

Timothy H. Bayburt

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Education

- Ph.D. Biochemistry, University of Washington, Seattle, WA (1996).
Thesis title: Interfacial Enzymology of the Mammalian Calcium-Dependent Cytosolic Phospholipase A₂.
- B.S. Microbiology, University of Michigan, Ann Arbor, MI (1987).

Experience and Accomplishments

- **Senior Research Scientist, University of Illinois, Department of Biochemistry (2005-present)**. Research structural and functional aspects of receptors and enzymes in biological membranes. Principle Investigator of NIH grant (R41) for application of Nanodisc technology to GPCRs. Direct technical staff and guide graduate students on related projects.
- **Research Scientist, University of Illinois, Department of Biochemistry (2002-2005)**. Developed new technology (Nanodiscs) to assemble multipass transmembrane proteins such as GPCRs as single monomers and as isolated oligomers for functional study.
- **Post-Doctoral Research Associate, University of Illinois, Department of Biochemistry and Beckman Institute for Advanced Science and Technology (1996-2002)**. Developed innovative phospholipid bilayer assemblies (Nanodiscs) for solubilizing membrane-associated proteins and manipulating in solution and on surfaces. Developed atomic force microscopy technique to determine membrane protein height above a membrane.
- **University of Washington, Department of Biochemistry, Graduate Research Assistant (1990-1996)**. Developed fluorescence and radiometric assays to characterize membrane-associated enzymes involved in inflammatory response.
- **University of Michigan, Department of Chemistry, Laboratory Technician (1987-1990)**. Assisted in construction of NMR instrumentation and control software.

Awards and Memberships

- 2006 Keystone Symposia Scholarship Award to “G-protein Coupled Receptors: Evolving Concepts and New Techniques” (2006).
- Individual National Research Service Award, National Institutes of Health (1997-1999).
- Molecular Biophysics Training Grant, National Institutes of Health (1992-1994).
- Biotechnology Training Grant, National Institutes of Health (1991-1992).
- Member of the American Association for the Advancement of Science and the Biophysical Society.

Grants Authored/co-Authored

NIH 1R41GM075362 G-Protein Coupled Receptor Nanostructure Pharmaceuticals 2005-2006.

NIH 1R21GM063574 Nanostructures for Solubilizing Serpentine Receptors (S. Sligar, PI) 2001-2003.

NIH 1F32GM019024 Nanoscale Structure/Function of P450 in Membranes 1997-1999.

Patents

Membrane Scaffold Proteins. (2006) United States Patent 7,048,949

Membrane Scaffold Proteins. (2006) United States Patent 7,083,958

Publications

Marin, V. L., Bayburt, T. H., Sligar, S. G., Mrksich, M. (2007) Functional Assays of Membrane-Bound Proteins with SAMDI-TOF Mass Spectrometry. *Angewandte Chemie* 46, 8796-8798.

Bayburt, T. H., Leitz, A. J., Xie, G., Oprian, D. D., Sligar, S. G. (2007) Transducin Activation by Nanoscale Lipid Bilayers Containing One and Two Rhodopsins. *J. Biol. Chem.* 282, 14875-14881.

Bayburt, T. H., Grinkova, Y. V. and Sligar, S. G. (2006) Assembly of Single Bacteriorhodopsin Trimers in Bilayer Nanodiscs. *Arch. Biochem. Biophys.* 450, 215-222.

Leitz, A. J., Bayburt, T. H.; Barnakov, A. N., Springer, B.A., Sligar, S. G. (2006) Functional Reconstitution of β 2-adrenergic Receptors Utilizing Self-Assembling Nanodisc Technology. *BioTechniques* 40, 601-612.

Bayburt, T. H. and Sligar, S. G. (2003) Self-Assembly of Single Integral Membrane Proteins into Soluble Nanoscale Phospholipid Bilayers. *Protein Science* 12, 2476-2481.

