

Sina Ghaemmaghami, PhD

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Education and Research

McMaster University, Hamilton, ON Canada (1991-1996)

BS, Biochemistry. Graduated with Honors.
Advisor: Dr. Vitai Ananthanarayanan

Duke University, Durham, NC (1996-2001)

Ph.D., Biochemistry
Advisor: Dr. Terrence Oas

Research focus: proteomics and protein folding
Thesis: "Analysis of Protein Stability by Hydrogen Exchange"

University of California, San Francisco (2001-2006)

Postdoctoral Fellow, Department of Cellular & Molecular Pharmacology
Advisor: Dr. Jonathan Weissman

Research focus: proteomics and functional genomics in yeast

University of California, San Francisco (2006-2012)

Adjunct Professor, Institute for Neurodegenerative Diseases
Advisor: Dr. Stanley Prusiner

Research focus: proteomics and prion biology

University of Rochester (2012-present)

Assistant Professor, Department of Biology

Research focus: protein degradation, proteomics, prion biology

Other U of R affiliations: Center for Neural Development and Disease, Biophysics, Structural Biology and Computational Biology Graduate Program, Biochemistry and Molecular Biology Graduate Program, Biological Chemistry Cluster, Director of the University of Rochester Mass Spectrometry Resource Laboratory

Honors and Awards

1991	Ontario Scholarship, Canada
1991-1995	Dean's Honor List, McMaster University, Hamilton, Canada
1995-1996	NSERC (Canada) Undergraduate Industrial Fellowship
1996-1999	NIH Predoctoral Trainee
2001-2002	Howard Hughes Postdoctoral Trainee
2002-2005	NIH Ruth L. Kirschstein Postdoctoral Fellowship
2003-2005	UCSF Postdoctoral Teaching Fellowship
2007-2009	The John Douglas French Alzheimer's Foundation Distinguished Research Scholar Award

2014-2019 NSF Faculty Early Career Development (CAREER) Award
2016 Thermo Scientific / American Society of Mass Spectrometry TMT Innovation Award
2017 Georgen Award for Excellence in Undergraduate Teaching

Professional Organizations and Outside Service

2010-present American Society for Mass Spectrometry
1996-present American Association for the Advancement of Science
1996-present The Protein Society
1996-present Reviewer for Biochemistry, Analytical Chemistry, Molecular and Cellular Proteomics, Cell Systems, Autophagy, PLOS One and Prion journals
2001-2002, 2005 Howard Hughes Medical Institute
2013-present Human Proteome Organization
2013-present Ad-hoc reviewer for the National Science Foundation

Scientific Presentations

2000 Protein Society Symposium, San Diego, CA, (selected speaker)
2001 International Symposium on Mass Spectrometry in the Health and Life Sciences, San Francisco, CA, (poster)
2002 Vanderbilt Genomic Conference, Nashville, TN (poster)
2002 Yeast Genetics and Molecular Biology Meeting, Madison, WI (selected speaker)
2002 American Association of Pharmaceutical Scientists (AAPS) Annual Conference, Toronto, Canada, (invited speaker)
2004 Beyond Genome: Proteomics, San Francisco, CA, (invited speaker)
2004 Duke Symposium on Computational Protein Biology, Durham, NC (invited speaker)
2004 Genentech Research in Progress Series, San Francisco, CA (invited speaker)
2006 Prion Conference, Torino, Italy (poster)
2006-2010 Annual Fairchild Foundation Symposium, San Francisco, CA (invited speaker)
2008 Prion Conference, Madrid, Spain (poster)
2010 Prion Conference, Salzburg, Austria (selected speaker)
2010 Mainz University, Germany, Department of Chemistry (invited speaker)
2011 Prion Conference, Montreal, Canada (selected speaker)
2012 Keystone Symposium, Proteomics and Interactomes, Stockholm, Sweden (selected speaker)
2012 University of Rochester Biophysics Retreat (invited speaker)
2012 University of Rochester Department of Microbiology and Immunology (invited seminar speaker)
2013 Prion Conference, Banff, Canada (selected speaker)
2013 University of Rochester Aging Day (invited speaker)
2013 University of Rochester Department of Biochemistry Retreat (invited speaker)
2013 University of Rochester Chemistry-Biology Cluster Retreat (invited speaker)
2013 The Buck Institute for Research on Aging (invited seminar speaker)
2013 University of Rochester Summer Scholars Program Seminar (invited speaker)
2013 University of Toronto, Tanz Center for Research in Neurodegenerative Disease (invited speaker)
2014 Wilkes University, Department of Chemistry (invited speaker)
2014 University of Rochester Center for Neural Development and Disease Seminar
2014 Human Proteome Organization (invited speaker)
2014 SUNY Geneseo, Department of Chemistry (invited speaker)

