

EDUCATION

Ph.D., Biochemistry, Kent State University, August 2008

Dissertation Advisor: Arne Gericke, PhD

Thesis title: Characterization of the Binding of PTEN and its Disease Related Mutants to Phospholipid Model Membranes

B.S., Integrated Life Sciences, Kent State University, May 2004

Minors: Chemistry, Biology, Health Care Ethics

RESEARCH EXPERIENCE

ProMedica Health System, Toledo, OH

Medical Science Writer April 2010-present

- Served as member of the Scientific Advisory Committee for ProMedica Biorepository
- Developed and implemented research design in clinical trials and basic research projects
- Served on Editorial Board of *Translation: The University of Toledo Journal of Medical Sciences*
- Oversaw and participated in data collection, analysis and interpretation in multidisciplinary fashion, working with clinicians, basic researchers, and statisticians yielding 50 new study protocols and submission of over 20 manuscripts for publication in peer-reviewed journals

Kent State University, Kent, OH

Postdoctoral Fellow Arne Gericke, PhD, Advisor 2008-2010

- Used various spectroscopic and thermodynamic techniques to determine that an autism related point mutation of the phosphatase PTEN's C2 domain (PTEN_{H93R}) enhances interactions with the membrane and results in conformational changes
- Determined the dissociation constant of the binding of PTEN_{H93R} with specific lipids and mixed lipid model membranes using isothermal titration calorimetry (ITC) and Fluorescence Resonance Energy Transfer (FRET) techniques
- Coated gold nanoparticles with asymmetric model membranes to characterize the binding and conformational changes of proteins upon interaction with phosphoinositides using Raman spectroscopy
- Managed laboratory function, including supervision and mentoring of graduate and undergraduate students' research, maintained scientific instrumentation, responsible for troubleshooting and interfacing with the manufacturers

Kent State University, Kent, OH

Graduate Research Assistant Arne Gericke, PhD, Advisor 2004-2008

- Characterized the binding of the phosphatase PTEN to lipid model membranes with fluorescence spectroscopy and ITC to demonstrate that the enzyme binds specifically to its product, PI(4,5)P₂
- Used Attenuated Total Reflectance-Fourier Transform Infrared (ATR-FTIR) spectroscopy to characterize conformation changes of proteins, including PTEN, upon interaction with model lipid membranes
- Used various spectroscopic and thermodynamic techniques to determine that cancer-related point mutations of PTEN's N-terminus abolishes interactions with the membrane and prevents conformational changes found to be required for activity
- Demonstrated that the interaction of the 16 amino acid N-terminus of PTEN to phosphoinositide-containing model membranes is specific, rather than electrostatic in nature, using fluorescence spectroscopy and ITC

University of Pennsylvania, Philadelphia, PA
Visiting Graduate Assistant Paul Janmey, PhD

- Investigated the binding of the proteins gelsolin and profilin to lipid model membranes using fluorescence spectroscopy, to show that interactions with the membrane are not governed by electrostatic interactions
- Used fluorescence quenching and FRET to determine that presence of cholesterol enhances the binding gelsolin and profilin to phosphoinositide containing model membranes

Kent State University, Kent, OH
Undergraduate Research Assistant Arne Gericke, PhD

- Investigated physical properties of lipid model membranes using fluorescence spectroscopy (FRET) and demonstrated that cholesterol enhances domain formation in membranes containing unsaturated, physiologically relevant phosphoinositides

TEACHING EXPERIENCE

Honorary Graduate Faculty Member, Advisor
University of Toledo Medical Center, March 2012 – June 2015

Research Mentor, Northwest Ohio Consortium for Public Health,
University of Toledo, 2011-2012

REU Student Research Program, Mentor
University of Pennsylvania, 2006

REU Student Research Program, Mentor
Kent State University, 2005-2009

Teaching Assistant, General Chemistry II Labs,
Kent State University, Spring 2005 and Fall 2007

Grading Assistant, Chemistry in Our World
Kent State University, Fall 2004

Laboratory Chemical Preparer, General Chemistry I Labs,
Kent State University, Fall 2004

PUBLICATIONS

Jiang, Z, **Redfern, RE**, Isler, YB, Ross, AH and Gericke, A. Cholesterol stabilizes fluid phase phosphoinositide domains. *Chemistry and Physics of Lipids*. **In Press**.

Redfern, RE, Brown, MB and Benson, AG. High Jugular Bulb in a Cohort of Patients with Definite Ménière's Disease. *Journal of Laryngology and Otology*. **In Press**.

Santarelli, G, **Redfern, RE**, and Benson, A. Bone-Anchored Hearing Aid Implantation in a Patient with Goldenhar's Syndrome. *ENT Journal*. **In Press**.

