

## Joseph Provost, Ph.D. Curriculum Vitae

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| <b>Present Address</b> | 1120 5 <sup>th</sup> Ave So<br>Fargo, ND. 58201<br>701-271-0537<br><a href="mailto:provost@mnstate.edu">provost@mnstate.edu</a> | 208 Science Laboratory<br>Department of Chemistry<br>Minnesota State University Moorhead<br><a href="http://www.mnstate.edu/provost">www.mnstate.edu/provost</a> |
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### **Education and Professional Experience:**

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| June 2008 - June 2011 | CUR Councilor – Chemistry Division   |  |
| Aug 2006 – 2009       | Chair Biochemistry & Biotechnology Oversight/Program Committee                                       |  |
| May 2005 – 2010       | Chair ASBMB UAN Committee – Past chair 2010  |  |
| July 2005 - 2009      | Editorial Advisory Board – Chemical Biology and Drug Design  |  |
| July 2005 – Present   | BWP Ltd. Biotechnology Management  | Scientific Advisor   |
| July 2005             | Contributor-   | GRE Subject Examination Questions  |
| May 2004 – 2008       | Editorial Board Member – Biochemistry and Molecular Biology Education                                |  |
| June 2004 – 2009      | Fargo All City Youth Hockey Board of Directors-  | Secretary  |
| Jan 2003 – 2009       | ASBMB Education and Professional Development Committee,  |  |
| June 2003 – 2006      | Minnesota Academy of Science Board of Directors  |  |
| July 2001 – Present   | DragonTech Biotechnology   | Partner/CEO  |
| Jan 2000 - 2006       | Aldevron LLC   | Scientific Advisor   |
| June 1998 – Present   | Radiation Safety Officer – MSUM  |  |
| May 2006 – Present    | Department of Chemistry  | Professor MSUM   |
| Aug 2005 – May 2006   | Department of Biosciences  | Professor MSUM   |
| Aug 2002 – Aug 2005   | Department of Biosciences  | Associate Professor MSUM   |
| Aug 2001 - Present    | Department of Chemistry  | Associate Professor MSUM   |
| Aug 1997 - 2001       | Department of Chemistry  | Assistant Professor MSUM   |
| Aug 1994 - Aug 1997   | Howard Hughes Medical Inst.<br>Dept. Molecular Physiology<br>and Biophysics<br>Vanderbilt University | Howard Hughes<br>Research Fellow<br>Postdoctorate  |
| Oct 1988 - Jul 1994   | Department of Biochemistry<br>and Molecular Biology<br>University of North Dakota                    | Graduate Teaching Assistant/<br>Ph.D. Biochemistry and<br>Molecular Biology                  |
| Sept 1983-May 1988    | Bemidji State University<br>1500 Birchmont Drive NE<br>Bemidji, MN 56601                             | B. S. - Chemistry<br>Minor - Biology   |
| 1983 - 2002           | MN National Guard<br>Military Police, Infantry &<br>Chemical Corps                                   | Platoon Leader,<br>Company Commander<br>Battalion Staff Officer<br>Last rank – Captain (Ret) |

**Teaching Description and Research Students Trained:** 24 contact hours (8 -9classes/labs taught per year). 100 Undergraduate, 18 High School students & 4 HS teachers trained. Total number of equivalent years of student research training = 219.

## Professional Memberships

American Society for Cell Biology 2002  
American Society for Biochemistry and Molecular Biology 1996 -present  
American Chemical Society, Red River Valley Section, Executive Board – 1999 -2001  
Minnesota Academy of Science 1997 – 2006  
Council on Undergraduate Research 1998 – 2005, 2007 - present  
Project Kaleidoscope, Faculty for the 21<sup>st</sup> Century 1999 - present

