

Alan K. Howe

Associate Professor with tenure
Department of Pharmacology
University of Vermont

RESEARCH FOCUS

My research, which has been continuously funded by the NIH for the past 15 years, focuses on mechanisms cells use to interpret & respond to their extracellular environment, with specific interest in how cell signaling and cytoskeletal dynamics are regulated in subcellular space during migration and matrix invasion. We employ & develop a wide variety of cutting-edge techniques - microfluidics, micro-contact printing, tunable hydrogels - to precisely manipulate physical, chemical, and mechanical aspects of 2- & 3-D cellular microenvironments to assess the consequences of these manipulations on cell morphology, motility, and subcellular signaling events with high spatiotemporal resolution. Current projects focus on 1) mechano-chemical regulation of GPCR signaling during migration; 2) regulation of invasion & metastasis by matrix tension; and 3) regulation of leading edge mitochondrial trafficking by localized energy sensing.

PUBLICATIONS

- [39 publications](#), comprising 28 research articles, 9 review articles, and 2 book chapters
- Publications have appeared in *Nature Cell Biology*, *PNAS*, *J Biol Chem*, *Curr Opin Cell Biol*, and *PLoS ONE*
- Collectively, publications have been cited over 4,000 times and have reached an *h*-factor of 24

FUNDING

- Continuously funded since beginning postdoctoral studies in 1996
- Sources include: fellowships from the UNC Lineberger Comprehensive Cancer Center & the American Cancer Society; the Howard Temin Career Award from the NIH/NCI; three R01 awards as Principal Investigator from the NIH/NIGMS (all funded on their first submission); institutional pilot awards; collaborative effort on colleagues' grants

TEACHING, MENTORING & ACADEMIC SERVICE

- Lectured in 13 different graduate, undergraduate, and medical schools courses at UVM. Course titles/topics include (but are not limited to) *Cell & Molecular Biology*, *Cancer Biology*, *Molecular Basis of Biological Motility*, cell communication; cell adhesion & ECM; cellular mechanisms of metastasis; introduction to pharmaco-kinetics & -dynamics; antineoplastic chemotherapy & medicinal chemistry
- Chaired the UVM Cell, Molecular & Biomedical Sciences graduate program Education Committee
- Directed graduate cell & molecular biology core courses; co-directed graduate cancer biology
- Served as primary mentor for clinical faculty, postdoctoral fellows, and doctoral & masters students and have served on some 38 graduate student thesis committees.

PROFESSIONAL SERVICE

- *Ad hoc* reviewer for 21 journals (notably *J Cell Biol*, *Nature Cell Biol*, *J Cell Sci*, *Mol Biol Cell*, *Cancer Res*)
- Chair, Cell Structure & Metastasis Peer Review Group, American Cancer Society
- *Ad hoc* member, NIH Study Sections: Intercellular Interactions (ICI); Molecular & Integrative Signal Transduction (MIST); Special Emphasis Panel (SEP) ZRG1 CB D(50)R - "Technologies for Single Cell Analysis"; ZRG1 OBT-K (02) : Cancer Biology SEP; K99 Career Award Review Panel - ZDE1 RK 12 M

DISTINCTIONS

- Basic Science Lecturer of the Year, Physician Assistant Studies Program, Franklin Pierce University
- Twice nominated, Silver Stethoscope Award for Teaching Excellence, UVM College of Medicine
- Distinguished Alumnus Speaker, Lineberger Cancer Center Training Grant, UNC-Chapel Hill
- U.S. Patent No. 7,799,526 - *Phosphoprotein detection reagent and methods of making and using the same* (licensed by Invitrogen™)

EDUCATION & TRAINING

- Postdoctoral fellowship – Pharmacology (2003), University of North Carolina - Chapel Hill
- Ph.D. – Tumor Cell Biology (1996), Northwestern University
- B.S. – Biochemistry (1990), University of New Hampshire

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EDUCATION

Ph.D.	Northwestern University, Evanston IL	09/1996	Tumor Cell Biology
B.S.	University of New Hampshire, Durham NH	06/1990	Biochemistry

