

Amit Choudhary, Ph.D.

Assistant Professor of Medicine, Harvard Medical School
Harvard Institutes of Medicine, 570A, 4 Blackfan Circle
Boston, MA 02115 Phone: (617) 714-7445
Email: achoud@broadinstitute.org Lab website: scholar.harvard.edu/c_amit

EDUCATION

- 2006–2011 Ph. D. in Biophysics, University of Wisconsin–Madison, Madison, WI
Research advisor: Prof. Ronald T. Raines
- 2003–2006 M.S. in Chemical Sciences, Indian Institute of Science, Bangalore, India
Research advisors: Profs. Kavirayani R. Prasad and Jayant B. Udgaonkar
- 2000–2003 B. Sc.(Honors) in Chemistry, University of Delhi, Delhi, India
Research advisors: Profs. Shamsheer S. Bari and R. K. Trikha

FACULTY ACADEMIC APPOINTMENTS

- 2015–present Assistant Professor of Medicine
Harvard Medical School, Boston, MA
- 2011–2015 Junior Fellow, Society of Fellows
Harvard University, Cambridge, MA
Mentor: Prof. Stuart L. Schreiber

OTHER PROFESSIONAL POSITIONS

- 2014–2019 Burroughs Wellcome Fellow, Burroughs Wellcome Fund, RTC, NC
- 2014 Consultant, MedImmune (AstraZeneca), Gaithersburg, MD
- 2011–2015 Visiting Fellow, Broad Institute, Cambridge, MA
- 2008–2011 Research Assistant, University of Wisconsin–Madison
- 2007–2008 Technical Assistant (Mass Spectrometry), University of Wisconsin–Madison
- 2006–2007 Teaching Assistant, University of Wisconsin–Madison

PUBLICATIONS (Peer-reviewed, §equal contributors)

31. Maji, B. §, Moore, C.L. § et al "Multidimensional, chemogenic control of CRISPR-Cas9". In preparation
30. Subramanian, H.K. §, Maji, B. §, et al "Conditional control of Cas9 activity using toehold-mediated strand displacement reactions." In preparation
29. Paul, B. §, Pedro, M.S.D.C. §, et al "Site-specific cysteine bioconjugation using molecular-recognition driven catalysis". In preparation
28. Chou, D H-C§, Vetere, A§, Choudhary, A§ et al "Kinase-independent small molecule inhibition of JAK-STAT signaling". *J. Am. Chem. Soc.* **2015**, 137; 7929–7934.
27. Choudhary, A§, Kamer, K.J. §, Shoudlers, M.D. §, Raines, R.T.* "4-Ketoproline: An electrophilic proline analog for bioconjugation". *Peptide Sci.* **2015**, 104, 110–115.
26. Vetere, A.§; Choudhary, A.§; Burns, S. M.; Wagner, B. K.* "Targeting pancreatic beta cell to treat diabetes". *Nature Rev. Drug Discov.* **2014**, 13, 278–289.