Fiester, SE, Evangelista, SF, Adams, DJ, **Redfern, RE**, and Woolverton, CJ. The role of the liquid crystalline state in the bundling of *Salmonella enterica* servovar Typhimurium flagella. *Liquid Crystals*. (2014). 41(9):1277-1285.

Adepoju, L, Wanjiku, S, Brown, M, Qu, W, **Redfern, RE**, and Sferra, J. Effect of Insurance Payer Status on the Surgical Treatment of Early Stage Breast Cancer: Analysis of Data from a Single Health System. *JAMA Surgery*. (2013). 148(6):570-572.

Brown, M, **Redfern, RE**, Bressler, K, Swicegood, T and Molnar, M. Effects of an Advanced Nursing Assistant Education Program on Job Satisfaction, Turnover Rate, and Clinical Outcomes. *Journal of Gerontological Nursing*. (2013). 39(10):34-43.

Redfern, RE and Heiney, JP. Difficult Leg Wounds Successfully Closed with Decortication, Oasis, and KCI V.A.C. *Journal of Wound Care*. (2013). 22(6):314-316.

Heiney, JP, **Redfern, RE**, and Wanjiku, S. Subjective and Novel Objective Radiographic Evaluation of Inflatable Bone Tamp Treatment of Articular Calcaneus, Tibial Plateau, Tibial Pilon and Distal Radius Fractures. *Injury*. (2013). 44(8):1127-1134.

Banas, D, Lazebnik, R, Rome, E, Wanjiku, S, and **Redfern, RE**. Eating Disorder Training and Attitudes among Primary Care Residents. *Clinical Pediatrics*. (2013).52(4). 351-357.

Ramanathan, RK and **Redfern, RE**. "Case Study: Novel Application of GuideLiner for Anomalous Right Coronary Artery Intervention". *Journal of Invasive Cardiology*. (2013) 25(1) E20-E22.

Brown, M, **Redfern, RE**, and Bressler, K. "Elimination of Position-Change Alarms in an Alzheimer's and Dementia Long Term Care Facility". *American Journal of Alzheimer's Disease and Other Dementias*. (2011). 26(8) 599-605

Redfern, RE, Daou, MC, Li, L., Munson, M, Gericke, A, and Ross, AH. "A Mutant Form of PTEN Linked to Autism". *Protein Science*. (2010). 19(10):1948-56

Gericke, A, Qin, C, **Redfern, RE**, Redfern, D, Fujimoto, Y, Taleb, H, Butler, W.T. and Boskey, A.L. "Different Forms of DMP1 Play Distinct Roles in Mineralization". *Journal of Dental Research*. (2010). 89(4):355-359.

Redfern, RE, Redfern, D, Furgason, ML, Munson, M, Ross, AH and Gericke, A. "Phosphoinositides Selectively Bind to PTEN Phosphatase and Induce Structural Changes". *Biochemistry*. (2008). 47. 2162-2171

PRESENTATIONS

Oral presentations:

Redfern, RE, Hill, A, Ross, AH and Gericke, A. "The Lysine at Position 13 of PTEN's N-Terminus is Necessary for its Preferred Interaction with PI(4,5)P₂". Biophysical Annual Meeting, Boston, MA, March 2009.

Gericke, A, Jiang, Z, **Redfern, RE**, Kooijman, EE, and Ross, AH. "Physical Foundations of PTEN/Phosphoinositide Interaction". Annual Physical Society Meeting. Pittsburgh, PA, March 2009.

Blaih, Y, Jiang, Z, **Redfern, RE**, Ross, AH and Gericke, A. "Spectroscopic Characterization of Phosphoinositide/Protein Interaction". PITTCO. Chicago, IL, March 2009.

Woods, S, King, KE, **Redfern, RE**, Ross, AH and Gericke, A. "Lipid Bilayer Coated Gold Nanoparticles Provide Insight into Proteins' Conformational Changes". Biophysical Annual Meeting. Boston, MA, March, 2009.

Jiang, Z, Gericke, A and **Redfern, RE** "Cholesterol Dependent Phosphoinositide Domain Formation" Biophysical Annual Meeting, Long Beach, CA February 2008.

Redfern, RE, Redfern, DA, Ross, AH and Gericke, A. "Effect of phosphoinositide identity and lateral organization on PTEN binding and structure" Biophysical Society Annual Meeting, Baltimore, MD, March 2007.

Gericke, A, **Redfern, RE**, Redfern, DA and Ross, AH. "Effect of phosphoinositide identity and lateral organization on PTEN binding and structure" PCAMB, Puebla, Mexico, January 2007.

Poster Presentations:

Redfern, RE and Wheeler, M. "ProMedica's Experience Transitioning to the Use of a Central Institutional Review Board". PRIM&R Advancing Ethical Research Conference, Boston, MA, November 2013.

