Robert V. Stahelin

ADDRESS: Department of Chemistry
University of Illinois at Chicago
845 W. Taylor St., Room 4500 (M/C 111)
Chicago, IL 60607
Phone: 312-969-8158
LAB: 312-996-8158
FAX: 312-996-0431
Email: rstahel@uic.edu

EDUCATION:

2003 Ph. D. in Chemistry
University of Illinois, Chicago, IL

1998 B. S. in Biochemistry
University of Illinois, Chicago, IL

PROFESSIONAL EXPERIENCE:

2003-present **Postdoctoral Research Associate**, University of Illinois
Department of Chemistry (Dr. Wonhwa Cho)
Research Experience: Currently expanding abilities to quantify protein-membrane interactions *in vitro* and *in vivo*. Developing novel methods to monitor protein activity *in vivo* and examine native protein translocation. Work has already lead to more than 10 publications (see below). Successful and diverse collaborations have opened up new avenues to understanding protein-membrane interactions.
Supervisory Experience: Supervising 15 graduate students and 4 undergraduate students. Initiating project ideas and experimental outlines. Teaching students numerous techniques in molecular biology, cell biology, microscopy, and quantifying protein-ligand interactions.

2000-present **Biochemistry Laboratory Instructor and Coordinator**
Department of Chemistry, University of Illinois
Teaching Experience: Taught Chemistry 455 (Biochemistry laboratory) for the past 5 years (over 250 graduate and undergraduate students). Lectures and laboratories focus on general trends in molecular biology, cell biology, biochemistry, and biophysics as well as an introduction to new developments in these areas.

1998-2003 **Graduate Student**, University of Illinois
Department of Chemistry (Dr. Wonhwa Cho)
Research Experience: Developed outstanding techniques for *in vitro* and *in vivo* quantification of protein-membrane interactions. Formed fruitful

collaborations to expand understanding of protein-membrane interactions. This work lead to more than 10 unique publications (see below) and invited review articles as well as numerous awards (see below). Furthermore, many graduate students and post-docs have utilized the techniques.

Supervisory Experience: Supervised 6 graduate and 6 undergraduate students. Taught students techniques of molecular biology, cell biology, protein chemistry, and enzyme assays. Helped initiating project ideas and experimental outlines.

HONORS, AWARDS and PROFESSIONAL SERVICES:

2005-present	Microscope Advisory Committee, Research Resources Center, University of Illinois
2002-2003	Dean's Scholar Award, University of Illinois Outstanding Graduate Student Award
2002-present	Sigma Xi Scientific Research Society
2002-present	FASEB
2002	Sigma Xi Award for Research Presentation
2002	Provost Award for Graduate Research One Year Funding for Proposal on Membrane Binding of FYVE Domains
2001-2002	University Fellowship, University of Illinois Outstanding Graduate Student Award
2001-present	Biophysical Society
1999	Merit Award for Teaching, University of Illinois General Chemistry Teaching Assistant Award
1998-present	American Chemical Society
1998-present	Golden Key National Honor Society

PUBLICATIONS:

1. **Stahelin, R. V.** and Cho, W. "Membrane Binding Analysis of C1 and C2 Domains Using Surface Plasmon Resonance" (2001) *Biophys. J.*, 80: 1, 534a

2. Bittova, L., **Stahelin, R. V.**, and Cho, W. "Roles of Ionic Residues of the C1 Domain in Protein Kinase C-α Activation and the Origin of Phosphatidlyserine Specificity" (2001) *J. Biol. Chem.*, 276, 4218-4226.

3. **Stahelin, R. V.**, and Cho, W. "Differential Roles of Ionic, Aliphatic, and Aromatic Residues in Membrane-Protein Interactions: A Surface Plasmon Resonance study on Phospholipases A_2" (2001) *Biochemistry* 40, 4672-4678.

4. Cho, W., Bittova, L., and **Stahelin, R. V.** "*In Vitro* Membrane Binding Assays for Peripheral Proteins" (2001) *Anal. Biochem.*, 296, 153-161. **Invited Review Article**

5. **Stahelin, R. V.** and Cho, W. "Roles of Ca^{2+} Ions in the Membrane Binding of C2 Domains " (2001) *Biochem. J.*, 359,679-685.

