

Craig James Markin

Department of Biochemistry • Stanford University

e-mail: cmarkin@stanford.edu

Education

09/2006 – 03/2013	Ph.D. Biochemistry, University of Alberta
09/2002 – 04/2006	B.Sc. Honors Biochemistry, University of Alberta

Research Experience

07/2015 – Current	Postdoctoral fellow, Department of Biochemistry, Stanford University (Dr. Daniel Herschlag and Dr. Polly Fordyce)
04/2013 – 06/2015	Postdoctoral fellow, Department of Biochemistry, University of Alberta (Dr. Leo Spyropoulos)
09/2006 – 03/2013	Ph.D. student, Department of Biochemistry, University of Alberta (Dr. Leo Spyropoulos)
09/2005 – 04/2006	BIOCH 499 (Undergraduate Research Project), Department of Biochemistry, University of Alberta (Dr. Michael James)

Awards

Year	Award	Value (CAD)
2013	Neil Madsen Biochemistry Thesis Prize	1,000
2012	Graduate Leaders in Biochemistry Award	700
2011-13	Alberta Innovates – Health Solutions Graduate Studentship (Province of Alberta)	ann. 30,000
2010	Graduate Leaders in Biochemistry Award	700
2010-11	Queen Elizabeth II Graduate Scholarship	15,000
2009-10	Queen Elizabeth II Graduate Scholarship	15,000
2008-9	Queen Elizabeth II Graduate Scholarship	15,000
2008	Alberta Learning and Information Service Graduate Student Scholarship	2,000
2007-8	Queen Elizabeth II Graduate Studentship	6,000
2003	Jason Lang Scholarship (Province of Alberta)	1,000
2002	Faculty of Science Academic Excellence Scholarship	1,000
2002	University of Alberta Academic Excellence Scholarship	2,500

Publications

9. Hodge C.D., Edwards R.A., **Markin C.J.**, McDonald D., Pulvino M., Huen M.S.Y., Zhao J., Spyropoulos L., Hendzel M.J., Glover J.N.M. (2015) Covalent inhibition of Ubc13 affects ubiquitin signaling and reveals active site elements important for targeting. *ACS Chem. Biol.* Accepted. DOI: 10.1021/acscchembio.5b00222
8. Rout M.K., Hodge C.D., **Markin C.J.**, Xu X., Glover J.N.M., Xiao W., Spyropoulos L. (2014) Stochastic gate dynamics regulate the catalytic activity of ubiquitination enzymes. *J. Am. Chem. Soc.* **136**, 17446-17458
7. Anamika*, **Markin C.J.***, Rout M.K., Spyropoulos L. (2014) Molecular basis for impaired DNA damage response function associated with the RAP80 Δ E81 defect. *J. Biol. Chem.* **289**, 12852-12862 (**co-first authorship**)
6. **Markin C.J.**, Spyropoulos L. (2012) Accuracy and precision of protein-ligand interaction kinetics determined from chemical shift titrations. *J. Biomol. NMR* **54**, 355-376
5. **Markin C.J.**, Spyropoulos L. (2012) Increased precision for analysis of protein-ligand dissociation constants determined from chemical shift titrations. *J. Biomol. NMR* **53**, 125-138
4. **Markin C.J.**, Saltibus L.F., Kean M.J., McKay R.T., Xiao W., Spyropoulos L. (2010) Catalytic proficiency of ubiquitin conjugation enzymes: balancing pK_a suppression, entropy, and electrostatics. *J. Am. Chem. Soc.* **132**, 17775-17786
3. Schellenberg M.J., Ritchie D.B., Wu T., **Markin C.J.**, Spyropoulos L., MacMillan A.M. (2010) Context-dependent remodeling of structure in two large protein fragments. *J. Mol. Biol.*, **402**, 720-730
2. **Markin C.J.**, Xiao W., Spyropoulos L. (2010) Mechanism for recognition of polyubiquitin chains: balancing affinity through interplay between multivalent binding and dynamics. *J. Am. Chem. Soc.* **132**, 11247-11258. This work was subsequently rated as recommended by the Faculty of 1000.
1. **Markin C.J.**, Saltibus L.F., Spyropoulos L. (2008) Dynamics of the RING domain from human TRAF6 by ^{15}N NMR spectroscopy: implications for biological function. *Biochemistry* **47**, 10010-10017