EMPLOYMENT HISTORY

Associate Professor with tenure	University of Vermont	07/01/09 - Present
Assistant Professor	University of Vermont	08/01/03 - 06/30/09
Research Assistant Professor	U. North Carolina	08/01/01 - 07/31/03
Postdoctoral Research Assistant	U. North Carolina	09/01/96 - 07/31/01

FUNDING

Pending

1 T32 CA211033-01 (J. Stein & A. Howe, co-PIs) 09/01/16 – 08/31/21
NIH/NCI

Translational Cancer Research Training Program

This training program will employ an innovative model of transdisciplinary mentorship strategy, pairing both a Scientist Mentor and a Clinical Co-Mentor for each outstanding postdoctoral and/or clinical fellow, to train the next generation of cancer researchers for leadership roles in collaborative team investigation.

Active

1 R01 GM 117490-01 (Howe, P.I.) 01/01/16 – 12/31/20
NIH/NIGMS

Mechano-Chemical Regulation of GPCR/PKA Signaling During Cell Migration

This project will delineate the mechanism coupling cellular tension to localized, ligand-dependent activation of canonical G-protein coupled receptor signaling.

Role: Principal Investigator

R01 GM097495-01 (Howe, P.I.) 09/01/11 – 08/31/15
NIH/NIGMS on NCE until 08/31/16

Cross-talk between PKA, cellular tension, and Ca²⁺ channels during cell migration

This project will explore the mechanisms underlying mechanosensitive PKA signaling & stretch-activated Ca²⁺ channels (SACCs) during cell migration

Role: Principal Investigator

5 R01 GM117839-06 (M. Thali, P.I.) 10/01/15 – 09/30/19
NIH/NIGMS

Multiscale analysis of HIV-1 assembly, release, and cell-to-cell transmission

The goal of this proposal is to elucidate how cell-intrinsic and environmental factors regulate HIV-1 Env-induced cell-cell fusion and to test if small T cell-based syncytia contribute to virus spread and pathogenicity.

Role: Collaborator

University of Vermont Cancer Center 08/01/15 – 07/31/16

Lake Champlain Cancer Research Organization Pilot Grant Program

Investigating Kif18A as a therapeutic target for colorectal cancer

This project will investigate the role of the mitotic kinesin Kif18A in cell division, cell motility, and radiosensitization of colorectal cancer cells.

Role: Collaborator (Jason Stumpff (UVM), PI)

Completed

U. Mass/Dartmouth/UVM Cancer Centers 10/01/11 – 09/30/14
 Collaborative Research Program
Protein Kinase A and Mechanotransduction in Ovarian Cancer Pathogenesis
 Role: Principal Investigator (B. Berwin (Dartmouth), co-PI)

UVM College of Medicine 07/01/12 – 06/30/14
 Pilot Award Program
Microtubule-based transport of mitochondria during cell migration: mechanism & consequences
 Role: Principal Investigator

2R01 AT 001121-06 (Langevin, PI) NIH/NCCAM 05/01/08 – 04/30/13
Connective Tissue Mechanotransduction
 Role: Collaborator

Pilot Award 07/01/10 – 06/30/11
 Vermont Cancer Center / Lake Champlain Cancer Research Organization
Intermolecular Epitope Antibodies for Visualizing Subcellular Protein Complexes

1 R01 GM 074204-01 (Howe, PI) NIH/NIGMS 06/01/05 – 05/31/11
Spatial Regulation of Protein Kinase A in Cell Migration
 Role: Principal Investigator

Research Equipment Grant (Jane Hill, P.I.) 10/01/08 – 06/30/10
 University of Vermont Office of the Vice-President for Research
A Rapid Prototyping and Fabrication Facility for Microfluidic Research
 Role: co-Principal Investigator

5 P20 RR 016435-04 (Parsons, PI) NIH/NCRR 07/01/06 – 06/30/10
 UVM Neuroscience COBRE - Project 1 (Howe, PI)
Spatial Regulation of Protein Kinase A Signaling During Growth Cone Guidance
 Role: Principal Investigator

5 K01 CA 92237-01 (Howe, PI) NIH/NCI 08/01/01 – 07/31/07
 Howard Temin Career Award - *Regulation of Adhesion-Dependent Signaling by PKA and PAK.*
 Role: Principal Investigator