6. **Stahelin, R. V.,** Long, F., Diraviyam, K., Bruzik, K. S., Murray, D., and Cho, W. "Phosphatidylinositol 3-Phosphate Induces the Membrane Penetration of the FYVE Domains of Vps27p and Hrs" (2002) *J. Biol. Chem.* 277, 26379-26388.

7. Karathanassis, D., **Stahelin, R. V.,** Bravo, J., Perisic, O., Pacold, C. M., Cho, W., and Williams R. L. "Binding of the PX domain of $p47^{phox}$ to Phosphatidylinositol 3,4-bisphosphate and Phosphatidic Acid is Masked by and Intramolecular Interaction" (2002) *EMBO J.* 21, 5057-5068.

8. Cho, W., Digman, M. A., Ananthanarayanan, B., and **Stahelin, R. V.** "Bacterial Expression and Purification of C1 and C2 Domains of Protein Kinase C Isoforms" (2003) *Methods in Molecular Biology, vol. 233: Protein Kinase C Protocols*, Ed., Newton, A.C., K. Humana Press, Totowa, New Jersey 291-298.

9. **Stahelin, R. V.**, Forslund, R. E., Wink, D. J., and Cho, W. "Development of a Biochemistry Laboratory Course with a Project-Oriented Goal" (2003) *Biochemistry and Molecular Biology Education*, 31, 106-112.

10. **Stahelin, R. V.**, Rafter, J. D., Das, S., and Cho, W. "A Molecular Basis for Differential Subcellular Localization of C2 domains of Protein Kinase C-α and Cytosolic Phospholipase A_2" (2003) *J. Biol. Chem.* 278, 12452-12460.

11. Diraviyam, K., **Stahelin, R. V.**, Cho, W., and Murray, D. "Computer Modeling of the Membrane Interactions of FYVE Domains" (2003) *J. Mol. Biol.* 328, 721-736.

12. **Stahelin, R. V.,** Burian, A., Murray, D., Bruzik, K. S., and Cho, W. "Membrane Binding Mechanisms of the NADPH Oxidase PX Domains" (2003) *J. Biol. Chem.* 278, 14469-14479.

13. **Stahelin, R. V.,** Long, F., Peter, B. J., Murray, D., De Camilli, P., McMahon, H. T., and Cho, W. "Contrasting Membrane Interaction Mechanisms of AP180 N-terminal Homology (ANTH) and Epsin N-terminal Homology (ENTH) Domains" (2003) *J. Biol. Chem.* 278, 28993-28999.

14. Ananthanarayanan, B., **Stahelin, R. V.,** Digman, M. A., and Cho, W. "Activation Mechanisms of Conventional Protein Kinase C Isoforms are Determined by the Ligand Affinity and Conformational Flexibility of Their C1 Domains" (2003) *J. Biol. Chem.* 278, 46886-46894.

15. Malkova, S., **Stahelin, R. V.,** Long, F., Pingali, S. V., Cho, W., and Schlossman, M. L. "X-ray Reflectivity Studies of $cPLA_2$-C2 Domains Adsorbed onto Langmuir Monolayers of SOPC" (2004) *Biophysical Journal,* 86:1, 377a.

16. **Stahelin, R. V.,** Digman, M. A., Medkova, M., Ananthanarayanan, B., Rafter, J. D., Melowic, H. R., and Cho, W. "Mechanism of Diacylglycerol-Induced Membrane Targeting and Activation of Protein Kinase Cδ" (2004) *J. Biol. Chem.* 279, 29501-29512.

17. Blatner, N. R., **Stahelin, R. V.,** Diraviyam, K., Hawkins, P. T., Hong, W., Murray, D., and Cho, W. "The Molecular Basis of the Differential Subcellular Localization of FYVE Domains" (2004) *J. Biol. Chem.,* 279, 53818-53827.

18. **Stahelin, R. V.,** Ananthanarayanan, B., Blatner, N. R., Singh, S., Bruzik, K. S., Murray, D., and Cho, W. "Mechanism of Membrane Binding of the Phospholipase D1 PX Domain" (2004) *J. Biol. Chem.,* 279, 54918-54926.

