Xu Wang

School of Molecular Sciences
Arizona State University
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Education

Ph. D. Biochemistry Nov, 1999 to June 2005
University of Alberta, Canada
B.Sc. (Hon.) Sep, 1995 to Apr, 1999
University of Alberta, Canada

Employment

Assistant Professor Jan, 2011 to Present
Department of Chemistry & Biochemistry
Arizona State University
Tempe, AZ USA

Post-doctoral Fellow Aug, 2005 to 2010
Complex Carbohydrate Research Center
University of Georgia
Athens, GA USA

Graduate Research Assistant Nov, 1999 to June, 2005
Department of Biochemistry
University of Alberta
Edmonton, AB Canada

Honors and awards

NIH K99 Path to Independence Award	2009-2010
Canadian Institutes of Health Research Fellowship Award	2007-2010
AHFMR Full-time Fellowship	2006-2008
Canadian Institutes of Health Research, Doctoral Research Award	2001-2004
AHFMR Full-time Studentships	2000-2005

Research Funding

Ongoing Research Support

NIH R21 GM118339 PI (35%) 07/01/15-06/31/18
Title: Single Molecule Sequencing of Glycosaminoglycans Using Nanopores
Direct cost: $400,000. Total amount: $580,000

NIH R01 GM118518 PI (100 %) 02/01/17-01/31/22
Title: Interactions of Pleiotrophin with PTPRZ

Direct cost: $1,000,000. Total amount: $1,400,000.

NIH U01 CA221235 PI (33 %) 08/01/17-07/31/20
Title: Sequencing of Glycosaminoglycans Using Recognition Tunneling Nanopores
Direct cost: $920,000. Total amount: $1,390,000.

Completed Support

NIH R00 GM088483 PI (100%) 2011-2013
Title: Structural interactions of bacterial adhesin with glycosaminoglycans
Direct cost: $400,000. Total amount: $580,000

Unfunded Applications

NIH R21 CA185648 PI (100%) 2014-2016
Title: Structure of the pleiotrophin dimer and its interactions with chondroitin sulfate
Direct cost: $275,000. Total amount: $398,660
Original submission: 06/2013

NIH R01 GM107163 PI (60%) 2014-2019
Title: CCL5 oligomerization and its interaction with GAGs
Direct cost: $1,500,000. Total amount: $2,000,000
Original submission: 10/2012. Resubmission: 11/2013

NIH R01 GM115569 PI (100%) 2015-2019
Title: New approaches to studying protein-glycosaminoglycan interactions
Direct cost: $875,000. Total amount: $1,300,000
Original submission: 10/2014

NIH R01 GM113060 PI (100%) 2014-2019
Title: Signaling mechanisms of the cytokine pleiotrophin
Direct cost: $1,250,000. Total amount: $1,800,000
Original submission: 02/2014.

NSF CAREER MCB 1453611 & 1552893 PI (100%) 2016-2020
Title: Novel NMR Techniques for the Study of Protein-Glycosaminoglycan Interactions
Direct cost: $500,000. Total amount: $710,000
Original submission: 07/2014. Resubmission: 07/2015
Ranked in the top group both times, but not funded.

Publications

H-index: 15 (Google Scholar) *: graduate student. †: undergraduate student.

In Preparation

1. *Ryan, E. O. and Wang, X. Interdomain Linker of Pleiotrophin is a Critical Glycosaminoglycan-Binding Site. In Preparation.

2. Im, J. O., Wang, X., Lindsay, S. and Zhang, P. Translocation of Glycosaminoglycan Through Solids-State Nanopore. In Preparation.