## Honors

- Served on Multiple NSF and NIH Panel Reviews
- Runner-Up Outstanding Posters ASBMB Undergrad Poster Session: Student Winners – Craig Kutz, Andrew Haak and Jenny Canine. 2009 FASEB Annual Meeting.
- ASBMB Student Travel Award Winners – best poster regional ASBMB meeting (4) 2009
- Symposium Session Host – MnSCU & PKAL – POGIL and JIT Learning MnSCU 20089
- Co-Organizer – ASBMB Undergraduate Presentation Symposium 2006 - 2008
- Co-Organizer – ASBMB Undergraduate Poster Competition (2003-2008)
- Co-Organizer ACS-ASBMB Regional Meeting 2005 - 2008
- Outstanding ACS-ASBMB Oral Presentation 2008 – Jenny Canine (travel Award)
- TriBeta Honor Society Best Presentation Cell Biology/Biochemistry 2006
- TriBeta Honor Society Runner-Up Presentation Mathew Duval and Jennifer Taves 2005
- TriBeta Honor Society Runner-Up Presentation Anusha Mishra and David Ronderos 2004
- TriBeta Honor Society Best Poster Presentation, Rachel Sang and Jessica Johnson 2003
- Phi Beta Kappa, 2003 – present
- Nominated MSUM CASE Professor of the Year 2003
- MnSCU Award for Excellence in Curriculum Programming – Biotech Oversight Group 2003
- Organizer – MN Academy of Science Meeting 2003
- Academic Affairs Excellent Award for Student Service –Biotech. Oversight Group MSUM 2001
- Winchell Undergraduate Research Symposium Award, Best Presentation in Biochemistry Section. Minnesota Academy of Science. Nichole L. Korpi 2001
- Organizer – MN, ND and SD Academy of Science Meeting
- Winchell Undergraduate Research Symposium Award, Best Presentation in Cellular and Molecular, Biochemistry Section. MN Acad of Science Summer Tegtmeier. 2000
- Academic Affairs Excellence Award for Research - MSU Moorhead 2000
- UND Summer Doctoral Fellowship 1993
- Ya-Pin Lee Graduate Student Award – UND Dept of Biochemistry and Molecular Biology 1994
- Outstanding Undergraduate Student Researcher – Bemidji State University 1988
- Army ROTC Full Academic Scholarship 1985 and 1986
- Music Scholarship 1983 Bemidji State University

## Grants – \$1,839,969 Awarded. \$302,450 pending

- 2009 – NIH Supplement for Kodak Imagine Station– \$81,500
- 2009 – NSF – MRI: Acquisition of a TIRF/Widefield Fluorescence Microscopy System for Research and Education in Cellular Biology and Neuroscience: Co-PI Pending \$169,700
- 2009 – NSF RET Supplement for High School Teacher/Student Research – \$48,500
- 2009 – ASBMB K-12 Teacher Research Award. \$12,400
- 2008 – NIH R15-CA-135616-01 AREA – Mechanism and interaction of NHE and MMP9 in tumor invasion and metastasis \$186,364
- 2008 – NSF RUI MCB-0817784 – Phosphorylation of NHE by RhoA Kinase \$369,275
- 2008 – MSUM Faculty Grant – NHE regulation of MMP activity in lung cancer. \$2350
- 2007 – MSUM Instructional Improvement Grants Analytical Chemistry Upgrade \$7422
- 2007 MSUM Faculty Grant – NHE and MMP9 involvement in Tumor formation in Mice \$2430
- 2006 – NSF MCB – Molecular Biosystems. Request to Support ASBMB efforts for Undergraduate Research Education. \$67,500.
- 2006 – NIH Undergraduate Research Supplement \$18,816
- 2005 – NSF CCLI A&I Enhancing Student Learning by the Integration of Research-based Activities into Biochemistry Laboratories \$ 171,130 with match