2014 Niagara University, Department of Chemistry (invited speaker)
 2014 Allegheny College, Department of Biology (invited speaker)
 2015 Keystone Symposium, Autophagy, Breckenridge Colorado (poster presentation)
 2015 University of Rochester, Department of Biology Donut Talks
 2015 University of Rochester Biophysics Retreat (invited speaker)
 2015 University of Massachusetts Department of Biochemistry and Molecular Biology (invited speaker)
 2016 University of Toronto, Department of Biochemistry (invited speaker)
 2016 Broad Institute of Harvard and MIT, Chemical Biology (invited speaker)
 2016 University of Rochester Medical Center, The Informatics and Genomics Research Center (TIGR) (invited speaker)
 2017 Brigham Young University, Department of Chemistry (invited speaker)

Teaching and mentorship

2012-2017 Advisor to four Ph.D. students and one MS student, degrees obtained by one Ph.D. and one M.S. student
 2012-2017 Mentored 21 undergraduates and 2 high school students in various research projects. Two undergraduates were co-authors on published review papers. Two students completed senior theses.
 2012-2017 BIO395: Independent Study (supervised ten students to date)
 2012-2017 BIO581: Topics in Cellular, Developmental and Molecular Biology (one lecture each year)
 2014 BIO516: Cell/Dev/Mol Biology Seminar
 2014-2017 IND408: Advanced Biochemistry (two lectures each year)
 2014-2017 BIO250H/252: Introduction to Biochemistry-Honors (developed the course)
 2016-2017 IND419: Introduction to Quantitative Biology (three lectures each year)

University Service

2012 Departmental Committees: seminar series, faculty search
 2013 Departmental Committees: seminar series, departmental retreat
 2013-2014 Initiated a program for seminars given by student-invited speakers in the Department of Biology
 2013-2014 Proteomics core facility advisory committee
 2013-2014 Participated in minority recruitment efforts of the Biochemistry and Molecular Biology programs by at a number of local colleges
 2013-2017 Part of thesis and qualification committees of ten Ph.D. students
 2013-2016 Biophysics, Structural Biology and Computational Biology Graduate Program selection committee
 2014 Internal grant review panels for the Center for AIDS research (CFAR)
 2014 Participated in minority graduate student recruitment efforts of the Biochemistry department by giving presentations at a number of local colleges
 2014 Participated in Big Data Initiative faculty search as a Biology Department representative
 2014 Departmental Committees: seminar series, retreat, faculty search
 2014 Center for Excellence in Teaching and Learning (CETL) hiring committee and Student Course Development Projects (SCDP) program participant
 2014-2017 Participated in the organization of the Upward Bound program
 2015 Participated in McNair Scholarship program

2015 Departmental Committees: seminar series, retreat
2015-2017 Director of the University of Rochester Mass Spectrometry Resource
Laboratory, organized a biannual regional mass spectrometry symposium