In Revision

1. *Shen, D., Podolnikova, N. P., Yakubenko, V. P., Ugarova, T. P. and Wang, X. Pleiotrophin is a Ligand of Integrin Mac-1. *J. Biol. Chem.* In Revision. (Corresponding author, impact factor: 4.5)

With ASU affiliation:

1. Im, J. O., Biswas, S., Liu, H., Zhao, Y., Sen, S., Biswas, S., Ashcroft, B., Borges, C., Wang, X., Lindsay, S. and Zhang, P. Electronic Single Molecule Identification of Carbohydrate Isomers by Recognition Tunneling. *Nature Comm*. In Press. PMID: 28000682. (Imapct factor: 11.3)
2. *Ryan, E. O., *Shen, D., Wang, X. (2016) C-terminal tail of PTN is required for stable interaction with Chondroitin Sulfate A. *FEBS J.* 283:1488. PMID: 26896299 (Corresponding author, impact factor: 4.0, citations: 2)
3. *Morgan, A. M., Sepuru, K. M., *Feng, W., Rajarathnam, K., Wang, X. (2015) Flexible Linker Modulates Glycosaminoglycan Affinity of Decorin Binding Protein A. *Biochemistry*. 54:5113. PMID: 26223367. (Corresponding author, impact factor: 3.38, citations: 0)
4. *Feng, W. Wang, X. (2015) Structures of Decorin Binding Protein B from *Borrelia Burgdorferi*. *BBA Proteins & Proteomics.* 1854:1823. PMID: 26275806. (Corresponding author, impact factor: 2.92, citations: 2).
5. †Deshauer, C. *Ryan, E. O., *Morgan, A. M., Handel, T. M., Prestegard, J. H., Wang, X., (2015) Interactions of the Chemokine CCL5/RANTES with Medium Sized Chondroitin Sulfate Ligands. *Structure*. 23:1066. PMID: 25982530. (Corresponding author, impact factor: 6.79, citations: 4)
6. *Morgan, A. M., Wang, X. (2015) Structural Mechanisms Underlying Sequence-Dependent Variations in GAG Affinities of Decorin Binding Protein A, a *Borrelia burgdorferi* Adhesin. *Biochem. J.* 467:439. PMID: 25695518. (Corresponding author, impact factor: 4.78, citations: 4).
7. Bolia, A., Woodrum, B. W., Cereda, A., Ruben, M. A., Wang, X., Ozkan, S. B., and Ghirlanda, G. (2014) Dissecting the determinants for dimannose binding in cyanovirin. *Biophys. J.* 106:1142. PMID: 24606938. (Impact factor: 3.83, citations: 9)
8. Podolnikova, N. P., Yakovlev, S., Yakubenko, V. P., Wang, X., Gorkun, O. V. and Ugarova, T. P. (2013) The interaction integrin αIIbβ3 with fibrin occurs through multiple binding sites in αIIb β-propeller domain. *J. Biol. Chem.* 289:2371. PMID:24338009. (Impact factor: 4.60, citations: 17)
9. *Morgan, A., Wang, X. (2013) Novel heparin-binding motif in decorin binding protein A from strain B31 of *Borrelia burgdorferi* explains higher binding affinity. *Biochemistry*. 52, 8237. PMID: 24148022. (*Corresponding author*, impact factor: 3.38, citations: 12)
10. Wang, X., Sharp, J. S., Handel, T. M., Prestegard, J. H. (2013) Chemokine oligomerization in cell signaling and migration. *Progress in Molecular Biology and Translational Science*. 117, 531. PMID: 23663982. (*Review*, impact factor: 2.32, citations: 20)

11. Wang, X. (2012) Solution Structure of Decorin-Binding Protein A from *Borrelia burgdorferi*. *Biochemistry*. 51, 8353-8362. PMID: 22985470. (*Corresponding author,* impact factor: 3.38, citations: 14)

Prior to ASU:

