B E N J A M I N T H O M A S W A L T E R S

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Objective

To find a position that utilizes more than 6 years of research experience in biochemistry and biophysics involving mass spectrometry with an emphasis on hydrogen-deuterium exchange to solve challenging problems in the biotechnological sciences.

Professional Expertise

Hydrogen Exchange • HPLC • Mass Spectrometry • Nuclear Magnetic Resonance Spectroscopy
Proteomics • Bioinformatics • Applied Mathematics & Algorithms • Quantitative Chemistry
Epitope Mapping • Protein Folding • Protein Stability • Protein Dynamics • Protein Purification

EDUCATION

University of Pennsylvania Perelman School of Medicine • Philadelphia, PA • 08/2007-12/2013

- Doctor of Philosophy, thesis defense scheduled for fall 2013, Department of Biochemistry and Molecular Biophysics & Biomedical Graduate Studies, Perelman School of Medicine.
- HHMI Translational Research Certification, 2010, Med into Grad Scholars Program.

NC State University • Raleigh, NC • 08/2002-05/2006

- Bachelor of Science in Biochemistry, minors in Genetics & Mathematics. *Magna cum Laude*.

PROFESSIONAL EXPERIENCE

University of Pennsylvania Perelman School of Medicine • Philadelphia, PA • 08/2007-12/2013
Ph.D. Candidate mentored by Professor S. Walter Englander.
Dissertation Title: The application of hydrogen exchange to study large protein folding & structural dynamics.

- Determination of the protein folding pathway (HX MS) and native structure stability (NMR) of the largest protein studied to date at structural resolution using experiments designed specifically for this task (**publication 1**).
- Development of algorithmic strategies to determine site-resolved deuterium occupancy from peptide fragment level HX MS data (**publication 2**).
- Development of hydrogen exchange mass spectrometry (HX MS) experiments designed to study protein folding. My work here involves experimental optimization (**publications 3-5**) and algorithms designed to process and interpret HX MS experimental results.
- Nuclear Magnetic Resonance Spectroscopy (NMR): substantial contributions to hydrogen exchange methodologies by the development of a multidimensional sparse-sampling NMR experiment with the ability to study native state hydrogen exchange for the first time in large (>40kDa) proteins at amino acid resolution. I also developed algorithms needed to process the data using multidimensional Fourier transformation and signal analysis. (**publication 6**).
- Self-taught computer programming in the Python language to create algorithms for processing and analysis of data from hydrogen exchange experiments by NMR and MS.
- Presentation of research at three technical conferences with 200+ attending professionals in addition to numerous on-campus presentations.
- Teaching assistant for Macromolecular Biophysics II (BMB 519), Spring Semester, 2010. Responsibilities include weekly office hours, formal classroom sessions for material review, and grading of coursework.

NC State University Dept. of Molecular & Structural Biochemistry • Raleigh, NC • 05/2006 – 6/2007
Biochemistry Research Technician supervised by Professors Michael Goshe & Steve Clouse.

- Development of multi-step protein purification of integral membrane proteins.
- Proteomic analysis of post-translational modifications on integral membrane proteins by LC-MS.
- Development of novel protease removal strategies minimizing sample loss (**publication 7**).

PROFESSIONAL EXPERIENCE CONTINUED

NC State University Genetics & Zoology Departments • Raleigh, NC • 05/2005 – 05/2006
Molecular Biology Research Technician supervised by Professor Robert R. H. Anholt.

- Gene sequencing and ANCOVA analysis of identified single nucleotide polymorphisms in genes regulating olfaction with behavioral assays in *D. melanogaster*.

PUBLICATION RECORD

1. **Walters, B.T.**, Mayne, L., Englander, S.W. *The Folding Pathway of a Large Multidomain Protein Studied by HX MS*. In preparation for submission to **Proc Natl Acad Sci USA.**
2. Kan, Z.Y., **Walters, B.T.**, Mayne, L., Englander, S.W. *Protein Hydrogen Exchange at Residue Resolution by Proteolytic Framentation Mass Spectrometry Analysis*. Submitted to **J Am Chem Soc.,** June 2013.
3. Hu, W., **Walters, B.T.**, Kan, Z.Y., Mayne, L., Rosen, L.E., Marquesee, S., Englander, S.W. *Stepwise Protein Folding at Near Amino Acid Resolution by Hydrogen Exchange and Mass Spectrometry*. **Proc Natl Acad Sci USA.**, May 2013, 19(110):7684-7689.
4. **Walters, B.T.,** Ricciuti, A., Mayne, L., Englander, S.W. *Minimizing Back Exchange in The Hydrogen Exchange – Mass Spectrometry Experiment*. **J Am Soc of Mass Spectrom.**, Dec. 2012, 23(12):2132-2139.
5. Mayne, L., Kan, Z.Y., **Walters, B.T.**, Chetty, P.S., Ricciuti, A., Englander, S.W. *Many Overlapping Peptides for Protein Hydrogen Exhange Experiments by the Fragmentation Separation-Mass Spectrometry Method*. **J Am Soc of Mass Spectrom.**, September 2011, 22(11):1898-1905.
6. **Walters, B.T.**, Gledhill, J.M. Jr., Wand, A.J. *AMORE-HX: a multidimensional optimization of radial enhanced NMR-sampled hydrogen exchange*. **J Biol NMR.**, July 2009, 45(1-2):233-239.
7. Mitra, S.K., **Walters, B.T.**, Clouse, S.D., Goshe, M.B. *An Efficient Organic Solvent Based Extraction Method for The Proteomic Analysis of Arabidopsis Plasma Membranes*. **J Prot Res.**, June 2009, 8(6):2752-2767.

HONORS & AWARDS

- Chosen by directors of the HHMI Med into Grad Scholars Program to select the symposium topic and guide the selection of speakers for the 3rd Annual HMGS Translational Research Symposium, attended by peer translational research groups from Harvard, Yale, and MIT. May 2010.
- Recipient of the Structural Biology Training Grant, *valued $30K*, Johnson Research Foundation, 2010.
- Publication # 6 was featured in part one of a special two part structural dynamics series, the publication was submitted at the request of the journal, 2009.
- Awarded a full-scholarship and monthly living stipend for doctoral studies, *lifetime value ~ $500K,* Biomedical Graduate Studies, University of Pennsylvania, Perelman School of Medicine, 2007.

PROFESSIONAL AFFILIATIONS

- ASMS – American Society for Mass Spectrometry.
- AAAAS – American Association for the Advancement of Science.
- ACS – American Chemical Society.
- Phi Lambda Upsilon, National Honorary Chemical Society.
- National Society of Collegiate Scholars.

REFERENCES PROVIDED UPON REQUEST