PROFESSIONAL SERVICE

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- *Ad hoc* reviewer: - *Biochim. Biophys Acta, BMC Cancer, BMC Cell Biol, Cancer Res, Cell Death Differ, Cell Motil Cytoskel, J Biol Chem, J Cell Biochem, J Cell Biol, J Cell Physiol, J Cell Sci, J. Invest Derm, J Leuko Biol, J Vis Exp, Mol Biol Cell, Mol Cancer Res, Nature Cell Biol, Nature Signaling Gateway, Oncogene, PLoS ONE, Nature, Science, Vasc Pharm*
 - Reviewer, “*Understanding Cancer*” (textbook) - Garland Sciences, pub. (2016)
 - Cell Structure & Metastasis Peer Review Group, American Cancer Society (Member, 2011-Present; Chair, 2015-Present)
 - Cell Structure & Survival (CSS-3) Peer Review Study Group (National), American Heart Association (2010-Present)
 - *Ad hoc* member, NIH Study Sections: Intercellular Interactions (ICI; 2011-Present); Molecular & Integrative Signal Transduction (MIST; 2014-Present)

- *Ad hoc* member, NIH Special Emphasis Panels: ZRG1 OBT-K (02) - Cancer Biology SEP (2014); K99 Career Award Review Panel - ZDE1 RK 12 M, NIDCR (2013); ZRG1 CB D(50)R - "Technologies for Single Cell Analysis" (2012)
- Consultant on Biological & Biomedical Sciences, Creative Microsystems Inc., Waitsfield VT (2011-2014)
- Member, Molecular Signaling 1 Peer Review Study Group (National), American Heart Association (2004-2008)
- Expert Referee, Research Council of Norway "Centres for Research-based Innovation" (2008)
- *Ad hoc* reviewer, Research at Undergraduate Institutions Grant Program, National Science Foundation (2007)

UNIVERSITY SERVICE AND COMMITTEES

2015-2016	Performance Review Committee for Dr. Sanjay Sharma (Dean – UVM Grossman School of Business)
2013-Present	Co-Director (w/Dr. Jane Lian), UVMCC Program in Host Factors & Tumor Progression
2013-2015	UVMCC/Biochemistry Faculty Search Committee
2012-Present	Protocol Review & Monitoring Committee, UVM Cancer Center
2011-2014	Hematology/Oncology Clinical Research Faculty Search Committee, Department of Medicine
2011-2012	Professional Standards Committee, University of Vermont
2011-2012	Developmental Neuroscience Faculty Search Committee, Department of Biology, College of Agriculture & Life Sciences
2010	College of Nursing Faculty Search Committee
2008-2010	Molecular Physiology & Biophysics Faculty Search Committee
2007	Dean's Planning Group for the UVM Umbrella Program in Life Sciences
2006-2007	UVMCC Cell Signaling Program Director Search Committee
2006-2007	UVM Faculty Senate Subcommittee for Education & Research Technologies
2006-2007	Co-chair, Faculty Senate Subcommittee for Research, Scholarship, & Graduate Education
2006-Present	UVM Neuroscience Graduate Program
2006	UVMCC Translational Research Design Group
2005	UVMCC Cell Signaling Group Leader Search Committee
2005	UVMCC Communications Director Search Committee
2005-2007	Director, Department of Pharmacology Seminar Series
2005-2008	Cell & Molecular Biology Program Steering Committee
2005-2008	Chair, Cell & Molecular Biology Program Education Committee
2005-Present	Member, Environmental Pathology Training Grant
2005-Present	UVM Faculty Senate – Pharmacology Representative
2004-2007	UVM Faculty Senate – Research, Scholarship, & Graduate Education Subcommittee
2004-Present	Faculty Member, Cancer Biology Training Grant
2004-Present	Faculty Member, Physiology & Pharmacology Training Grant
2003-Present	Cell & Molecular Biology Program Education Committee
2003-Present	Cell & Molecular Biology Program Faculty
2003-Present	Graduate Faculty, University of Vermont
2003-Present	Full Member, University of Vermont Cancer Center