12. Barb, A. W., Wang, X., Prestegard, J. H. (2013) Refolded recombinant Siglec5 for NMR investigation of complex carbohydrate binding. *Protein Expression and Purification*, 88, 183. PMID: 23321067. (citations: 7)
13. Wang, X., Watson, C. M., Sharp, J. S., Handel, T. M., Prestegard, J. H. (2011) Oligomeric Structure of the Chemokine CCL5/RANTES from NMR, MS and SAXS Data. *Structure*, 19, 1138. PMID: 21827949. (citations: 43)
14. Wang, X., Lee, H. W., Liu, Y. and Prestegard, J. H. (2011) Structural NMR of Protein Oligomers using Hybrid Methods. *J. Struct. Biol.* 173,515. PMID: 21074622. (citations: 22)
15. Lee, H.W., Wylie, G., Bansal, S., Wang, X., Barb, A., Macnaughtan, M., Ertekin, A., Montelione, G. and Prestegard, J. (2010) Three-dimensional structure of the weakly associated protein homodimer SeR13 using RDCs and paramagnetic surface mapping. *Prot. Sci.* 19,1673. PMID: 20589905. (citations: 12)
16. Raman, S., Lange, F., Rossi, P., Tyka, M., Wang, X., Prestegard, J., Montelione, G., Baker, D. (2009) High-Resolution NMR Structure Determination Without Side Chain Assignments. *Science*, 327, 1014. PMID: 20133520. (citations: 185)
17. Wang, X., Weldeghiorghis, T., Zhang, G., Imeriali, B & Prestegard, J.H. (2008) Solution structure of Alg13: the sugar donor subunit of a yeast N-acetylglucosamine transferase. *Structure*, 16, 965-975. PMID: 18547528. (citations: 23)
18. Wang, X., Bansal, S., Jiang, M., Prestegard, J.H. (2008) RDC-assisted modeling of symmetric protein homo-oligomers. *Prot. Sci.* 17, 899-907. PMID: 18436958. (citations: 46)
19. Julien, O.; Sun, Y.-B.; Wang, X.; Lindhout, D. H.; Thiessen, A.; Irving, M.; Sykes, B. D. (2008). Tryptophan Mutants of Cardiac Troponin C: 3D Structure, Troponin I Affinity, and in situ Activity. *Biochem*, 47, 597-606. PMID: 18092822. (citations: 3)
20. Wang, X., Srisailam, S., Yee, A. A., Lemak, A., Arrowsmith, C., Prestegard, J. H., Tian, F. (2007). Domain-domain motions in proteins from time-modulated pseudocontact shifts. *J. BioNMR*, 39, 53-61. PMID: 17657568. (citations: 19)
21. Wang, X., Lee, H.-S., Sugar, F. J., Jenney, F. E., Adams, M. W. W., Prestegard, J. H. (2007). PF0610, a novel winged helix-turn-helix variant possessing a rubredoxin-like Zn ribbon motif from the hyperthermophilic archaeon, Pyrococcus furiosus. *Biochemistry*, 46, 752-76. PMID: 17223696. (citations: 8)
22. Wang, X., Mercier, P., Letourneau, P. J. & Sykes, B. D. (2005). Effects of Phe-to-Trp Mutation & Fluorotryptophan Incorporation on the Solution Structure of Cardiac Troponin C, and Analysis of its Suitability as a Potential Probe for *in situ* NMR Studies. *Prot. Sci.* 14, 2447-2460. PMID: 16131667. (citations: 19)
23. Li, M. X. Wang, X. & Sykes, B. D. (2004). Structural based insights into the role of troponin in cardiac muscle pathophysiology. *J. Muscle Res. Cell Motil.* 25, 559-79. PMID: 15711886. (citations: 118)

24. Shields, D. J., Altarejos, J. Y., Wang, X., Agellon, L. B. & Vance, D. E. (2003). Molecular dissection of the S-adenosylmethionine-binding site of phosphatidylethanolamine N-methyltransferase. *Journal of Biological Chemistry* 278, 35826-35836. PMID: 12842883. (citations: 30)
25. Li, M. X., Wang, X., Lindhout, D. A., Buscemi, N., Van Eyk, J. E. & Sykes, B. D. (2003). Phosphorylation and mutation of human cardiac troponin I deferentially destabilize the interaction of the functional regions of troponin I with troponin C. *Biochemistry* 42, 14460-14468. PMID: 14661957. (citations: 29)
26. Wang, X., Li, M. X. & Sykes, B. D. (2002). Structure of the regulatory N-domain of human cardiac troponin C in complex with human cardiac troponin $I_{147-163}$ and bepridil. *Journal of Biological Chemistry* 277, 31124-31133. PMID: 12060657. (citations: 62)
27. Li, M. X., Saude, E. J., Wang, X., Pearlstone, J. R., Smillie, L. B. & Sykes, B. D. (2002). Kinetic studies of calcium and cardiac troponin I peptide binding to human cardiac troponin C using NMR spectroscopy. *European Biophysics Journal with Biophysics Letters* 31, 245-256. PMID: 12122471. (citations: 27)
28. Wang, X., Li, M. X., Spyracopoulos, L., Beier, N., Chandra, M., Solaro, R. J. & Sykes, B. D. (2001). Structure of the C-domain of human cardiac troponin C in complex with the Ca^{2+} sensitizing drug EMD 57033. *Journal of Biological Chemistry* 276, 25456-25466. PMID: 11320096. (citations: 71)

Invited Book Chapters

1. Wang, X. (2017). Chapter 11. NMR Studies of Protein-Glycosaminoglycan Interactions. *NMR in Glycoscience and Glycotechnology*. Edited by Koichi Kato and Thomas Peters. Published by Royal Society of Chemistry.

