

Shuo Han, Ph.D.

Department of Biochemistry
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Education

- 2009-2017 **Ph.D. in Genetics**
Stanford University School of Medicine, Stanford, CA
- 2005-2009 **B.S. in Biology** (GPA 4.9/5.0)
Massachusetts Institute of Technology, Cambridge, MA

Research Experience

- 2017-2022 **Postdoctoral Research, Stanford University School of Medicine**
Advisor: Dr. Justin Sonnenburg
Mechanistic interrogation of the human gut microbiome
- Constructed a microbiome-focused mass-spectrometry reference library and analytical pipeline (Python) to identify 800+ metabolites in diverse sample types
 - Created a web-based Metabolomics Data Explorer (JavaScript) for dynamic user interactions with the metabolomics datasets with 3000+ samples
 - Democratized this metabolomics pipeline through tutorial workshops and collaborations at and outside Stanford
 - Discovered novel metabolic patterns across microbial phylogeny by strain-resolved comparative genomics and comparative metabolomics
 - Constructed gnotobiotic mouse models to toggle aging-relevant metabolites via manipulating microbes in the gut
- 2009-2017 **Ph.D. Dissertation Research, Stanford University School of Medicine**
Advisor: Dr. Anne Brunet
Thesis committee members: Drs. Andrew Fire, Stuart Kim, and Or Gozani
Epigenetic regulation of fat metabolism and longevity
- Discovered a novel role of bioactive lipids (mono-unsaturated fatty acids), which link H3K4me3 chromatin modifiers to lifespan extension in *C. elegans*
 - Described the molecular details responsible for the synthesis of these lipids in the intestine and for the germline-to-intestine communication
 - Demonstrated that dietary intake of mono-unsaturated lipids extends lifespan in the physiological context, highlighting their health benefits could be extended to mammals
- 2007-2009 **Undergraduate Research, MIT/Whitehead Institute**
Advisor: Dr. Gerald Fink
Mechanism of fungal evasion from the host
- Discovered several chromatin-modifying factors that modulate cell surface antigen variations in budding yeast *S. cerevisiae*
- 2006 **Undergraduate Summer Research, University of California Irvine School of Medicine**
Advisor: Dr. Haoping Liu
Mechanism of fungal infection strategies
- Examined the role of mitogen-activated protein kinase Fus3 in yeast filamentation

Selected Awards and Honors

- 2021 **Stanford.Berkeley.UCSF Next Generation Faculty Symposium, Honorable Mention**
Selected based on research achievements and significant contributions to increasing diversity, equity, and inclusion in science.
- 2019-present **NIA Ruth L. Kirschstein National Research Service Award Postdoctoral Fellowship**
Three-year fellowship award
- 2018-2019 **Stanford University School of Medicine Dean's Postdoctoral Fellowship**
One of the twenty recipients selected from applicants from 40+ departments
- 2014-2015 **Stanford University Mass Spectrometry (SUMS) Seed Grant recipient**
One year of research funding from SUMS Vincent Coates Foundation on exploring the link between lipid metabolism and longevity in *C. elegans*
- 2014 **Travel Fellowship for CSHL Meeting on the Molecular Genetics of Aging**
Selected based on research abstract
- 2010-2013 **National Science Foundation Graduate Research Fellowship**
Three-year fellowship awarded based on research proposal and broader impacts
- 2009-2014 **Stanford Graduate Fellowship**
Five-year fellowship awarded for academic and research achievements
- 2009 **MIT John L. Asinari Award for Outstanding Research in Life Sciences**
One of the few students per year nominated by MIT Biology faculty based on research achievements
- 2008 **HHMI EXROP Undergraduate Research Fellow**
One student per year nominated by MIT Biology faculty to conduct a 10-week independent summer research project under HHMI funding
- 2008 **MIT Hope Babette Tang Scholarship**
Awarded for academic achievements
- 2008 **2nd Place, S. Klein Prize in Technical Writing, MIT Ilona Carmel Writing Competition**
Awarded for effective written communication of the undergraduate research thesis
- 2005-2008 **Robert C. Byrd Honors Scholarship**
Awarded for academic achievements