25. Choudhary, A. [§]; Hu He, K. [§]; Mertins, P.; Udeshi, N. U.; Dančák, V.; Yadlin-Fomina, D.; Kubicek, S.; Clemons, P. A.; Schreiber, S. L.; Carr, S. A.; Wagner, B. K.* “Quantitative proteomics comparison of alpha and beta cells to uncover novel targets for lineage reprogramming”. *PLOS ONE* **2014**, DOI: 10.1371/journal.pone.0095194.
24. Choudhary, A.; Newberry, R. N.; Raines, R. T.* “ $n \rightarrow \pi^*$ interaction engender chirality in carbonyl groups”. *Org. Lett.* **2014**, *16*, 3421–3423.
23. Vetere, A. [§]; Choudhary, A. [§]; Wagner, B. K.* “Strategies to increase pancreatic beta cell mass”. *Nature Rev. Drug Discov.* **2013**.
22. Choudhary, A.; Fry, C. G.; Kamer, K. J.; Raines, R. T.* “An $n \rightarrow \pi^*$ interaction reduces the electrophilicity of the acceptor carbonyl group”, *Chem. Comm.* **2013**, *49*, 8166–8168.
21. Guzei, I. A.*; Choudhary, A.; Raines, R. T. “Pyramidalization of a carbonyl carbon atom in (2S)-N-(selenoacetyl)proline methyl ester”, *Acta Cryst.* **2013**, *E69*, o805–o806.
20. Kamer, K. J.; Choudhary, A.; Raines, R. T.* “Intimate interactions with carbonyl groups: Dipole-dipole or $n \rightarrow \pi^*$?” *J. Org. Chem.* **2013**, *78*, 2099–2103.
19. Krow, G. R.*; Shoulders, M. D.; Edupuganti, R.; Gandla, D.; Yu, F.; Sonnet, P. E.; Sender, M.; Choudhary, A.; DeBrosse, C.; Ross III, C. W.; Carroll, P.; Raines, R. T. “Synthesis of 5-fluoro- and 5-hydroxymethanopyrrolidines via lithiation of N-Boc-methanopyrrolidines. Constrained Cy-exo and Cy-endo Flp and Hyp conformer mimics”, *J. Org. Chem.* **2012**, *77*, 5331–5344.
18. Choudhary, A.; Kamer, K. J.; Raines, R. T.* “A conserved interaction with the chromophores of fluorescent proteins”, *Prot. Sci.* **2012**, *21*, 171–177.
17. Choudhary, A. and Raines, R. T.* “An evaluation of peptide bond isosteres”, *ChemBiochem*, **2011**, *12*, 1801–1807.
16. Choudhary, A.; Kamer, K. J.; Raines, R. T.* “An $n \rightarrow \pi^*$ interaction in aspirin: Implications for structure and reactivity”, *J. Org. Chem.* **2011**, *76*, 7933–7937.
Highlighted by Faculty of 1000 Biology.
Highlighted by Chemistry World (RSC)
15. Choudhary, A. and Raines, R. T.* “Signature of the $n \rightarrow \pi^*$ interaction in α -helices”, *Prot. Sci.* **2011**, *20*, 1077–1081.
Cover article
Highlighted by *Prot. Sci.* DOI:10.1002/pro.645
14. Krow, G. R.*; Shoulders, M. D.; Sender, M.; Cannon, K. C.; DeBrosse, C.; Yu, F.; Gandla, D.; Edupuganti, R.; Sonnet, P. E.; Ross III, C. W.; Zdilla, M. J.; Choudhary, A.; Raines, R. T. “Synthesis of conformationally constrained 5-fluoro- and 5-hydroxymethano-pyrrolidines. Ring puckered mimics of gauche and anti-3-fluoro- and 3-hydroxypyrrolidines”, *J. Org. Chem.* **2011**, *76*, 3626–3634.
13. Choudhary, A.; Pua, K. H.; Raines, R. T.* “Quantum mechanical origin of the conformational preferences of 4-thiaproline and its S-oxides”, *Amino Acids*, **2011**, *41*, 181–186.
12. Shoulders, M.D.; Kotch, F.W.; Choudhary, A.; Guzei, I.A.; Raines, R.T. * “The aberrance of the 4S diastereomer of 4-hydroxyproline”, *J. Am. Chem. Soc.* **2010**, *132*, 10857–10865.
11. Choudhary, A.; Kamer, K. J.; Powner, M. W.; Sutherland, J. D.*; Raines, R. T.* “A stereoelectronic effect in prebiotic nucleotide synthesis”, *ACS Chem. Biol.* **2010**, *5*, 655–657.
Highlighted in *Chem. & Eng. News* **2010**, *88*, 39.

