William KM Lai

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EDUCATION

2008 – 2013 **PhD in Biochemistry,** SUNY Buffalo, Buffalo, New York
Thesis: "Computational Tools for Investigating the Role of Chromatin in Regulating Genomic Functional Elements"

2005 – 2008 **BS in Neuroscience,** University of Pittsburgh, Pittsburgh, Pennsylvania
Latin Honors: Cum Laude
Minor in Chemistry 2008 from the University of Pittsburgh

RESEARCH EXPERIENCE

2018 – **Assistant Research Professor** in the Department of Biochemistry and Molecular Biology, Pennsylvania State University.

2013 – 2018 **Postdoctoral Research Associate** in the Department of Biochemistry and Molecular Biology, Pennsylvania State University in the laboratory of B. Franklin Pugh, PhD.

2009 – 2013 **Graduate Assistant** in the Department of Biochemistry, State University of New York at Buffalo, Buffalo, New York in the laboratory of Michael Buck, PhD.

2003 – 2008 **Laboratory Research Assistant** in the Department of Biological Sciences, State University of New York at Buffalo, Buffalo, New York in the laboratory of Richard R. Almon, PhD.

JOURNAL PUBLICATIONS

18. **Lai WKM**; Pugh BF; Gilmour DS. Permanganate-ChIP-seq for genome-wide identification of single-stranded DNA-protein interactions. *Methods in Molecular Biology* (Accepted – Under Revision)

17. Yamada N; **Lai WKM**; Farrell, N; Pugh BF; Mahony S. Characterizing protein-DNA binding event subtypes in ChIP-exo data. *Bioinformatics.* 2019, *35* (6):903-913

16. Rossi MJ; **Lai WKM**; Pugh BF. Simplified ChIP-exo and ChIP-seq assays. *Nature Communications*. 2018, *9* (2842).

15. Rossi, MJ; **Lai WKM**; Pugh, BF. Genome-wide determinants of sequence-specific DNA binding of general regulatory factors. *Genome Research.* 2018, *28* (4):497-508

14. Rossi, MJ; **Lai WKM**; Pugh BF. Correspondence: DNA shape is insufficient to explain binding. *Nature Communications.* 2017, 8:15643

13. **Lai WKM**; Pugh BF. Understanding nucleosome dynamics and their links to gene expression and DNA replication. *Nature Reviews Molecular Cell Biology.* 2017, *18* (9):548

12. **Lai WKM**; Pugh BF. Genome-wide uniformity of human 'open' pre-initiation complexes. *Genome Research.* 2017, 15-26

11. Paul E; Tirosh I; **Lai W**; Buck MJ; Palumbo MJ; Morse RH. Chromatin Mediation of a Transcriptional Memory Effect in Yeast. *G3 Genes|Genomes|Genetics*. 2015, *5* (5):829-838

10. Puri S*; **Lai WKM***; Rizzo JM*; Edgerton M; Buck MJ. Iron-responsive chromatin remodeling and MAPK signaling enhance adhesion in Candida albicans. *Molecular Microbiology*. 2014, *93* (2):291-305 (*co-first authors)

9. **Lai WKM**; Buck MJ. An Integrative Approach to Understanding the Combinatorial Histone Code at Functional Elements. *Bioinformatics.* 2013, *29* (18):2231-7

8. Givens, R; **Lai, W**; Rizzo, J; Bard, J; Mieczkowski, P; Leatherwood, J; Huberman, J; Buck, M. Chromatin architectures at fission yeast transcriptional promoters and replication origins. *Nucleic Acids Research*. 2012, *40* (15):7176-7189

7. **Lai WKM**; Bard JE; Buck MJ. ArchTEx: accurate extraction and visualization of next-generation sequence data. *Bioinformatics*. 2012, *28* (7):1021-3 https://github.com/WilliamKMLai/ArchTEx

6. **Lai WKM**; Buck MJ. ArchAlign: coordinate-free chromatin alignment reveals novel architectures. *Genome Biology.* 2010, *11* (R126) **Highly Accessed** https://github.com/WilliamKMLai/ArchAlign

5. Escamilla-Hernandez, R; Chakrabarti, R; Romano RA; Smalley K; Zhu QQ; **Lai W**; Halfon MS; Buck MJ; Sinha S. Genome-wide search identifies *Ccnd2* as a direct transcriptional target of Elf5 in mouse mammary gland. *BMC Molecular Biology.* 2010, *11* (68)

4. Almon RR; DuBois DC; **Lai W**; Xue B; Nie J; Jusko WJ. Gene expression analysis of hepatic roles in cause and development of diabetes in Goto-Kakizaki rats. *Journal of Endocrinology*. 2009, 200 (3):331-46

3. Almon RR; Yang E; **Lai W**; Androulakis IP; Ghimbovschi S; Hoffman EP; Jusko WJ; DuBois DC. Relationships between Circadian Rhythms and Modulation of Gene Expression by Glucocorticoids in Skeletal Muscle. *American Journal of Physiology. Regulatory, Integrative, and Comparative Physiology*. 2008, *295* (4):R1031-47

2. Almon RR; Yang E; **Lai W**; Androulakis IP; DuBois DC; Jusko WJ. Circadian variations in rat liver gene expression: relationships to drug actions. *Journal of Pharmacology and Experimental Therapeutics*. 2008, *326* (3):700-16

1. Almon RR; **Lai W**; DuBois DC; Jusko WJ. Corticosteroid-regulated Genes in Rat Kidney: Mining Time Series Data. *American Journal of Physiology. Endocrinology and Metabolism.* 2005, *289* (5):E870-82

MANUSCRIPTS IN PREPARATION

Lai WKM; Bocklund K; Mistretta K; Pugh BF. Methods of defining "success" in ChIP-seq/exo experiments.