- 2004 – TriBeta National Research Award. A Biochemical Analysis of Autism. \$1,000
- 2004 – MSUM Faculty Grant – A Biochemical Analysis of Potential Mutations Associated with Autism Syndrome Disorders. \$1,730
- 2004 – ASMBM Student Travel Award \$900
- 2004 – Anheiser Bush Award for MSUM Science Culture and Microscopy Facilities, Judy Peterson, Ronald Jeppson, Joe Provost and Mark Wallert. \$30,000.
- 2004 – MnSCU Center for Teaching and Learning Grants: Advancing the Incorporation of Research and Technology Into MSUM Biochemistry and Biotechnology Courses. \$15,000.
- 2003 – Autism Genetic Exchange, Genetic and cellular materials for autism research..
- 2004 – NIH R15, Mark Wallert and Joe Provost. Regulation of NHE and MAPK Requires PLD. \$197,500.
- 2003 – MSUM Faculty Grant – Role of phospholipase D in MAPK activation. \$2,500.
- 2002 – NSF RUI RET. Mark Wallert and Joe Provost Involving High School Students in Biomedical Research. \$10,000.
- 2002 – Center for Learning and Teaching MnSCU, Creating a concerted biochemistry problem based laboratory. \$2,750
- 2002 - Ellen Brisch, Mark Wallert, Joe Provost, Chris Chastain and Michelle Malott MNSCU Match Grant. Developing web based research support using Tegrity. \$30,000
- 2001 - Ellen Brisch, Mark Wallert, Chris Chastain and Joe Provost. NSF MRI - Optical Imaging Fluorescence Microscopy enhancement \$116,163
- 2001 - ASBMB Undergraduate Faculty Awards; \$1700
- 2001 – Mark Wallert, Joe Provost, Chris Chastain, Shawn Dunkirk, NSF CCLI MSU Biotechnology Emphasis: Integrating Research into Education to Build a Learning Community \$154,790
- 2001 - 1999 - ASBMB Undergraduate Faculty and Student Travel Award; \$800
- 2000 – Aldevron LLC Purification of adjuvant for oral vaccines -\$2000
- 2000 –MSUM Strategic Goals Initiative - From Outreach to Recruiting - Sciences and Mathematics at Moorhead State University - \$62,000
- 2000 – Joe Provost and Mark Wallert. NSF RUI Grant; Regulation of MAP Kinase and NHE1 by the G proteins Gq and G13 -\$156,341
- 2000 – Joe Provost and Mark Wallert. MSU Faculty Grant - Lysophosphatidic acid Transactivation of the Epidermal Growth Factor Receptor – Implications for the Regulation of Cellular Signaling in Lung Cells. \$2,200
- 2000 – Mark Wallert and Joe Provost. Rolland Dille Fund for Excellence - Hormonal regulation of Intracellular pH via G Protein Signaling Molecules in Lung Cells. - \$2,200
- 1999 - ASBMB Undergraduate Faculty and Student Travel Award; \$800
- 1999 – MSUM Strategic Goals Initiative - Acquisition of a Centrifuge - \$ 27,000
- 1999 – MSUM Strategic Goals Initiative - From Outreach to Recruiting - Sciences and Mathematics at Moorhead State University - \$37,588
- 1999 - MSU Faculty Grant - Regulation of RhoA and MAPK by G proteins - \$2,300
- 1998 - MSU Faculty Grant - Regulation of Phospholipase D through a Tyrosine Protein Kinase - \$2,000

#### **Courses Taught:**

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| Biochemistry I & II (Chem 400/410)            | Biotechniques I II (Chem 475/476)           |
| Biochemistry Laboratory I & II (Chem 405/415) | Biotechnology Seminar (Chem 477)            |
| Basic Principles of Chemistry (Chem 102)      | Health Profession Chemistry Lab (Chem 108)  |
| Health Professional Chemistry (Chem 110)      | Chemistry in Everyday Life (Chem 105)       |
| General Chemistry Laboratory (Chem 165)       | Organic Chemistry Laboratory I (Chem 355)   |
| Medical Observations I & II (Biol 391 392)    | Human Physiology Laboratory (Biol 394)      |
| Research in Biology (Biol 497)                | Undergraduate Research (Chem 497/Biol 497)) |

**Interests/Expertise:** Signal transduction, enzymology, membrane ion channels, purification of membrane and cytosolic proteins, protein interactions / regulation, G-proteins and protein kinase/phosphatases, conventional, chromatography, FPLC, HPLC, CE, isolation of cellular organelles, tissue culture, recombinant protein expression and purification, baculovirus protein expression, transient transfection, lipid analysis and isolation, microinjection, fluorescence microscopy, immunotechniques- Western blotting, ELISA, immunoprecipitation, immunokinase assays, polyclonal antibody production, animal handling and organ removal. Molecular biology techniques in cloning, sequencing, subcloning and mutation.