10. Bartlett, G. J.[§]; Choudhary, A.[§]; Raines, R. T.*; Woolfson, D. N.* “ $n \rightarrow \pi^*$ Interaction in proteins”, *Nat. Chem. Biol.* **2010**, *6*, 615–620.
Highlighted in *News and Views, Nat. Chem. Biol.* **2010**, *6*, 567–568.
Highlighted by Faculty of 1000 Biology.
Highlighted in *Chem. & Eng. News* **2010**, *88*, 7.
9. Jakobsche, C. E.[§]; Choudhary, A.[§]; Miller, S. J.*; Raines, R. T.* “ $n \rightarrow \pi^*$ Interaction and $n(\pi)$ Pauli repulsion are antagonistic for protein stability”, *J. Am. Chem. Soc.* **2010**, *132*, 6651–6653.
8. Choudhary, A.; Fry, C. G.; Raines, R. T.* “Modulation of an $n \rightarrow \pi^*$ interaction with α -fluoro groups”, *ARKIVOC* **2010**, *8*, 251–262.
7. Krow, G. R.*; Edupuganti, R.; Gandla, D.; Choudhary, A.; Lin, G.; Sonnet, P. E.; DeBrosse, C.; Ross III, C. W.; Cannon, K. C.; Raines, R. T. “5(6)-*anti*-Substituted-2-azabicyclo[2.1.1]hexanes: A nucleophilic displacement route”, *J. Org. Chem.* **2009**, *74*, 8232–8242.
6. Choudhary, A.; Gandla, D.; Krow, G. R.; Raines, R. T.* “Nature of amide carbonyl–carbonyl interactions in proteins”, *J. Am. Chem. Soc.* **2009**, *131*, 7244–7246.
Highlighted in *Nat. Chem. Biol.* **2009**, *5*, 456.
5. Prasad, K. R.*; Penchalaiah, K.; Choudhary, A.; Anbarsan, P. “Stereoselective synthesis of (-)-microcarpalide”, *Tet. Lett.* **2007**, *48*, 309–311.

PUBLICATIONS (Conference proceedings)

4. Secor, S.M.; Choudhary, A.; Lundh, M.; Wagner, B.K. “Is extreme physiology of Burmese pythons relevant to diabetes?” *FASEB* 2014, *28*, 1108.8
3. Lundh, M; Choudhary, A.; Chou, D. H-C.; Tang, A.; Mandrup-Poulsen, T.; Wagner, B. K.* “Transcription and activity of the proteasome are induced by pro-inflammatory cytokines, and proteasome activity is inhibited by HDAC and deubiquitinase inhibition”. *Diabetologia*, 2012, *55*, S207.
2. Choudhary, A. and Raines, R. T.* “A donor–acceptor perspective on carbonyl–carbonyl interactions in proteins.” *Breaking Away: The Proceedings of the 21st American Peptide Symposium* (Michal Lebl, Ed.). pp. 347–349, Prompt Scientific Publishing, San Diego, CA (2009).
1. Choudhary, A. and Raines, R. T.* “ $n \rightarrow \pi^*$ interaction in the molecules of life” In *Proceedings of the 31st European Peptide Symposium* (Lebl, M.; Meldal, M. M.; Jensen, K. J.; Jensen, T. H., Eds.), pp. 2–3, Prompt Scientific Publishing, San Diego, CA (2010).

AWARDS AND HONORS

2014–2019	Career Award at the Scientific Interface, Burroughs Wellcome Fund	
2011–2015	Junior Fellow, Society of Fellows, Harvard University	Life membership to Harvard’s Society of Fellows
2010, 2011	Protein Society Young Investigator Travel Grant, American Protein Society	Funds provided to select young investigators to present their findings at American Protein Society Symposium
2009	American Peptide Society Travel Grant, American Peptide Society	Funds provided to select investigators to present their findings at American Peptide Society Symposium
2006	JN Tata Scholar, JN Tata Endowment	Funds for travel to USA and graduate studies at University of Wisconsin–Madison