MENTORING

Faculty

2011 – 2013	Brian W. Nielsen, M.D., M.S., Clinical Instructor and Women's Reproductive Health Research Scholar, (Dept. of Obstetrics, Gynecology & Reproductive Sciences, UVM)
2007 – 2012	Paula B. Deming, Ph.D. (MLRS Department, UVM)

Postdoctoral Trainees – Past

2013 – 2014	Tamara F. Williams, Ph.D. (currently, Asst. Professor, Dept. of Pathology, UVM)
2006 – 2009	Shirley Campbell (currently, Res. Asst., University of Montreal)
2005 – 2007	Paula B. Deming (currently, Assoc. Professor & Interim Chair, MLRS Department, UVM)

Graduate Trainees – Present

2015 – Present Hannah Naughton (CMB Program)
 2015 – Present Solmaz Karimi (Pharmacology Masters Program)

Graduate Trainees – Past

2012 – 2014 Laura Director (Cell & Molecular Biology; Masters Defense 09/2014)
 2009 – 2014 Andrew McKenzie (Pharmacology; Ph.D. Defense 07/2014)
 2008 – 2010 Ying Ruan (Cell & Molecular Biology; Masters Defense 10/2010)
 2006 – 2008 Jacqueline teRiele (left program with Masters Degree with former advisor)
 2005 – 2006 Monique Birger (left program; currently a medical laboratory technician)

Graduate Thesis Committees – Current (*program/advisor; years*)

Ashik Nabi (Biology/J. Van Houten; 2015-Present); Devin Champagne (CMB/M. Rincon; 2014-Present); Haein Kim (CMB/J. Stumpff; 2013-Present); Vicki DeVault (CMB/J. Boyson; 2013-Present); Andrew Lombardo (CMB/D. Warshaw; 2013-Present).

Graduate Thesis Committees – Past (*program/advisor; years; 38 total*)

Michelle McNamara (NGP/C. Forehand; 2013-2015); Krithika Rao (CMB/J. Spees; 2012-2015); Mel Symeonides (CMB/M. Thali; 2010-2015) Meredith Koch (BME/R. Oldinski; 2013-2015); Marion Weir (Biology/B. Balliff; 2011-2015); Adam Sateriale (CMB/C. Huston; 2010-2014); Tyler Picariello (CMB/J. Van Houten; 2010-2015); Lucas Tilley (MMG/G. Ward; 2011-2013); Kheng Newick (CMB/N. Heintz; 2009-2013); Derrick McVicker (CMB/C. Berger; 2007-2012); Andrew Menke (CMB/W. Dostmann; 2011-2012); Jessica Cassavaugh (Pharm/K. Lounsbury; 2010-2011); Michael Williams (NGP/A. Morielli; 2010-2011); Megan Valentine (Biol/J. Van Houten; 2008-2015); Meagan Goodwin (CMB/D. Weiss; 2008-2011); Jamie Carter (MMG/M. Tierney; 2006-2011); Mujeeb Cheerathodi (Biol/B. Balliff; 2010-2011); Rosalyn Abbott (Biomed Engineering/J. Iatridis; 2009-2011); Vincent Caloiero (Biol/E. Delay; 2008-2009); William Diaz (CMB/C. Berger; 2008-2009); Casey Korecki (Mech. Eng/J. Iatridis; 2007-2008); Melissa Tinsley (MMG/J. Burke; 2007); Phani Garimella (Pharm/K. Lounsbury; 2007-2009); C. Matthew Bradbury (CMB/M. Bosenberg; 2007-2009); Anbu Rajendran (Biol/J. Van Houten; 2006-2010); Dimitry Kremontsov (CMB/M. Thali; 2006 – 2009); Shivmukar Raidas (CMB/W. Dostmann; 2006 – 2009); Benjamin Stark (MMG/D. Johnson; 2006-2008); Sandhya Khurana (MMG/M. Thali; 2006-2007); Lee Stirling (CMB/A. Morielli; 2005 – 2009); Emilee Connors (Pharm/A. Morielli; 2005 – 2009); Wei Xiao (Plant Biol/M. Tierney; 2005 – 2007); Lydia Nausch (Pharm/W. Dostmann; 2005 – 2007); Matthew Maneen (Neurol./M. Cipolla; 2005 – 2006); Melissa Batonick (MMG/M. Thali; 2005 – 2006); Tim Phalen (CMB/N. Heintz; 2004 – 2007); Sharon Cawley (CMB/W. Dostmann; 2004 – 2006); Sarah Hale (CMB/K. Lounsbury; 2003 – 2008)