**Publications** -Underlined names indicate undergraduates

**Publications:**

1. **Provost J.J.**, McCoy, A., Voog, J., Hansen, L., and Wallert, M. Adrenergic Activation of MAPK is RhoA Dependent. In preparation for JBC.
2. Canine J., Rastedt, D., Kutz, C., Haak, A., **Provost, J.J.** and. Wallert, MA. PE and LPA activation of tumorigenesis in non-small cell lung cancer. – In preparation.
3. Knutson K., Smith J., Wallert MA., and **Provost JJ.** Bringing the Excitement and Motivation of Research to Students; Using Inquiry and Research – Based Learning in a Year-Long Biochemistry Laboratory. Submitted Cell Education 2009.
4. **Provost, J.J.**, Organized Chaos: How to Run a Regional Scientific Meeting. ASBMB,s Enzymatic, July 2009; 4-5
5. **Provost, J.J.**, PEPCCK Supermouse: JBC in the Classroom. ASBMB,s Enzymatic, June 2009; 6-7
6. Taves J., Rastedt, D., Canine J., Mork D., Wallert, MA. and **Provost, J.J.** Sodium hydrogen exchanger and phospholipase D are required for alpha(1)-adrenergic receptor stimulation of metalloproteinase-9 and cellular invasion in CCL39 fibroblasts. Arch Biochem Biophys 2008: **477**, 60-66.
7. Sang, R.S., Johnson, J.F., Taves, J., Nyguen, C., Wallert, M.A., and **Provost, J.J.**  $\alpha_1$ -adrenergic receptor stimulation of cell motility requires phospholipase D mediated extracellular signal-regulated kinase activation. Chem Biol Drug Des 2007; **69**: 240–250
8. Wallert, M.A., Voog, J., McCoy, A., Thronson H., and **Provost J.J.** Cross talk between MAPK and RhoA in the regulation of NHE1 and stress fiber formation by lysophosphatidic acid. In preparation JBC.
9. Wallert, M.A., H.L. Thronson\*, N.L. Korpi\*, S.M. Olmschenk\*, A. McCoy\*, M. Funfar\*, and **J.J. Provost.** Two G-Protein Coupled Receptors Activate NHE1 in Chinese Hamster Lung Fibroblasts Through an ERK-dependent Pathway. Cellular Signaling 2004. **12**: p. 231-242
10. **Provost, J.J.**, Korpi N.L., .. Olmschenk S.M. , Funfar M., McCoy A., and Wallert M.A.. Protein Kinase C and Phospholipase C $\beta$  Mediate the  $\alpha_1$ -Adrenergic Activation of NHE1 in Chinese Hamster Lung Fibroblasts. Biochemistry and Cell Biology 2005 **2**. 123-132.
11. **Provost, J.J.** Protein kinase inhibitor data table. Biomedical PDA 2004. Professional PDA Publishing, LLC, and John Wiley and Sons, Inc.
12. Mark M., Brisch E., Chastain C., Malott, M., and **Provost, J.** Implementing the Recommended Curriculum in Biochemistry and Molecular Biology at a Regional Comprehensive University through a Biology/Chemistry Double Major. The Minnesota State University Moorhead Experience. 2004.
13. Wallert, M.A., Foster J.D., Scholnick, D.A., Olmschenk, S.M., Kuehn, R.J. and **Provost, J.J.** Kinetic Analysis of Glucose 6-Phosphatase: An Investigative Approach to Carbohydrate Metabolism and Kinetics. Biochemistry and Molecular Biology Education, Vol. 29, 2001, pp. 199-203