2003–2006	Ministry of Human Resource Development Scholarship, Government of India	Funds for tuition and boarding for studies at Indian Institute of Science, Bangalore, India
2002	Summer Research Fellow, Jawaharlal Nehru (JN) Center for Advanced Scientific Research, Bangalore, Karnataka, India	

TEACHING AND TRAINING

Teaching of Students in Courses

University of Wisconsin–Madison

2006	Advanced General Chemistry (1 st -year undergraduates; with Prof. Mahesh Mahanthappa)	Department of Chemistry, University of Wisconsin–Madison Chem 109 (6hrs of lecture and lab work per wk for 16wks)
2010	Chemical Biology (1 st -and 2 nd -year graduate students; with Prof. Ronald Raines)	Department of Biochemistry, University of Wisconsin–Madison Biochem 704 (guest lecturer)

Laboratory and Other Research Supervisory and Training Responsibilities

2014– present	Supervision of three postdoctoral fellows and one graduate student	Daily mentorship
2015– present	Supervision of two undergraduate researchers, Broad Institute	Research mentorship for 15hrs/week for each undergraduate student
2012	Research supervision of two graduate student interns, Broad Institute	Daily mentorship for three months for each graduate student
2009, 2010	Research supervision of two rotation students from Integrated graduate program in Biochemistry, University of Wisconsin–Madison	Daily research mentorship for one month for each graduate student
2007–2008, 2009–2011	Research supervision of two undergraduates, Department of Biochemistry, University of Wisconsin–Madison	Research mentorship for 15hrs/week for each undergraduate student

Supervised Trainees

2016– present	Dr. Peng Wu, Ph.D., Postdoctoral Fellow, Brigham and Women's Hospital Supervising research on antibody–drug conjugation
2016– present	Dr. Ajay Amrendra, Ph.D., Postdoctoral Fellow, Brigham and Women's Hospital Supervising research on development of small molecule inhibitors of KIM-1 activity Co-advised with Prof. Joseph Bonventre
2015– present	Dr. Basudeb Maji, Ph.D., Postdoctoral Fellow, Brigham and Women's Hospital Supervising research on the development of SM-regulators of CRISPR-Cas system
2015– present	Christopher Moore, BS, Graduate Student at Department of Chemistry (MIT) Supervising research on the development of SM-regulators of CRISPR-Cas system Co-advised with Prof. Matthew Shoulders

2015–present	Erika Ding and Sebastian Santiago, Undergraduate researchers, Broad Institute Supervising method development to confirm drug–target engagement in cells and tissues
2015	Lucas Akin and Daniel Mirny, Undergraduate summer researchers, Broad Institute Supervised method development to confirm drug–target engagement in cells and tissues
2014–2015	Dr. Bishwajit Paul, Ph.D., Instructor of Medicine, Harvard Medical School Supervised research on antibody–drug conjugation This trainee has started their independent laboratory at Bangalore University, India
2012	Christine Bradford, BS, Graduate Student at University of Wisconsin–Madison Supervised research on Bioprospecting of snakes' natural products
2012	Robert Newberry, BS, Graduate Student at University of Wisconsin–Madison Supervised research on development of targeted antioxidants
2010	Ambalika Khadria, MS, Graduate Student at University of Wisconsin–Madison Supervised research on development of hyperstable collagen mimetics
2009	Douglas Knowles, BS, Graduate Student at University of Wisconsin–Madison Supervised research on development of protein stabilizing small molecules
2009–2011	Kimberli J. Kamer, BS, Graduate Student at Harvard University Supervised research on $n \rightarrow \pi^*$ interaction; published 6 papers
2007–2008	Khian H. Pua, BS, Graduate Student at Harvard University Supervised research on $n \rightarrow \pi^*$ interaction; published 1 paper