Research Support

Current support

National Science Foundation

MCB-1350165 CAREER (PI: Ghaemmaghani) 1/01/2014 – 12/31/2018

000497-NSF \$123,778 Annual Direct

“Career: Global analysis of in vivo protein folding efficiencies by mass spectrometry”

National Institutes of Health

1S100D021486-01 (PI: Ghaemmaghani) 03/15/2016 – 03/14/2017

NIH S10 Shared Instrumentation Award \$308,767

"QExactive+ for University of Rochester Proteomics Research"

National Institutes of Health

1 R35 GM119502-01 (PI: Ghaemmaghani) 08/01/2016 – 05/31/2021

000205 - DHHS/PHS/NIH \$236,256 Annual Direct

"The prevalence and mechanism of selectivity in basal autophagy

Completed

Collaborative Bioinformatics Pilot Award from Center for Integrative Bioinformatics and
Experimental Mathematics (CIBEM)

Quantitative proteomic analysis of influenza-infected mice

[PI: Ghaemmaghani]

(5/1/2013 - 4/30/2015 - \$49,282)

Schmitt Program in Integrative Neuroscience (SPIN)

Disrupted protein translation causes astrocyte dysfunction in Vanish White Matter disease

[PI: Pröschel, Ghaemmaghani]

(5/16/2016 - 5/15/2017 - \$50,000)

Pending

1S100D025242-01 (PI: Ghaemmaghani) 02/01/2018 – 02/01/2019

NIH S10 Shared Instrumentation Award \$1,081,132

"Orbitrap Fusion Lumos Mass Spectrometer for UR Proteomics Research"

1R01AG057353-01 (PI: Jasper, Co-PI: Ghaemmaghani) 10/01/2017 – 10/01/2022

NIH S10 Shared Instrumentation Award \$3,199,546

"Proteostasis and metabolism in brain aging" *Impact Score: 26*

Patents:

Quantitative, high-throughput screening method for protein stability (US 7148071 B2)

Methods for detecting modification resistant nucleic acids (US 20100120625 A1)

Isotopic labeling for the measurement of global protein levels and turnover *in vivo* (EP 2582789 A4)

Publications:

1. S. Ghaemmaghami, J.M. Word, R.E. Burton, J.S. Richardson and T.G. Oas (2000). Folding kinetics of a fluorescent variant of monomeric λ repressor. ***Biochemistry*** 37, 9179-918
2. S. Ghaemmaghami, M.C. Fitzgerald and T.G. Oas (2000). A quantitative, high-throughput screen for protein stability. ***Proc. Natl. Acad. Sci. USA*** 97, 8296-8301
3. S. Ghaemmaghami and T.G. Oas (2001). Quantitative protein stability measurement in vivo. ***Nature Struct. Biol.*** 8, 879-882
4. K.D. Powell, S. Ghaemmaghami*, M.Z. Wang, M. Liyuan, T.G. Oas and M.C. Fitzgerald (2002). A general mass spectrometry-based assay for the quantitation of protein-ligand binding interactions in solution. ***J. Am. Chem. Soc.*** 124, 10256-10257
5. S. Ghaemmaghami, W.K. Huh, K. Bower, R.W. Howson, A. Belle, N. Dephoure, E.K. O'Shea and J.S. Weissman (2003). Global analysis of protein expression in yeast. ***Nature*** 425, 737-741
6. R. Howson, W.K. Huh, S. Ghaemmaghami, J.V. Falvo, K. Bower, A. Belle, N. Dephoure, D.D. Wykoff, J.S. Weissman and E.K. O'Shea (2005). Construction, verification, and experimental use of two epitope-tagged collections of budding yeast strains. ***Comp. Funct. Genomics*** 6, 2-16
7. J.R.S. Newman, S. Ghaemmaghami, J. Ihmels, D.K. Breslow, M. Noble, J.L. DeRisi and J.S. Weissman (2006) Single-cell proteomic analysis of *S. cerevisiae* reveals the architecture of biological noise. ***Nature*** 441, 840-846 918
8. S. Ghaemmaghami, P.W. Phuan, B. Perkins, J. Ullman, B.C. May, F.E. Cohen, S.B. Prusiner (2007) Cell division modulates prion accumulation in cultured cells. ***Proc. Natl. Acad. Sci. USA*** 104, 17971-17976
9. N.T. Ingolia, S. Ghaemmaghami, J.R.S. Newman, and J.S. Weissman (2009) Genome-wide analysis in vivo of translation with nucleotide resolution using ribosome profiling. ***Science*** Apr 10 v324, 218-223
10. Ghaemmaghami S, Ahn M, Lessard P, Giles K, Legname G, DeArmond SJ, Prusiner SB. (2009) Continuous quinacrine treatment results in the formation of drug-resistant prions. ***PLoS Pathog.*** Nov;5(11):e1000673. Epub 2009 Nov 26
11. Ghaemmaghami S, Ullman J, Ahn M, St Martin S, Prusiner SB. (2009) Chemical induction of misfolded prion protein conformers in cell culture. ***J Biol. Chem.*** Apr 2;285(14):10415-23
12. Ghaemmaghami S, May BC, Renslo AR, Prusiner SB (2010) Discovery of 2-aminothiazoles as potent antiprion compounds. ***J. Virol.*** Apr; 84(7):3408-12