Publications

- Guthrie L, Spencer SP, Perelman D, Van Treuren W, **Han S**, Yu FB, Sonnenburg ED, Fischbach, MA, Meyer TW, and Sonnenburg JL. Impact of 7-day homogenous diet on interpersonal variation in human gut microbiomes and metabolomes. *Cell Host Microbe* 30, 863-874 (2022).
- Han S***, Van Treuren W*, Fischer CR, Merrill BD, DeFelice BC, Sanchez JM, Higginbottom, SK, Guthrie, L, Fall LA, Dodd D, Fischbach MA, and Sonnenburg JL. A metabolomics pipeline for the mechanistic interrogation of the gut microbiome. *Nature* 595, 415-420 (2021). *Equal contribution
 - Article featured in News and Views: Kindschuh WF and Korem T. Deciphering metabolism, one microbe at a time. *Nature* 595, 355-357 (2021).

3. Wastyk HC, Fragiadakis GK, Perelman D, Dahan D, Merrill BD, Yu FB, Topf M, Gonzalez CG, Van Treuren W, **Han S**, Robinson JL, Elias JE, Sonnenburg ED, Gardner CD, and Sonnenburg JL. Gut-microbiota-targeted diets modulate human immune status. *Cell* 184, 4137-4153 (2021).
4. Mars RAT, Yang Y, Ward Y, Houtti M, Priya S, Lekatz HR, Tang X, Sun Z, Krishna RK, Korem T, Bhattarai Y, Zheng T, Bar N, Frost G, Johnson AJ, Van Treuren W, **Han S**, Ordog T, Grover M, Sonnenburg J, D'Amato M, Camilleri M, Elinav E, Segal E, Blekhman R, Farrugia G, Swann JR, Knights D, and Kashyap PC. Longitudinal multi-omics reveals subset-specific mechanisms underlying irritable bowel syndrome. *Cell* 182, 1460-1473 (2020).
5. **Han S**, Schroeder EA, Silva-García CG, Hebestreit K, Mair WB, Brunet A. Mono-unsaturated fatty acids link H3K4me3 modifiers to longevity in *C. elegans*. *Nature* 544,185-190 (2017).
 - Article featured in Research Highlights: Baumann K. Ageing: Is fat a key to longevity? *Nat Rev Mol Cell Biol* 18, 341 (2017).
6. Biegging-Rolett KT, Johnson TM, Brady CA, Beaudry VG, Pathak N, **Han S**, Attardi LD. p19(Arf) is required for the cellular response to chronic DNA damage. *Oncogene* 35, 4414-4421 (2016).
7. **Han S**, Brunet A. Lysosomal lipid lengthens life span. *Science* 347, 32-33 (2015).
8. **Han S**, Brunet A. Histone methylation makes its mark on longevity. *Trends Cell Biol* 22, 42-49 (2012).
9. Greer EL, Maures TJ, Hauswirth AG, Green EM, Leeman DS, Maro GS, **Han S**, Banko MR, Gozani O, Brunet A. Members of the H3K4 trimethylation complex regulate lifespan in a germline-dependent manner in *C. elegans*. *Nature* 466, 383-387 (2010).

Presentations

Invited Talk

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| 2022 | 7 th Microbiome Movement - Drug Development Summit |
| 2021 | Metabolomics Association of North America-Microbiome Interest Group Seminar, Virtual. |
| 2020 | 8 th Microbiome Probiotics R&D and Business Collaboration Forum, Virtual. |
| 2019-2020 | Chan Zuckerberg Biohub Microbiome Initiative Meeting, San Francisco. |
| 2019 | Department of Microbiology & Immunology Annual Conference, Stanford. |
| 2017 | Stanford ChEM-H Metabolomics Knowledge Center Meeting, Stanford. |
| 2016 | Mass Spectrometry Research Applications Symposium, Stanford. |
| 2015 | Current Issues in Genetics, Stanford. |
| 2014 | CSHL meeting on the Molecular Genetics of Aging, New York. |
| 2012 | Stanford Worm Meeting, Stanford. |

Poster

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| 2021 | World Microbe Forum, Virtual Conference. |
| 2018 | Department of Microbiology & Immunology Annual Conference, Stanford. |
| 2012 | CSHL meeting on the Molecular Genetics of Aging, New York. |
| 2010-2016 | Bay Area Aging Meeting, UCSF/UC Berkeley/Stanford/Buck Institute. |
| 2010-2016 | Department of Genetics Annual Conference, Stanford. |