14. Dunkirk, S.G., Wallert, M.A. Baumgartner, M. and **Provost, J.J.** Purification and Characterization of a Phospholipase D from Rat Liver Membranes. *Protein Expr Purif.* 2002 Vol 24 pp. 1-12
15. Williger, B-T, **Provost, J.J.**, Ho, W.T., Milstine, J. and Exton, J.H. Arfaptin 1 Domains Required for Interaction with ADP-Ribosylation Factor and Inhibition of Phospholipase D. *FEBS Letters*, Vol 454, pp. 85 - 89, 1999
16. Park, S.K., **Provost, J.J.**, Ho, W.T., Bae, C.D., and Exton, J.H. Cloning, Expression and Regulation of a Phospholipase D Cloned from Rat Brain. *Journal of Biological Chemistry*, Vol 272, pp. 29263-29271, 1997
17. Yeo, J. **Provost, J.J.** and Exton, J. Dissociation of Tyrosine Phosphorylation and Activation of Phospholipase C in Swiss 3T3 Cell Treated with Platelet-Derived Growth Factor. Effect of the PKC Inhibitor Ro-31-8220. *Biochimica et Biophysica Acta*, Vol. 1356 pp. 308-320, 1997
18. Vinggaard, A.M., **Provost, J.J.** Exton, J.H. and Hansen, H.S. Arf and RhoA Regulate Both the Cytosolic and Membrane-Bound Phospholipase D from Human Placenta. *Cellular Signaling*, Vol. 9 pp. 189-196, 1997
19. **Provost, J.J.**, Fudge, J., Israelit, S., Siddiqi, A.R., and Exton, J.H. Tissue specific Distribution and Subcellular Distribution of Phospholipase D in Rat Tissue. Evidence for Distinct RhoA- and ARF Regulated Isozymes. *Biochemical Journal*, Vol. 319 pp. 285-291, 1996 ASBMB Presentation
20. **Provost, J. J.**, Ray, P. D., and Lambeth, D. O. Concomitant Purification and Characterization of Malate Dehydrogenase, Aspartate Transaminase, Nucleoside Diphosphate Kinase and Enolase from Rabbit Liver Cytosol. *Preparative Biochemistry & Biotechnology*, Vol 26 pp. 121-134, 1996
21. **Provost, J. J.**, Munis, P. and Morine, G. H. Alternate Method for Determining Zinc in Hair. *Microchemical Journal* , Vol. 47 pp. 28-32, 1993

#### **Invited Presentations:**

1. **Provost J.J.** NHE1-Cell motility and invasion. Concordia College Dept of Biology. 2009
2. **Provost J.J.** and Wallert M.A. Creighton Medical School, Dept of Pharmacology – Non Small Lung Cell Cancer and NHE1 2009
3. **Provost J.J.** Two Sides of a Coin - The Sodium Hydrogen Exchanger (NHE1)- Proton Transporter and Signaling Scaffold. A New Role for the Sodium Hydrogen Exchanger in Lung Cell Motility and a Therapeutic Target to Treat Non-Small Cell Lung Carcinoma. University of Minnesota Duluth, Dept of Chemistry. 2009
4. **Provost K.J.** Marry A. M. Establishing, Funding and Mentoring Undergraduate Research. 4<sup>th</sup> Annual Undergraduate Research in the Molecular Sciences/ASBMB Regional Meeting. 2009
5. **Provost J.J.** North Dakota State University ACS Graduate Seminar – Career options – Teaching at a PUI. Fargo North Dakota. 2008
6. **Provost J.J.** A new Role for the Sodium Hydrogen Exchanger in Lung Cell Migration and Invasion: A Potential Therapeutic Target to Treat Lung Cancer. Grand Valley State University. 2008.
7. **Provost J.J.** Research-Based Biochemistry Laboratory Workshop 2008 ASBMB Annual Meeting.
8. **Provost J.J.**, Thinking outside the academic box. Alternative careers in science, law, sales industry... UND Graduate School Retreat Keynote speaker. October 2007
9. **Provost J.J.**, MN CEP Presentation on Biobusiness in Moorhead Fargo. 2007