Undergraduate Student Mentoring – Current

Austin Merrill (BIOL/Honors)

Undergraduate Student Mentoring – Past (13 total)

Marissa Marzano (BIOC); Sonya Shafique (BIOL); Stephanie Hicks (BIOC; 2012 – 2013); Ellen Slade (BIOC; 2012 – 2013); Nivedita Shankar (BIOC; 2011 – 2012); Kelsey Veilleux (Chem 291; 2011); Brad Harasimowicz (Pharm 295; 2010 – 2011); Julia Secker-Walker (BIOC; 2010 – 2011); Alison Mercier (BIOC/Honors College; 2009 – 2011); Caitlin Russell (BIOC/HELIX; 2009 – 2010); Kyriel Pinneault (BIOL; 2010); Jamie Stone (BIOL/work-study; 2008 – 2009); Ryan McConnell (BIOL/HELIX; 2008)

TEACHING**University of Vermont (Course (hours) - topics)**Graduate/Medical courses

- Molecular Basis of Biological Motility (10 lecture hrs/year) - *Molecular Basis of Cell Migration*
- UVM College of Medicine Vermont Integrated Medical Curriculum (5-15 lecture hrs/year) - *Introduction to Pharmacokinetics & Pharmacodynamics; Antibacterials; Antivirals; Antifungals; Antineoplastics; Antileukemic Pharmacotherapy; Geriatric Pharmacology; Review of Pharmacokinetics*
- Cancer Biology (2 lecture hours/semester; co-Director) - *Cellular Mechanisms of Metastasis*
- Medicinal Chemistry (3 lecture hours/semester) – *Targeted Anticancer Drugs*
- Toxicology (4.5 lecture hours/semester) - *Plant Toxins*

- Summer Medical Pharmacology (15 total lecture hours/summer) - *Introduction to Pharmacokinetics & Pharmacodynamics; Antibacterial Chemotherapy; Antivirals; Antifungals; Antineoplastics*
- Cellular & Molecular Pharmacology (5 total lecture hours/semester) – *GPCR signaling; Cell Adhesion & the Cytoskeleton*
- Cell & Molecular Biology (17.5 total lecture hours/year) - *Cell Communication & Signaling; Phosphatases; Extracellular Matrix; Cell-ECM Adhesion; Cell-Cell Adhesion; Tissue Organization; Literature Review*

Undergraduate

- A Biography of Cancer (4 lecture hrs/year) - *Molecular mechanisms of transformation; cancer drugs*
- Introduction to Pharmacology (3 lecture hours/semester) - *GPCR signaling, Antibiotics, Antineoplastics*

Outside UVM

2013-Present Physician Assistant Program, Franklin Pierce College, West Lebanon NH - *Guest lecturer – Antimicrobial chemotherapy; antineoplastic chemotherapy*

INVITED TALKS, HONORS & DISTINCTIONS

Selected Invited Talks (32 total since 2003)