Civjan, N. R., Bayburt, T. H., Schuler, M. A. and Sligar, S. G. (2003) Direct Solubilization of Heterologously Expressed Membrane Proteins by Incorporation into Nanoscale Lipid Bilayers. *BioTechniques* 35, 556-563.

Bayburt, T. H., Grinkova, Y. V. and Sligar, S. G. (2002) Self-Assembly of Discoidal Phospholipid Bilayer Nanoparticles with Membrane Scaffold Proteins. *Nano Letters* 2, 853 – 856.

Bayburt, T. H. and Sligar, S. G. (2002) Single Molecule Height Measurements on Microsomal Cytochrome P450 in Nanometer-Scale Phospholipid Bilayer Disks. *Proc. Natl Acad. Sci. USA* 99, 6725-6730.

Bayburt, T. H., Carlson, J.W., and Sligar, S.G. (2000) Single Molecule Height Measurements on a Membrane Protein in Nanometer-Scale Phospholipid Bilayer Disks. *Langmuir* 16, 5993-5997.

Carlson, J.W., Bayburt, T. H., and Sligar, S.G. (2000) Nanopatterning Phospholipid Bilayers. *Langmuir* 16, 3927-3931.

Bayburt, T., Carlson, J. Godfrey, B., Shank-Retzlaff, M., and Sligar, S. G. (1999) Structure, Behavior and Manipulation of Nanoscale Biological Assemblies. In *Handbook of Nanostructured Materials and Nanotechnology*, (H. Nalwa, Ed.) Academic Press, San Diego.

Bayburt, T. H., Carlson, J.W., and Sligar, S.G. (1998) Reconstitution and Imaging of a Membrane Protein in a Nanometer-Size Phospholipid Bilayer. *J. Struct. Biol.* 123, 37-44.

Bayburt, T.H. and Gelb, M.H. (1997) Interfacial Catalysis by Human 85 kDa Cytosolic Phospholipase A₂ on Anionic Vesicles in the Scooting Mode. *Biochemistry* 36, 3216-3231.

Bayburt, T.H., Yu, B.-Z., Street, I., Ghomashchi, F., Laliberté, F., Perrier, H., Wang, Z., Jain, M.K., and Gelb, M.H. (1995) Continuous, Vesicle-Based Fluorometric Assays of 14- and 85-kDa Phospholipases A₂. *Anal. Biochem.* 232, 7-23.

- Glover, S., de Carvalho, M.S., Bayburt, T.H., Jonas, M., Chi, E., Leslie, C.C., and Gelb, M.H. (1995) Translocation of the 85-kDa Phospholipase A₂ from Cytosol to the Nuclear Envelope in Rat Basophilic Leukemia Cells Stimulated with Calcium Ionophore or IgE/Antigen. *J. Biol. Chem.* 270, 15359-15367.
- Jain, M.K., Krause, C.D., Buckley, J.T., Bayburt, T.H., and Gelb, M.H. (1994) Characterization of Interfacial Catalysis by *Aeromonas hydrophila* Lipase/Acyltransferase in the Highly Processive Scooting Mode. *Biochemistry* 33, 5011-5020.
- Bayburt, T.H., Yu, B.-Z., Lin, H.K., Browning, J., Jain, M.K., and Gelb, M.H. (1993) Human Nonpancreatic Secreted Phospholipase A₂: Interfacial Parameters, Substrate Specificities, and Competitive Inhibitors. *Biochemistry* 32, 573-582.
- Jain, M.K., Ghomashchi, F., Yu, B.-Z., Bayburt, T.H., Murphy, D., Houck, D., Brownell, J., Reid, J.C., Solowiej, J.E., Wong, S.M. et al. (1992) Fatty Acid Amides: Scooting Mode-Based Discovery of Tight-Binding Competitive Inhibitors of Secreted Phospholipases A₂. *J. Med. Chem.* 35, 3584-3586.