10. **Provost J.J.**, Podcasts in the Classroom and Laboratory. MSUM Teaching with Technology Conference. May 2007
11. **Provost J.J.** *Regulation of Cell Migration by PLD* 2007. Invited Seminar South Dakota State University Department of Chemistry and Biochemistry.
12. **Provost J.J.** *Undergraduate Research – Tumor Cell Migration* 2007 North Dakota State University Department of Veterinary Pathology.
13. **Provost J.J.** and Wallert M.A. *Stress and Cancer Progression; Novel Roles for the Alpha One Adrenergic Receptor and PLD1* 2007 ASBMB Presentation. Washington DC.
14. **Provost J.J.** Dragontech – MSUM developing a bio business partnership. Sen. Byron Dorgan's Life Sciences Workshop – NDSU 2006
15. **Provost J.J.** and Wallert M.A. Undergraduate Research: Funding, running and integrating research into undergraduate programs. Nebraska BRIN Workshop. 2006
16. **Provost J.J.** and Wallert M.A. Problem Based Learning – Incorporating Research Into Classes. Workshop with Science Faculty at Mayville State University
17. **Provost J.J.** Presentation on MSUM Biobusiness and Research – MnSCU Bio business alliance, Bemidji MN. 2005
18. **Provost J.J.** Bioterrorism Today – A new spin on an old trick. Tri-College Commumiversity. 2004
19. Wallert M.A. and **Provost J.J.** Research Across the Curriculum. Moorhead MN Rotary. 2004.
20. **Provost J.J.** Two Peas in a Pod. Incorporating Research into Science Courses. MnSCU Center for Teaching and Learning, Learning by Doing. 2004
21. Wallert, M.A. and **Provost J.J.** Research Based Undergraduate Training. Dickenson State University ND First Annual Research Day. 2004.
22. **Provost, J.J.** and Wallert, M.A. Use of Technology to augment laboratory and lecture courses. MSUM president's professional development day, 2003.
23. Wallert, M.A. and **Provost, J.J.** Creating a Research-Based Course: Principles and Practice. ND SMET workshop for four and two year Universities. (2004)
24. **Provost, J.J.** and Wallert, M.A. Cross Talk Between G-Proteins and Growth Factor Pathways: Defining the Regulation and Function of the Na<sup>+</sup>-H<sup>+</sup> Exchanger. University of Nebraska School of Medicine. Department of Pharmacology. 2003
25. Wallert M.A. and **Provost, J.J.** Cross Talk Between G-Proteins and Growth Factor Pathways: Defining the Regulation and Function of the Na<sup>+</sup>-H<sup>+</sup> Exchanger. University of North Dakota School of Medicine and Health, Department of Cell Biology and Anatomy Lecture Series. 2003
26. **Provost, J.J.** and Wallert M.A. Evolution of a Biology Department: Incorporating Undergraduate Research to Drive Curriculum Reform. University of Mary
27. Wallert M.A. and **Provost, J.J.** Research Focused Undergraduate Education. Fargo Rotary, 2002.
28. Wallert M.A and **Provost, J.J.** Integration of Research into Courses and Laboratories. PKAL workshop for the North Dakota BRIN Program October, 2002

29. **Provost, J.J.** and Wallert M.A. Construction of a Research Based Undergraduate Education. Invited speaker for the ACS meeting June 2002
30. **Provost, J.J.** and Wallert M.A.  $\alpha_1$ -adrenergic activation of the sodium hydrogen exchanger requires both extracellular signal-regulated kinase and protein kinase C. *Invited Talk, 3<sup>rd</sup> Annual Structural Biology Symposium 2001*
31. Wallert, M.A. and **Provost, J.J.** Using the Tegrity Web Learner System to Deliver Laboratory Instruction. Exploring the Future of Instructional Technology. 2001
32. **Provost J.J.** and Wallert, M.A. MAP Kinase Mediated Activation of NHE1 by Lysophosphatidic Acid and Phenylephrine. *Invited Presentation. 2<sup>nd</sup> Annual Structural Biology Symposia 2000*
33. **Provost, J.J.**, Ho, W.T., and Exton, J.H. Regulation of a Novel RhoA-Specific Phospholipase D from Plasma Membrane. North Dakota State University Department of Biochemistry and Molecular Biology Seminar Series. 1999. *Invited presentation*
34. **Provost, J.J.**, Ho, W.T., and Exton, J.H. Regulation Of A RhoA-Specific Phospholipase D By Protein-Protein Interaction. ND, EPSCoR Conference on Protein-Protein Interactions, May 28-31, 1998. *Selected for oral presentation*
35. **Provost, J.J.**, Ho, W.T. Exton J.H. Purification and Regulation of a RhoA Activated Phospholipase. University of North Dakota Department of Biochemistry and Molecular Biology 1997
36. Williger, B-T, **Provost, J.J.**, Kanoh, H.M, and Exton, J.H. Binding And Effector Domain Of Arfaptin. Inhibition By PLD. *The FASEB Journal, 1997, Selected for oral presentation*