Banas, DA, Lazebnik, R, Rome, E, Wanjiku, S and **Redfern, RE**. "Investigation of Factors Affecting Primary Care Interest In And Comfort In Diagnosing Eating Disorders". 46th STFM Annual Spring Conference, Baltimore, Maryland, May 2013.

Gericke, A, King KE, **Redfern, RE**, Neumann, BE, Harishchandra, RK, and Ross, AH. "PTEN binding to morphologically heterogeneous membrane environments". Keystone Symposium PI-3K Signalling Pathways, Keystone, Colorado 2013.

Dhariwal, MK, Reyes, GM, Tottempudi, K and **Redfern, RE**. "Screening a Silent Killer in Primary Care". OAFP Annual Meeting, Columbus, OH. March 2012.

Jiang, Z, King, KE, **Redfern, RE**, Kooijman, EE and Gericke, A. "Phosphatidylinositol-4,5-bisphosphate Affects Ceramide-1-Phosphate Phase Behavior". Biophysical Annual Meeting, Boston, MA, March 2009.

Redfern, RE, McCullough, CE, Ross, AH and Gericke, A. "Ceramide-1-Phosphate Prevents Interaction of PTEN with Phosphatidylinositol-4,5-bisphosphate but Does Not Interact Significantly with the Protein Itself". Biophysical Annual Meeting, Boston, MA, March 2009.

Redfern, RE, Ross, AH and Gericke, A. "Mutations of PTEN's N-terminus Affect Binding to Phosphoinositides", PTEN Pathways Meeting, Cold Spring Harbor, NY, March 2008.

Redfern, RE, Ross, AH and Gericke, A. "Mutations of PTEN's N-terminus Affect Binding to Phosphoinositides", Biophysical Society Annual Meeting, Long Beach, CA, February 2008.

Redfern, RE, Gericke, A, and Ross, AH. "Effects of Phosphoinositide Identity and Lateral Organization on PTEN Binding and Structure", ASBMB, Washington D.C., May 2007.

Redfern, RE, Gericke, A, and Ross, AH. "Effects of Phosphoinositide Identity and Lateral Organization on PTEN Binding and Structure". Graduate Student Senate Research Colloquium, Kent, Ohio, March 2007.

Redfern, RE, Gericke, A, and Ross, AH. "Infrared Spectroscopic Characterization of PTEN/Phosphatidylinositol 4,5-bisphosphate Interaction", Keystone Symposium PI-3K Signalling Pathways, Sante Fe, New Mexico, March 2007.

Redfern, DA, **Redfern, RE**, Jiang, Z and Gericke, A. "Cholesterol effect on phosphoinositide /phosphatidylcholine mixing behavior". PCAMB, Puebla, Mexico January 2007.

Redfern, RE, Redfern, DA, Gericke, A and Ross, AH. "Infrared Spectroscopic Characterization of PTEN/Phosphatidylinositol 4,5-Bisphosphate Interaction". PTEN Pathways, Cold Spring Harbor, New York, March 2006.

Gericke, A, **Redfern, RE**, Redfern, DA, Munson, M and Ross, AH. "Spectroscopic characterization of PTEN/PIP2 interaction". FASEB, San Francisco, CA April 2006.

Gericke, A, Ross, AH, Redfern, DA and **Redfern, RE**. "Spectroscopic characterization of PTEN/ phosphatidylinositol-4,5-bisphosphate interaction" ASBMB, San Diego, CA April 2005.

Redfern, DA, **Redfern, RE**, Gericke, A and Ross, AH. "Infrared Spectroscopic Characterization of PTEN/Phosphatidylinositol 4,5-bisphosphate Interaction". Biophysical Society Annual Meeting, Long Beach, CA, February 2005.

Gericke, A, Redfern, DA and **Redfern, RE**. "pH Dependent Domain Formation in Phosphoinositide Model Membranes". FASEB 2004 Summer Research Conferences, Tucson, AZ July 2004.

AWARDS AND RECOGNITIONS

Bush Teaching Award, Kent State University – April 2008
Travel Award, Kent State University – January 2008
Travel Award, Kent State University – January 2007
Travel Award, Kent State University – January 2006
Travel Award, Kent State University – January 2005
Trustee Scholarship, Kent State University – 2004, 2003, 2002
Honors Scholarship, Kent State University – 2001
Kent State University Grant, Kent State University – 2001
Who's Who Among American High School Students - 1998

AFFILIATIONS

Public Responsibility in Medicine and Research – member since 2013
Graduate Student Organization – treasurer 2007-2008
Biophysical Society – member since 2005
Alpha Chi Sigma – member since 2003