Invited Talks

1. Interactions of Pleiotrophin with Glycosaminoglycans. Department of Biochemistry, Biophysics & Molecular Biology, Iowa State University. September 7th, 2017. Ames, IA, USA.
2. Effects of Pleiotrophin on GAG Dynamics. ACS Symposium on Glycan Structure and Dynamics. August 22nd, 2017. Washington DC, USA.
3. Interactions of Pleiotrophin with Glycosaminoglycans. Department of Medicinal Chemistry, School of Pharmacy, Virginia Commonwealth University. August 21st, 2017. Richmond, VA, USA.
4. GAG Specificity of Pleiotrophin. Washington DC Area NMR Group. May 19th, 2017. Washington DC, USA.
5. Pleiotrophin: Structure & Function. University of Texas Medical Branch. Dec. 2016, Galveston, TX, USA.
6. Structure of Pleiotrophin and Its Interactions with Glycosaminoglycans. The 4th Midkine Symposium. Apr 28th to 30th, 2016, Budapest, Hungary.
7. ‡Wang, X., Zhang, P. & Lindsay S. Single Molecule Analysis of Glycosaminoglycans Using Recognition Tunneling Nanopores. NIH Glycoscience Commonfund Meeting, July 10th, 2015, Bethesda, MD, USA.

8. Probing Dynamic Protein-Glycosaminoglycan Interactions Using Paramagnetic Ligands. The 53rd Eastern Analytical Symposium. Nov 17th to 19th, 2014. Somerset, N.J. USA.

Conference Presentations

*: graduate student. †: undergraduate student. ‡:presenter

With ASU Affiliations (contributed)

1. *Ryan, E. O., Baradji, A., Richter, R., ‡Wang, X. Interactions of the Cytokine Pleiotrophin with Glycosaminoglycan and the PTPRZ Core Protein. Society for Glycobiology Annual Meeting 2016. Nov. 19th to 22nd, 2016. New Orleans, LA, USA (contributed poster).
2. *Ryan, E. O., *Shen, D., ‡Wang, X. Interactions of the Cytokine Pleiotrophin with Glycosaminoglycans. UCSD Glycobiology Symposium. Mar. 25th, 2016. (contributed poster)
3. *Ryan, E. O., *Shen, D., ‡Wang, X. Interactions of the Cytokine Pleiotrophin with Glycosaminoglycans. Society for Glycobiology Annual Meeting 2015. Dec. 1st to 4th, 2015. San Francisco, CA, USA. (contributed poster).
4. *Morgan, A. M., *Ryan, E., †Deshauer, C., ‡Wang, X. Studying Protein-Glycosaminoglycan Interactions Using Paramagnetism. The 26th International Conference on Magnetic Resonance in Biological Systems. Aug. 24th to 29th, 2014. Dallas, TX, USA. (contributed poster)
5. †Deshauer, C., Yu, F., *Morgan, A. M., Prestegard, J. H., ‡ Structural characterizations of interactions of RANTES/CCL5 with GAG hexasaccharides. Gordon Research Conference on Chemotactic Cytokines. Jul. 27th to Aug. 1st, 2014. Mount Snow, VT, USA. (contributed poster)
6. †Deshauer, C., *Morgan, A., Heiss, C., Prestegard, J., ‡Wang, X. Studying protein-glycosaminoglycan interactions using paramagnetically labeled polysaccharide ligands. The 57th annual meeting of the biophysical society. Feb 2-6, 2013. Philadelphia, PA, USA. (contributed poster)
7. ‡Wang, X. Watson, C. Sharp, J. Prestegard, J. Self-oligomerization of the chemokine CCL5 and its interactions with chondroitin sulfate oligomers. Keystone Symposium on New Frontiers at the Interface of Immunity and Glycobiology. Mar 6-10, 2011. Banff, AB, Canada. (contributed poster)