#### **Professional Abstracts:**

1. Haak A., **Provost, J.J.**, Wallert, M.A., and Dorsam G. The regulation of Matrix Metalloprotease by NHE1 in Non-Small Lung Cancer Cells. *FASEB J. 2009 22:1029.5*
2. Kutz C., Canine J., **Provost J.J.**, Wallert M.A. Urokinase Plasminogen Activator's Affect on Cancer Progression in Non-Small Cell Lung Cancer. *FASEB J. 2009 671.5*
3. Canine J., Kutz, C., Wallert, M.A., and **Provost J.J.** Regulation of Signaling in Human Lung Cancer Cell Lines that Controls Cellular Proliferation and Migration: the Effect of LPA and PE. *FASEB J. 2009 704.8*
4. **Provost J.J.** A year long research experience in an undergraduate biochemistry laboratory. CUR 2008 National Meeting. St. Benedicts University.
5. Canine J., Wallert M.A., and **Provost J.J.** The role of the sodium hydrogen exchanger in stress fiber formation in human lung cancer stimulated with urokinase plasminogen activator, lysophosphatic acid, and phenylephrine *FASEB J. 2008 22:1029.5*
6. Rastedt D.E., Wallert M.A., and **Provost J.J.** NHE1 is critical in urokinase plasminogen activator-mediated invasion and migration processes in lung cells *FASEB J. 2008 22:1029.6*
7. Schafer M., Remmick J., Brandvold K., Foster J.D., Vaughn R., and **Provost J.J.** Characterization of direct ERK-mediated activation of the Dopamine Transporter *FASEB J. 2008 22:823.9*
8. Canine J., Kutz C., Rastedt D., Heinz B., Taves J., **Provost JJ.**, and Wallert M. Differential regulation of cellular signaling pathways that control cellular migration in human lung cancer cell lines: The effects of lysophosphatidic acid, urokinase-type plasminogen activator, and phenylephrine *FASEB J. 2007 21:523.11*