13. Price JC, Guan S, Burlingame A, Prusiner SB, Ghaemmaghmi S (2011) Analysis of proteome dynamics in the mouse brain. **Proc. Natl. Acad. Sci. USA** Aug 10;107(32):14508-13
14. Poncet-Montange G, St Martin SJ, Bogatova OV, Prusiner SB, Shoichet BK, Ghaemmaghmi S* (2011) A survey of antiprion compounds reveals the prevalence of non-PrP molecular targets. **J. Biol. Chem.** Aug 5;286(31):27718-28 (refereed research article)
15. Ghaemmaghmi S, Watts J, Nguyen H, Hayashi S, Lemus A, DeArmond SJ and Prusiner SB (2011) Conformational transformation and selection of synthetic prion strains. **J. Mol. Biol.** Oct 28;413(3):527-42
16. Guan S, Ghaemmaghmi S, Price JC, Prusiner SB, Burlingame AL (2011) A data processing pipeline for mammalian proteome dynamics studies using stable isotope metabolic labeling. **Mol. Cel. Proteomics** Dec;10(12):M111.010728
17. Friberg KN, Hung G, Wancewicz E, Giles K, Black C, Freier S, Bennett F, DeArmond SJ, Freyman Y, Lessard P, Ghaemmaghmi S, Prusiner SB (2012) Intracerebral Infusion of Antisense Oligonucleotides Into Prion-infected Mice. **Mol. Ther. Nucleic Acids** 1, e9; doi:10.1038/mtna.2011.6
18. Guan S, Price JC, Ghaemmaghmi S, Prusiner SB, Burlingame AL (2012) Compartment modeling for mammalian protein turnover studies by stable isotope metabolic labeling. **Anal. Chem.** Mar 23. May 1;84(9):4014-21
19. Ahn M, Ghaemmaghmi S, Huang Y, Phuan PW, May BC, Giles K, Dearmond SJ, Prusiner SB. (2012) Pharmacokinetics of Quinacrine Efflux from Mouse Brain via the P-glycoprotein Efflux Transporter. **PLoS One.** 7(7):e39112
20. Ghaemmaghmi S, Colby DW, Nguyen HO, Hayashi S, Oehler A, DeArmond SJ, Prusiner SB. (2013) Convergent replication of mouse synthetic prion strains. **Am J Pathol.** 182(3):866-74
21. Silber BM, Gever JL, Li Z, Gallardo-Godoy A, Renslo AR, Widjaja K, Irwin JJ, Rao S, Jacobson MP, Ghaemmaghmi S, Prusiner SB. (2013) Antiprion compounds that reduce PrPSc levels in dividing and stationary-phase cells. **Bioorgan. Med. Chem.** 15;21(24):7999-8012
22. Miller-Vedam L, Ghaemmaghmi S. (2013) Strain Specificity and Drug Resistance in Anti-Prion Therapy. **Cur. Top. Med. Chem.** 13(19):2397-406
23. Price JC, Ghaemmaghmi S. (2014) Analysis of proteome dynamics in mice by isotopic labeling. **Methods. Mol. Biol.** 1156:111-31
24. Ghaemmaghmi S, Russo M, Renslo AR. (2014) Successes and Challenges in Phenotype-Based Lead Discovery for Prion Diseases. **J. Med. Chem.** Aug 28;57(16):6919-29
25. Zhang T, Nouri E, Li J, Price JC, Hellerstein M, Qu J, Ghaemmaghmi S. (2014) Kinetics of precursor labeling in SILAC experiments. **Anal. Chem.** Nov 18;86(22):11334-41
26. Shen S, Li J, Zand M, Wu H, Ghaemmaghmi S, Qu J (2016) An Ion-Current-Based Temporal Proteomic Profiling of Influenza A Virus Infected Mouse Lungs Revealed Underlying Mechanisms of Altered Integrity of the Lung Microvascular Barrier. **Journal of Proteome Research.** Feb 5;15(2):540-53.
27. Zhang T, Shen S, Qu J, Ghaemmaghmi S. (2016) Global Analysis of Cellular Protein Flux Quantifies the Selectivity of Basal Autophagy. **Cell Rep.** Mar 15;14(10):2426-39.