Prior to ASU:

1. Wang, X., Pomin, V., Yu, F., Prestegard, J. Solution NMR studies of specific interactions of chondroitin sulfate hexamers with the chemokine CCL5. Keystone Symposium on Frontiers of Structural Biology. Jan 8-13, 2010
2. Wang, X., Tian, F., Weldeghiorghis, T., Imperiali, B. & Prestegard, J. Structure of the yeast glycosyltransferase alg13: a study in the elucidation of deuterated protein structures using specific lageling and orientational restraints. Keystone Symposium on Frontiers of Structural Biology. Jan 6-11, 2008
3. Wang, X., Bansal, S. and Prestegard J. H. RDC-assisted modeling of protein homo-oligomers. Computational aspects of biomolecular NMR, Gordon Research Conferences, Sep 24-29, 2006.

4. Wang, X. & Sykes, B.D. (2005). Exploring the possibility of investigating TnC dynamics in muscle fibres using ^{19}F-labelled TnC. *Biophysical Journal* 88**:** 130a-130a.
5. Wang, X. & Sykes, B. D. Probing structural perturbations in fluorotryptophan-containing cardiac TnC with ^{19}F NMR. Frontiers of NMR in Molecular Biology IX, Keystone Symposia. Jan 29- Feb 4, 2005.
6. Wang, X. & Sykes, B. D. (2003). F-19 NMR study of cardiac troponin C. *Biophysical Journal* 84, 567a-567a.
7. Li, M. X., Wang, X., Lindhout, D. A. & Sykes, B. D. (2003). Effects of mutation and phosphorylation on the interaction of cardiac troponin C and troponin I. *Biophysical Journal* 84, 566a-567a.
8. Wang, X., Li, M. X., Spyracopoulos, L., Sykes, B. D. (2002). Interactions between cardiac troponin C and cardiotonic drugs bepridil and EMD 57033. The XXth ICMRBS meeting, Toronto, Canada, Aug 25-30 2002.
9. Wang, X., Li, M. X. & Sykes, B. D. (2002). NMR structure of a ternary complex of the n-domain of cardiac troponin C with bepridil and cardiac troponin-$I_{147-163}$. *Biophysical Journal* 82, 390a-390a.
10. Li, M. X., Saude, E. J., Wang, X., Pearlstone, J. R., Smillie, L. B. & Sykes, B. D. (2002). Kinetic studies of calcium and troponin I peptide binding to human cardiac troponin C using NMR spectroscopy. *Biophysical Journal* 82, 390a-390a.
11. Li, M. X., Wang, X., Buscemi, N., Van Eyk, J. E. & Sykes, B. D. (2002). Novel phosphorylation of Ser 149 in cardiac troponin I (cTnI) by PAK reduces the affinity of cTnI for cardiac troponin C (cTnC). *Biophysical Journal* 82, 389a-389a.
12. Wang, X., Li, M. X., Spyracopoulos, L., Beier, N., Chandra, M., Solaro, R. J. & Sykes, B. D. (2001). Structure of the C-domain of cardiac troponin C in complex with Ca^{2+} sensitizer EMD 57033. *Biophysical Journal* 80, 86a-86a.
13. Li, M. X., Wang, X., Spyracopoulos, L. & Sykes, B. D. (2001). Structure of the n-domain of cardiac troponin C in complex with bepridil and cardiac troponin-$I_{147-163}$. *Biophysical Journal* 80, 88a-88a.