9. Nguyen C, Taves J, Mork D, Wallert M, and **Provost JJ** Role of phospholipase D in  $\alpha_1$ -adrenergic receptor signaling in CCL39 fibroblasts *FASEB J.* 2007 21:779.7
10. Rastedt DE, **Provost J J**, and Wallert M  $\alpha_1$ -adrenergic activation of phospholipase D in CCL39 fibroblasts stimulates PLD1 via PKC and RhoA kinase *FASEB J.* 2007 21:779.10
11. Taves J, Wallert M, and **Provost J.J.** Phospholipase D and sodium hydrogen exchanger isoform 1 are both critical regulators of MMP9 mediated cell invasion and migration in CCL39 lung fibroblasts *FASEB J.* 2007 21:647.5
12. Mork DL, Streitz L, Reames R, Wanunu M, Wallert M, and **Provost JJ** Investigation of the specific  $\alpha_1$ -adrenergic receptor pathway link to phosphorylation of sodium-hydrogen exchanger by RhoA kinase *FASEB J.* 2007 21:786.12
13. Taves J.M, Wallert M, and **Provost J.J** Sodium Hydrogen Exchanger 1 is required for Matrix Metalloproteinase 9 activity by Phenylephrine *FASEB J.* 2006 20:A934
14. Streitz L.M., Heinz B.A., **Provost J.J.**, and Mark A Wallert Phospholipase D Isoform 1 is Critical for  $\alpha_1$ -Adrenergic Receptor Stimulation of Cell Growth and Motility Events *FASEB J.* 2006 20:A934
15. Magstadt L.K. , **Provost J.J.** , and Wallert M. Urokinase Plasminogen Activator Regulation of ERK, Stress Fiber Formation, and NHE in CCL39 Fibroblasts *FASEB J.* 2006 20:A982
16. Rachel R Sang, Merina Shakya, and **Provost J.J.** Role of Phospholipase D in activation of the ERK, cell migration and cell invasion in Chinese hamster lung fibroblasts *FASEB J.* 2006 20:A485-A486.
17. Duval M.P., **Provost J.J.**, and Mark A. Wallert  $\alpha_1$ -Adrenergic Activation of ERK by Phospholipase D is Ras Dependant *FASEB J.* 2006 20:A482
18. Sang, R. L., Mitchell, K.M., Wallert M.A., and **Provost J.J.** Role of Phospholipase D in alpha adrenergic activation of ERK and wound healing. *The FASEB Journal* (2005).
19. Skolte, J.M., Wanunu, M.K., Provost J.J. and Wallert, M.A. Biochemical analysis of Small G protein signaling pathways in autism. *The FASEB Journal* (2005).
20. Anania, A., Provost J.J. and Wallert, M.A. Phenylephrine RhoA dependent activation of the Ras-ERK Pathway. *The FASEB Journal* (2005).
21. Johnson, J. Sang, R. Wallert, M. and **Provost J. J.** Phospholipase D Mediates Phenylephrine Induced Stress Fiber Formation in CCL39 Fibroblasts. *The FASEB Journal* 18 (8): C157 2004
22. Mishra, A. Ronderos D., **Provost J.J.**, and M. Wallert. Phenylephrine Activates  $\text{Na}^+\text{-H}^+$  Exchangers via Bifurcating Pathways Involving RhoA and ERK as Downstream Effects of Different Protein Kinase C Isoforms. *The FASEB Journal* 18 (8): C35. 2004
23. Anania, A.Y., M.A. Wallert, and **J.J. Provost.** An Innovative Method to Purify DNA. *Journal of the Minnesota Academy of Science* 68: 15, 2004.
24. Denker J, Santana C., Thompson A. and **Provost J.** Conversion of MDH to LDH by sight directed mutagenesis. *Journal of the Minnesota Academy of Science* 68: 30, 2004
25. Johnson, J., Sang R., Mitchell K., Wallert M., and **Provost J.** Phospholipase D Mediates Phenylephrine-Induced Cell Growth and Migration Factors in CCL39 Cells. *Journal of the Minnesota Academy of Science* 68: 26, 2004.

26. Metcalf, A.L., T.M. Burnside, M.P. Duval, M.A. Wallert, and **J.J. Provost**. The Role of Protein Kinase C in the Regulation of Stress Fiber Formation in Chinese Hamster Lung Cells. *Journal of the Minnesota Academy of Science* 68: 32-33, 2004.
27. Ronderos, D.S., A. Mishra, **J. Provost**, and M. Wallert. Na<sup>+</sup>-H<sup>+</sup> Exchangers are Activated by Phenylephrine, Via Protein Kinase C Isoforms that Diverge into Bifurcating Pathways Involving RhoA and ERK. *Journal of the Minnesota Academy of Science* 68: 35 - 36, 2004.
28. Skolte, J.M., Wananu M.K., **Provost J.J.**, and M.A. Wallert. An Initial Biochemical Analysis of Autism. *Journal of the Minnesota Academy of Science* 68: 37, 2004.
29. Burgad, D, Lipp A., Levoranson L. and **Provost J.J.** Purification and preparation of Antisera ggainst GFP. *Proceedings of the Minnesota Academy of Sciences* Vol 66, 2003.
30. Denker, J., Ronderos, D. and **Provost, J.J.** Kinetic Impact of Point mutated Val-86 to Lysine in Glyoxysomal Malate Dehydrogenase isolated from *Cutrullus vulgaris* *Proceedings of the Minnesota Academy of Sciences* Vol 66, 2003.
31. Hansen, L. McCoy, A. Wallert, M.A. and **Provost, J.J.** Wound Repair and MAPK Response to LPA, PE, and uPA in Normal and Cancerous Human Lung Cells. Winchel Presentation, *Proceedings of the Minnesota Academy of Sciences* Vol 66, 2003.
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