28. Zhang T, Ghaemmaghmi S. (2016) Auophagic Punctum: Global Analysis of Cellular Protein Flux Quantifies the Selectivity of Basal Autophagy. **Autophagy**. Aug 2;12(8):1411-2.
29. Ghaemmaghmi S. (2016) Biology and genetics of PrP prion strains. (invited chapter in "Prion Diseases" Edited by: Stanley Prusiner, Cold Spring Harbor Laboratory Press)
30. Welle K., Zhang T., Hryhorenko J., Shen S., Qu J., Ghaemmaghmi S. (2016) Time-resolved analysis of proteome dynamics by TMT-SILAC hyperplexing **Mol. Cel. Proteomics** Dec;15(12):3551-3563.
31. Nadtochiy S.M., Wang Y.T., Zhang J., Nehrke K., Schafer X., Welle K., Ghaemmaghmi S., Munger J., Brookes P.S.. Potential mechanisms linking SIRT activity and hypoxic 2-hydroxyglutarate generation: no role for direct enzyme (de)acetylation. **Biochem J**. 2017;474(16):2829-39.
32. Zhang T., Wolfe C., Pierle A., Welle K., Hryhorenko J.R., Ghaemmaghmi S. (2017) Proteome-wide modulation of degradation dynamics in response to growth arrest. **Proceedings of the National Academy of Sciences (USA)**. Under Review.
33. Swovick K., Welle K., Hryhorenko J.R., Seluanov A., Gorbunova A., Ghaemmaghmi S. (2017) Cross-species comparison of proteome turnover kinetics. **Mol Cell Proteomics**. Under Review.
34. Wang L., Davis S., Schilling B., Juhasz G., Gibson B., Ramanathan A., Ghaemmaghmi S., Jasper H. (2017) A metabolic switch at the center of JNK-induced proteostasis and longevity. **Aging Cell**. Under Review.
35. Popa-Wagner A., Coman C., Uzoni A., Welle K., Hryhorenko J.R., Ghaemmaghmi S. (2017) Increased degradation rates in the components of the mitochondrial oxidative phosphorylation chain of the cerebellum of old mice. **Neurobiology of Aging**. Under Review.