FUNDING

2018 **XSEDE Startup Allocation**, Extreme Science and Engineering Discovery Environment (XSEDE) supported by National Science Foundation grant number ACI-1548562. Allocation ID: **TG-MCB180094**

2018 **NVIDIA Academic GPU Grant**, NVIDIA Corporation, Santa Clara, CA
Title: "*Deconvolution of the gene and epigenetic regulatory code*"

TEACHING EXPERIENCE

Course Instructor, Spring 2014
Pennsylvania State University, State College, Pennsylvania
BMB 252 Honors – Molecular and Cellular Biology II

Graduate Teaching Assistant, Fall 2010
University at Buffalo, Buffalo, New York

Undergraduate Teaching Assistant, Fall 2006 – Spring 2008
University of Pittsburgh, Pittsburgh, Pennsylvania
General Chemistry Laboratory I and II

AWARDS

2015 **BBA Gene Regulatory Mechanisms Best Poster**, 34th Penn State Summer Symposium in Molecular Biology, State College, PA

2010 **Elizabeth Olmsted Ross Award for Outstanding Graduate Poster**, SUNY Buffalo, Buffalo, NY

2008-2009 **University at Buffalo Presidential Fellowship**, SUNY Buffalo, Buffalo, NY

2005-2008 **University of Pittsburgh Honors Full Tuition Scholarship**, University of Pittsburgh, Pittsburgh, PA

PRESENTATIONS

Transcription regulation: Chromatin and Polymerase II ASBMB Special Symposia 2018 – Poster Presentation

"Methods of defining "success" in ChIP-seq/exo experiments"

Mechanism of Eukaryotic Transcription CSHL 2017 – Poster Presentation

"Genome-wide determinants of sequence-specific DNA binding of general regulatory factors"

Penn State Cancer Institute Annual Retreat 2017 – Poster Presentation

"Application of ChIP-exo to tumor tissue reveals differences in the epigenetic profile between cancer types"

Mechanism of Eukaryotic Transcription CSHL 2015 – Poster Presentation

"High-resolution assays reveal details of mammalian initiation complex organization and function"

34th Penn State Summer Symposium in Molecular Biology 2015 – Speaker and Poster Presentation

"High-resolution assays reveal details of mammalian enhanceosome organization and function"

Epigenetics and Chromatin: Interactions and Processes Conference 2013 – Poster Presentation

"*Identifying genomic features by BLASTing through chromatin*"

National Graduate Student Research Conference 2012 – Poster Presentation

"*Role of Chromatin in Regulating Genomic Functional Elements*"

NorthEast Regional Yeast Meeting (NERY) 2011 – Speaker

"*ArchAlign and ArchBLAST: Next-Generation Tools to Detect and Understand Chromatin Architecture*"

NorthEast Regional Yeast Meeting (NERY) 2010 – Poster Presentation

"ArchAlign: A Next-Generation Alignment Algorithm to Detect Chromatin Architecture"

PROFESSIONAL ACTIVITIES

April 2015, 2016, 2017, **Judge**, Penn State Undergraduate Exhibit Poster Session
2016 **Journal Reviewer**, BMC Genomics
2012 – 2014, **Member**, Interaction Society for Computational Biology
2010 – 2012, **Member**, American Statistical Association

OTHER RELEVANT SKILLS / COURSES

Molecular Biology Courses:
2013 Human Embryonic Stem Cell Culturing Training Course - Hands on training for the culturing and maintenance of H1 and H9 human embryonic cells lines

Statistics Courses:
2012 Statistics for Bioinformatics
2011 Applied Multivariate Statistics, Statistical Genetics, Statistical Comparison and Association, Introduction to Theoretical Statistics II
2010 Regression Analysis, Math Analysis for Biostatistics, Introduction to Theoretical Statistics I

Experimental Design Courses:
2007 Pharmacokinetic – Pharmacodynamic Modeling Concepts and Applications Summer Course – Course on experimental design with a focus on multiple dosing strategies used to analyze cellular and organismal response from a pharmacological perspective.

Programming Languages:
Java, C++, Perl, Python, R

REFERENCES

Dr. Frank Pugh
Evan Pugh University Professor
Willaman Chair in Molecular Biology and
Professor of Biochemistry and Molecular Biology
Phone: (814) 863-8252
Email: bfp2@psu.edu
Postdoctoral Advisor

Dr. Shaun Mahony
Assistant Professor of Biochemistry & Molecular Biology
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Collaborator

Dr. Michael J. Buck
Associate Professor of Biochemistry
Director WNYSTEM Stem Cell Sequencing/Epigenomics Facility
Phone: (716) 881-7569
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PhD Advisor