Teaching

Lecture Courses Taught

Year	Semester	Course	Title	Enrollment	Rating	Team
2011	Fall	BCH501	Current Topics in Biochemistry	26	N/A	No
2012	Spring	BCH598	Solution NMR in Structural Biology	9	N/A	No
2012	Fall	BCH494	Topics in Protein Biochemistry	11	4.3	Yes
2013	Spring	BCH361	Principles of Biochemistry	316	2.9	Yes
2013	Spring	BCH494	Topics in Protein Biochemistry	16	4.3	Yes
2013	Fall	BCH494	Topics in Protein Biochemistry	7	4.5	Yes
2014	Spring	BCH494	Topics in Protein Biochemistry	21	4.9	Yes
2014	Spring	BCH361	Principles of Biochemistry	147	4.4	No
2014	Fall	BCH361	Principles of Biochemistry	173	4.5	No
2015	Spring	BCH494	Topics in Protein Biochemistry	18	4.7	No
2015	Fall	BCH361	Principles of Biochemistry	179	4.6	No

2016	Spring	BCH494	Topics in Protein Biochemistry	24	4.6	No
2017	Spring	BCH361	Principles of Biochemistry	114		No

Individual Laboratory Research Instruction

Year	Semester	Course	Title	Enrollment
2011	Fall	BCH392	Introduction to Research Technique	1
2011	Fall	BCH492	Honors Directed Study	3
2012	Spring	BCH392	Introduction to Research Technique	1
2012	Spring	BCH492	Honors Directed Study	3
2012	Fall	BIO495	Undergraduate Research	1
2012	Fall	BCH492	Honors Directed Study	1
2013	Spring	BCH392	Introduction to Research Technique	1
2013	Spring	BCH492	Honors Directed Study	1
2013	Fall	BCH392	Introduction to Research Technique	1
2013	Fall	BCH492	Honors Directed Study	1
2014	Spring	BCH392	Introduction to Research Technique	1
2014	Spring	BCH492	Honors Directed Study	1
2015	Summer	BCH492	Honors Directed Study	1
2015	Fall	BCH392	Introduction to Research Technique	1
2015	Fall	BCH492	Honors Directed Study	1
2016	Spring	BCH392	Introduction to Research Technique	1
2016	Fall	BCH392	Introduction to Research Technique	1
2017	Spring	BCH392	Introduction to Research Technique	2

Mentoring

Ph. D. Awarded:

1) Ashli Morgan, PhD, 08/11 – 08/15. Currently a laboratory instructor at ASU

Master Degree Awarded:

1) Brandon Rinker, Master, 05/17. Currently attending Dental School.

Current graduate students:

2) Wei Feng, PhD, 03/12 – present.
3) Di Shen, PhD, 08/13 – present.
4) Eathen Ryan, PhD, 08/14 – present.

Member of thesis advisory committee for following students from other groups:

Name	Program	Graduation Date
Dian Xu	Ph. D.	05/2015
J. Bennett Addison	Ph. D.	08/2014
Brian Woodrum	Ph. D.	08/2014
Jason Maxwell	M. S.	05/2015
Shuoxing Jiang	Ph. D.	05/2016

Dayna Peterson	Ph. D.	In Progress
Chengchen Guo	Ph. D.	In Progress
Nicholas Sisko	Ph. D.	In Progress
Bobby Baravati	Ph. D.	In Progress
Yueming Hu	Ph. D.	In Progress
Minjoo Kim	Ph. D.	In Progress
Jesus Aguilar Diaz De Leon	Ph. D.	In Progress
Yameng Liu	Ph. D.	In Progress

Chair of undergraduate honors thesis committee for the following students:

Name	Graduation Date	Current Position
Alex Chao	05/2012	Graduate student at UC Irvine
Courtney Deshauer	05/2012	Pharmacist
Tsuiying Lan	05/2013	U. of Michigan Dental School
Kristin Hoffman	05/2015	U. of Arizona Pharmacy School
Nathaniel Kuch	12/2015	Graduate student at U. of Wisconsin
Rahat Alam	In Progress	

Service

ASU

Graduate Program Committee	2016 - Present
Graduate Student Liaison	2011 – 2015
Departmental Instrumentation & Facilities Committee	2014 – 2015
Member, DCB chemical biology faculty search committee	11/2012 – 12/2012

Professional services

NSF Graduate Research Fellowship Program application reviewer	2015
Manuscript reviewer for	
Journal of Biological Chemistry	2012-2014
Biochemistry	2011-2013
Journal of Biotechnology	2012-2013
Journal of Visualized Experiments	2013
Glycobiology	2014
FEBS Letter	2016
BBA Reviews on Cancer	2016
Biochemical Journal	2016
Blood Advances	2017