19. Cho, W. and **Stahelin, R. V.** "Membrane-Protein Interactions in Membrane Trafficking and Signal Transduction" (2005) *Annu. Rev. Biophys. Biomol. Struct.,* 34:119-151. **Invited Review Article**

20. Subramanian, P.*, **Stahelin, R. V.*,** Szulc, Z., Bielawska, A., Cho, W., and Chalfant, C. E. "Ceramide-1-Phosphate Acts as a Positive Allosteric Activator of Cytosolic Phospholipase A_2 and Enhances the Interaction of the Enzyme with Phosphatidylcholine" (2005) *J. Biol. Chem.,* 280, 17601-17607.
***Equal Authorship**

21. **Stahelin, R. V.,** Digman, M. A., Medkova, M., Ananthanarayanan, B., Melowic, H. R., Rafter, J. D., and Cho, W. "Diacylglycerol-Induced Membrane Targeting and Activation of Protein Kinase Cε: Mechanistic Differences Between PKCδ and ε" (2005) *J. Biol. Chem.*, 280, 19784-19793.

22. Cho, W. and **Stahelin, R. V.** "*In Vitro* and Cellular Membrane Binding Mechanisms of Membrane Targeting Domains" (2005) Ed., Tamm L. *in press.*
Invited Review Article

23. Malkova, S., Long, F., **Stahelin, R. V.,** Pingali, S. V., Murray, D., Cho, W., and Schlossman, M. L. "X-ray Reflectivity Studies of $cPLA_2$-C2 Domains Determine its Depth of Penetration and Membrane Orientation" (2005) *Biophysical Journal,* 89, 1861-1873.

24. **Stahelin, R. V.,** Wang, J., Blatner, N. R., Rafter, J. D., Murray, D., and Cho, W. "The Origin of C1 and C2 domain Interactions of PKC-α *in vitro* and *in vivo*" (2005) *J. Biol. Chem., in press.*

25. **Stahelin, R. V.*,** Hwang, J. H.*, Kim, J. H., Park, Z. Y., Johnson, K. R., Obeid, L., and Cho, W. "The Mechanism of the Subcellular Localization of Human Sphingosine Kinase 1" (2005) *J. Biol. Chem., accepted with revision.*
***Equal Authorship**

26. Bhardwaj, N., **Stahelin, R. V.,** Langlois, R. E., Cho, W., and Lui, H. "Structural Bioinformatics of Membrane-Binding Proteins" (2005) *Proc. Natl. Acad. Sci., submitted.*

27. **Stahelin, R. V.** and Cho, W. "The Importance of k_d in the Subcellular Localization and Biological Activity of Peripheral Proteins" (2005) *Proc. Natl. Acad. Sci., submitted.*

MANUSCRIPTS IN PREPARATION:

28. **Stahelin, R. V.,** Karathanassis, D., Singh S., Perisic, O., Bruzik, K. S, Murray, D., Williams R. L., and Cho, W. "Structure and role of the PX domain in the Membrane Binding and Activation of PI3K-C2α" (2005) *J. Biol. Chem., in preparation.*

29. **Stahelin, R. V.,** Karathanassis, D., Singh S., Perisic, O., Bruzik, K. S, Murray, D., Williams R. L., and Cho, W. "Structural, Modeling, and Membrane Binding Analysis of the Phosphatdiylinositol-4-Phosphate binding PH and PX Domains" (2005) *J. Biol. Chem., in preparation.*

30. **Stahelin, R. V.,** Peter B. J., De Camilli, P., McMahon, H. M., and Cho, W. "A Two-Step Membrane Binding Mechanism of BAR Domains Harboring an N-terminal α-helix" (2005) *EMBO J., in preparation.*

31. Melowic, H. R., **Stahelin, R. V.,** Altman, A., and Cho, W. "Membrane Targeting and Activation Mechanism of Protein Kinase Cθ" (2005) *J. Biol. Chem., in preparation.*

32. Subramanian, P.*, **Stahelin, R. V.*,** Szulc, Z., Bielawska, A., Cho, W., and Chalfant, C. E. "Ceramide-1-Phosphate Radically Increases the Membrane affinity of Cytosolic Phospholipase A_2 at Low Calcium" (2005) *J. Biol. Chem., in preparation.*
***Equal Authorship**