Abstracts

9. Spyropoulos L., Markin C.J. Accurate thermodynamics and kinetics for weak protein-ligand interactions determined from NMR chemical shift titrations. *Weak Protein-Ligand Interactions: New Horizons in Biophysics and Cell Biology*, Beijing, China, October 14-18, 2012
8. Markin C.J., Spyropoulos L. Increased precision for analysis of protein-ligand dissociation constants determined from chemical shift titrations. *25rd International Conference on Magnetic Resonance in Biological Systems*, Lyon, France, August 19-24, 2012
7. Markin C.J., Saltibus L.F., Kean M.J., McKay R.T., Xiao W., Spyropoulos L. Mechanism of lysine-63 linked polyubiquitin chain formation and recognition by the DNA damage response protein RAP80. *The Ubiquitin Family 2011*, Cold Spring Harbor, New York, May 17-21, 2011
6. Spyropoulos L., Markin C.J. Flux of the ubiquitination enzyme cascade: molecular mechanism for K48-linked polyubiquitin synthesis. *The Ubiquitin Family 2011*, Cold Spring Harbor, New York, May 17-21, 2011
5. Markin C.J., Xiao W., Spyropoulos L. Mechanism for recognition of polyubiquitin chains: balancing affinity through interplay between multivalent binding and dynamics. *Ubiquitin Drug Discovery and Diagnostics 2010*, Philadelphia, Pennsylvania, August 23-25, 2010
4. Markin C.J., Julien O., Xiao W., Spyropoulos L. Mechanism for recognition of polyubiquitin chains. *EUROMAR 2010 and 17th International Society for Magnetic Resonance (ISMAR) Conference*, Florence, Italy, July 4-9, 2010
3. Spyropoulos L., Markin C.J., Kean M.J., Saltibus L.F. Mechanism of lysine-63 polyubiquitin chain formation and recognition by the DNA repair protein RAP80. *92nd Canadian Chemistry Conference and Exhibition*, Hamilton, Ontario, May 30-June 3, 2009
2. Markin C.J., Saltibus L.F., Spyropoulos L. Dynamics of the RING domain from human TRAF6 by ^{15}N NMR spectroscopy: implications for biological function. *23rd International Conference on Magnetic Resonance in Biological Systems*, San Diego, California, August 24-29, 2008
1. Markin C.J., Saltibus L.F., Spyropoulos L. Dynamics of the RING domain from human TRAF6 by ^{15}N NMR spectroscopy: implications for biological function. *91st Canadian Chemistry Conference and Exhibition*, Edmonton, Alberta, May 24-28, 2008

Teaching

May 12-16, 2014

Presented five lectures in Biochemistry 330 (Nucleic acids and molecular biology), covering prokaryotic DNA replication and mechanisms of DNA repair, and contributed questions to the midterm examination in this course. Mean student rating: 4.6/5.

March 11, 2011

Presented a lecture entitled “A systems biology approach to the kinetics of ubiquitination”, in Cell Biology 425/525 (Systems biology), an undergraduate/graduate level Cell Biology course. Mean student rating: 93/100.

Software

In addition to numerous scripts and programs for analyzing in-house data, I have developed K_D fit, a publically available Python program for quantifying protein-protein and protein-ligand dissociation constants from NMR chemical shift titrations. This software is intended to facilitate the use of improved sampling schemes as discussed in Markin C.J., Spyropoulos L. *J. Biomol. NMR* 53, 125-138 (2012) and is freely available upon request.

(http://www.bionmr.ualberta.ca/~lspy/index_9.html)

Other Contributions

2014. Served on the selection committee for the 2013 Department of Biochemistry Postdoctoral Fellow Leaders in Biochemistry Award, given to recognize the best article published in 2013 by a first-author postdoctoral fellow.

2012. Served on the selection committee for the 2011 Department of Biochemistry Graduate Leaders in Biochemistry Award, given to recognize the best article published in 2011 by a first-author graduate student.

2010. Was invited to prepare a video abstract for the *JACS* Beta website, featuring Markin C.J. *et al. J. Am. Chem. Soc.* 132, 17775-17786 (2010) (Video online at <http://pubs.acs.org/JACSbeta/vabstracts/vabstract6.html>).

2010-11. Treasurer of the Biochemistry Graduate Student Association.

2009-10. Vice-president of the Biochemistry Graduate Student Association.

Affiliations/Memberships

Member of the American Chemical Society