **An, H.**; Eum, S.-J.; Koh, M.; Lee, S.K.; Park, S.B. (2008) Diversity-oriented Synthesis of Privileged Benzopyranyl Heterocycles from S-cis Enones. *J. Org. Chem.*, 73, 1752-1761.

## PATENTS

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1. Alexander V Statsyuk; **Heeseon An**, Analogs of adenosine monophosphate (AMP) as inhibitors of ubiquitin-like modifier activating enzyme ATG7 (Serial No. 62/330,539, US Patent 20,170,312,284).
2. Neil L Kelleher; Alexander V Statsyuk; David T. Krist; **Heeseon An**; Luis Henrique Ferreira do Vale, Photocrosslinking reagents and methods of use thereof (Serial No. 62/173,129, PCT/US2016/036561)
3. Seung Hyoun Kang; So-Woong Choi; **Heeseon An**; Byoung-Gun Chae, Composition for external application to the skin containing cyclohexane dicarboxylic acid derivatives. (Korea Patent Number: 10-2009-0117136)
4. **Heeseon An**; Jinseob Shim; SeongA Cho; Juncheol Cho, Effect of Citral on reducing Retinol-induced skin irritation (Korea Patent Number: 10-2010-0071148)

## HONORS, FELLOWSHIPS, GRANTS

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- Josie Robertson Young Investigator's Award, MSKCC and Robertson program 2021-2025
- Keystone Symposia Future of Science Fund Scholarship 2018
- Katten Muchin Rosenman Travel Scholarship 2015
- The Robert H. Lurie Comprehensive Cancer Center of Northwestern University
- Bordwell Fellowship, Department of Chemistry, Northwestern University 2011-2012
- New Excellent Technology (NET) Ministry of Knowledge Economy, South Korea 2011
- Technology Platform Award (Silver medal), Amorepacific R&D Center, South Korea 2010

## JOURNAL REVIEWER

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Cell Chemical Biology (2021), Frontiers in Cell and Developmental Biology (2021), ACS Chemical Biology (2022), EMBO J (2023), Nature Chemical Biology (2023), Molecular Cell (2024)

## ORAL PRESENTATIONS

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### After Joining MSKCC

- New York Academy of Sciences, Chemical Biology of Protein Homeostasis 2024  
*Invited talk*
- Department of Biomedical Engineering, Hanyang University, South Korea 2024  
*Invited talk*, "Identifying Impaired Protein Degradation in Cancer to Develop New Therapy"
- EMBO Workshop, RNA meets Protein Decay, Croatia 2023  
*Invited talk*, "Redefining the role of individual ribosomal proteins to elucidate ribosomes with altered compositions"
- Cold Spring Harbor Meeting, Ubiquitins, Autophagy, and Disease, Cold Spring Harbor Meeting 2023  
*Invited talk*, "Molecular basis and significance of HMGCS1 degradation"
- American Society for Biochemistry and Molecular Biology (ASBMB), the Protein Interest Group 2021

## Protein Quality Control

*Invited talk, “Systematic Quantitative Analysis of Ribosome Inventory”*

### Before Joining MSKCC

- Keystone Symposia Conference, Selective autophagy, Kyoto, Japan 2018  
*Selected talk, “Systematic analysis of ribophagy in human cells reveals bystander flux during selective autophagy”*
- 6<sup>th</sup> Annual Biophysics Symposium, Northwestern University, USA 2015  
*Selected talk, “An Inhibitor of Ubiquitin Conjugation and Aggresome Formation”*
- Chemistry of Life Processes Forum, Northwestern University, USA 2015  
*“An Inhibitor of Ubiquitin Conjugation System: Design Strategies and Pharmacological Properties”*
- 4<sup>th</sup> Annual Biophysics Symposium, Northwestern University, USA 2013  
*Selected talk, “Discovery of New Ubiquitin-Like Proteins Using an Activity Based Probe for UBL pathways”*
- Annual Meeting of Amorepacific R&D Center, South Korea 2011  
*Award winners invited talk, “Ceramide-Stabilized Macro-Multilamellar Emulsions: Rheological Properties and Skin Hydration Effects”*
- 22<sup>nd</sup> World Congress of Dermatology, Seoul, South Korea 2010  
*Selected talk, “Effect of Citral Co-treatment for Reducing Retinol Induced Skin Irritation on Human Epidermis”*
- 3<sup>rd</sup> Symposium of the Pharmaceutical Society of Korea (Med. Chem. Division) 2007  
*“Diversity-oriented Synthesis of Privileged Benzopyranyl Heterocycles”*