THESIS, GRANT, AND MANUSCRIPT REVIEW ACTIVITIES

2015	French National Research Agency	<i>Ad hoc</i> Member
2010	Doctoral thesis review of Dr. Tuhin K. Pal (with Prof. Ronald T. Raines) Thesis title: Significance of self-contacting Asx/Glx residues in protein structures: Quantum chemical studies and molecular dynamics simulations	Indian Institute of Technology (IIT), Kanpur, India
2009–present	Journal of the American Chemical Society Chemical Communications (Royal Society of Chemistry) Biopolymers Public Library of Science ONE	<i>Ad hoc</i> reviewer

INVITED PRESENTATIONS

Regional (No presentations below were sponsored by outside entities)

2014	“Snakes, degrons, and diabetes,” Renal Division, Brigham and Women’s Hospital, Boston
2013	“Snakes, degrons, and diabetes,” Department of Chemistry, Massachusetts Institute of Technology (MIT)
2012	“Extreme cell makeover using chemistry,” Society of Fellows, Harvard University
2012	“RNA aptamers for global posttranslational modification analysis,” Broad Institute

National (The presentation sponsored by outside entity is so noted and the sponsor is identified)

- 2015 Exceptional Organisms: Snakes and Diabetes, Broad Institute's Retreat, Boston, MA
- 2014 "Snakes, deignons, and diabetes," Department of Chemistry, California Institute of Technology (Caltech), Pasadena, CA
- 2014 "Snakes, deignons, and diabetes," Department of Pharmaceutical Chemistry, University of California, San Francisco (UCSF), CA
- 2014 "Snakes, deignons, and diabetes," Department of Chemistry, Indiana University, Bloomington, IN
- 2014 "Snakes, deignons, and diabetes," Cardiovascular Research Institute, University of California, San Francisco
- 2014 "Why don't pythons get diabetes?," Cardiovascular and Metabolic diseases, MedImmune (AstraZeneca), Gaithersburg, MD
- 2014 "Snakes, deignons, and diabetes," Departments of Chemistry and Biology, Penn State University, State College, PA
- 2013 "Snakes, deignons, and diabetes," Department of Chemistry, New York University
- 2013 "Snakes, deignons, and diabetes," Department of Chemistry, University of Washington, Seattle, WA
- 2010 " $n \rightarrow \pi^*$ Interactions in the molecules of life," Departments of Chemistry and Experimental and Molecular Medicine, The Scripps Research University, La Jolla, CA
- 2010 " $n \rightarrow \pi^*$ Interactions in the molecules of life," Department of Chemical and Structural Biology, Rockefeller University, New York, NY
- 2010 " $n \rightarrow \pi^*$ Interactions in the molecules of life," Department of Chemistry, University of California–Berkeley, Berkeley, CA
- 2010 " $n \rightarrow \pi^*$ Interactions in the molecules of life," Department of Chemistry, New York University, New York, NY

International (The presentation sponsored by outside entity is so noted and the sponsor is identified)

- 2014 "Discovery of novel biologic-based therapeutics, based on the extreme physiology of Burmese pythons," Novo Nordisk New England and Eastern Canada Diabetes and Obesity Biologics Science Forum, Boston, USA (Invited seminar)

POSTER PRESENTATIONS

- 2010 " $n \rightarrow \pi^*$ Interactions in the molecules of life", 24th Annual Symposium of the Protein Society, Boston
- 2010 "Kinship of $n \rightarrow \pi^*$ interactions and hydrogen bonds" 24th Annual Symposium of the Protein Society, San Diego
- 2010 " $n \rightarrow \pi^*$ Interactions in the molecules of life", 5th Annual NIH National Graduate Student Research Festival

2009 "Nature of amide carbonyl–carbonyl interactions in proteins", 21st American Peptide Symposium, Bloomington

THESIS

M. S. thesis: Chiral pool based approach for the synthesis of bio-active lactones and 1, 2-aminoalcohols, 2006, Indian Institute of Science, Bangalore

Doctoral thesis: $n \rightarrow \pi^*$ Interactions in the molecules of life, 2011, University of Wisconsin–Madison