33. **Stahelin, R. V.*,** Subramanian, P.*, Szulc, Z., Bielawska, A., Cho, W., and Chalfant, C. E. "Elucidation of the Ceramide-1-Phosphate Binding Site of Cytosolic Phospholipase A_2" (2005) *J. Biol. Chem., in preparation.*
***Equal Authorship**

34. Malkova, S., **Stahelin, R. V.,** Pingali, S. V., Cho, W., and Schlossman, M. L. "Depth of Penetration and Orientation of the $p40^{phox}$ PX Domain Determined from X-ray Reflectivity Studies" (2005) *Nat. Struct. Mol. Biol., in preparation.*

35. **Stahelin, R. V.,** Tian, W., Altman, A., and Cho, W. "The C2 Domain of Protein Kinase Cθ is a PI(4,5)P_2 and Phosphopeptide Binding Module" (2005) *Mol. Cell., in preparation.*

ORAL PRESENTATIONS:

- **Invited Speaker:** *Identifying new membrane binding proteins,* Weill Medical School, Cornell University, New York, NY, July 2005.
- **Invited Speaker:** *Membrane-protein interactions in vitro and in vivo,* Virginia Commonwealth University, Richmond, VA, April 2004.
- **Invited Speaker:** *Correlation of protein-membrane interactions in vitro and in vivo,* BIAsymposium 2002, Chicago, IL, May 2002.
- *Phosphatidylinositol-3-Phosphate induces the membrane penetration of the FYVE domains of Vps27p and Hrs,* Sigma Xi Forum, April 2002.
- *Origin of phospholipid specificity of the C2 domains of PKC-α and cytosolic phospholipase A_2,* Sigma Xi Forum, April 2001.
- *Monitoring real-time membrane-protein interactions using surface plasmon resonance*, Sigma Xi Forum, April 2000.

TEACHING EXPERIENCE AND INTERESTS:

In 1999 I began development of a novel biochemistry laboratory course for graduate and undergraduate students. It made its successful debut in 2000 and has gotten admiring reviews from many students that have taken the course. The course features six hours of laboratory work per week and a one-hour lecture. The course is innovative pedagogically by giving students a set of relevant skills for biochemical research in the first half and then allowing them to apply those skills in designing and performing the procedures for a research-like project in the second half of the course. The development and assessment of this course has been published (see Publications).

2000-present	Biochemistry Laboratory Instructor and Coordinator, University of Illinois Department of Chemistry
1998	General Chemistry Teaching Assistant, University of Illinois Department of Chemistry (Dr. Cynthia Harwood)

REFERENCES

1. Wonhwa Cho (**Advisor**)
   Liberal Arts and Sciences Distinguished Professor of Chemical Biology
   Department of Chemistry (M/C 111)
   University of Illinois at Chicago
   845 West Taylor Street
   Chicago, Illinois 60607
   Tel: 312-996-4883, Fax: 312-996-2183
   Email: wcho@uic.edu

2. Diana Murray (**Collaborator**)
   Assistant Professor
   Department of Microbiology and Immunology
   Weill Medical College of Cornell University
   1300 York Avenue, Box 62, Bldgs. B and D, 3rd Floor
   New York, NY 10021
   Tel: 212-746-1184, Fax: 212-746-8587
   Email: dim2007@med.cornell.edu

3. Karol Bruzik (**Collaborator, also served on my thesis committee**)
   Associate Professor
   Department of Medicinal Chemistry and Pharmacognosy (M/C 781)
   University of Illinois at Chicago
   College of Pharmacy
   833 South Wood Street
   Chicago, IL 60612
   Tel: 312-996-4576, Fax: 312-996-7107
   Email: Kbruzik@uic.edu

4. Donald Wink (**Chemical education mentor, also served on thesis committee**)
   Professor and Department Head
   Department of Chemistry (M/C 111)
   University of Illinois at Chicago
   845 West Taylor Street
   Chicago, IL 60607
   Tel: 312-413-7383, Fax: 312-996-0431
   Email: dwink@uic.edu

5. Charles Chalfant (**Collaborator**)
   Assistant Professor
   Department of Biochemistry
   School of Medicine at Virginia Commonwealth University
   P.O. Box 980614, MCV Campus
   Richmond, VA 23298
   Tel: 804-828-9526, Fax: 804-828-1473
   Email: cechalfant@vcu.edu