- 2015 ASCB Special Interest Group – “The Cellular and Molecular Basis of Invasive Metastatic Cancer”
- 2015 Panelist, “The Emperor of All Maladies” Community Discussion, UVM Cancer Center
- 2013 College of Nanoscale Science & Engineering, SUNY (Nadine Hempel, host)
- 2013 Center for Cell Biology and Cancer Research, Albany Medical College (Mike Dipersio, host)
- 2012 Department of Pharmacology, Yale University (Ben Turk & David Calderwood, hosts)
- 2012 Norris Cotton Cancer Center, Dartmouth Medical School (Brent Berwin, host)
- 2011 Panel Speaker, Vermont Cancer Center 14th Annual Breast Cancer Conference
- 2011 Cell & Developmental Biology Department, SUNY-Upstate (Graduate Student Invited Speaker; Matthew Miller and Dr. Scott Blystone, hosts)
- 2011 Department of Biochemistry, University of Iowa; Kris DeMali, host
- 2010 Scientific Speaker, Oncology Grand Rounds, University of Vermont Cancer Center
- 2010 Gordon Research Conference on Signaling by Adhesion Receptors
- 2009 Department of Anatomy & Cell Biology, Rosalind and Morris Goodman Cancer Centre, McGill University; Nathalie Lamarche-Vane, host
- 2008 Department of Biochemistry, Louisiana State University Health Science Center; David Worthylake, host
- 2008 Department of Biology, McGill University; Jackie Vogel, host
- 2007 Platypus Technologies: Exhibitor Showcase on Cell Migration, American Society for Cell Biology, Washington D.C.
- 2006 Invited Scientific Speaker, Stowe Weekend of Hope Cancer Patient & Survivor Meeting, Stowe VT
- 2006 Invited Scientific Speaker, American Cancer Society, VT Chapter Meeting
- 2006 Medical College of Georgia, Augusta GA; Darren Browning, host
- 2006 Queen's University, Kingston, Ontario, Canada; Donald Maurice, host
- 2005 Yale University, New Haven CT; Anthony Koleske, host
- 2003 Albany Medical College, Albany NY; Andrew Aplin, host

Honors & Distinctions

- U.S. Patent No.7,799,526 - “*Phosphoprotein detection reagent and methods of making and using the same*” (licensed by Invitrogen™)
- Basic Science Lecturer of the Year, Physician Assistant Studies Program, Franklin Pierce University (2013)
- Nominee, UVM ‘Silver Stethoscope Award’ for medical school lectures, Classes of 2012 & 2013
- UVM selected applicant, Mary Kay Ash Foundation Translational Cancer Research Award (2011)
- Distinguished Alumnus Speaker, Lineberger Comprehensive Cancer Center Postdoctoral Fellow Training Grant, University of North Carolina at Chapel Hill (2010)

- Nominee, Vice-Chair for Gordon Research Conference on Signaling by Adhesion Receptors 2012
- Co-organizer, VCC Research Retreat on Translational Research (2006)
- Co-chair, Vermont Cancer Center Research Symposium (2004)
- Recipient, Howard Temin Career Award (NCI) – Independent Phase (2003)

PUBLICATIONS

Research Papers, Reviews and Book Chapters

1. Weivoda, M.M., Ruan, M., Hachfield, C.M., Pederson, L., **Howe, A.K.**, Davey, R.A., Zajac, J.D., Kobayashi, Y., Williams, B.O., Westendorf, J.J., Khosla, S., and Oursler, M.J. (2016). Wnt signaling inhibits osteoclast differentiation by activating canonical and cAMP/PKA pathways. *J. Bone Mineral Res.* **31**:65-75.
2. Rittiluechai, K., Ji, Y., Lounsbury, K., **Howe, A.**, and Vershraegen, C. (2015) Ovarian Cancer in 'International Manual of Oncology Practice (iMOP) – Principals of Medical Oncology' (de Mello, Taveres, and Mountzios, (eds)), pp. 393-434 (Springer, pub.)
3. Mirando, A.C., Fang, P., Williams, T.F., Baldor, L.C., **Howe, A.K.**, Ebert, A.M., Wilkinson, B., Lounsbury, K.M., Guo, M., and Francklyn, C.S.. (2015). Aminoacyl-tRNA synthetase dependent angiogenesis revealed by a bioengineered macrolide inhibitor. *Sci. Rep.* **14**:13160.
4. Deming, P.B., Campbell, S.L., Stone, J.B., Rivard, R.L., Mercier, A.L., and **Howe, A.K.**. (2015) Anchoring of protein kinase A by ERM (ezrin-radixin-moesin) proteins is required for proper netrin signaling through DCC (deleted in colorectal cancer). *J. Biol. Chem.* **290**:5783-96. PMC4342488
5. Verschraegen, C., Lounsbury, K., **Howe, A.**, and Greenblatt, M.. (2015) Therapeutic implications for ovarian cancer emerging from the Cancer Genome Atlas. *Trans. Cancer. Res.* **4**:40-59.
6. Langevin, H.M., Nedergaard, M., and **Howe, A.K.**. (2013) Cellular control of connective tissue matrix tension. *J. Cell. Biochem* **114**:1714-9. PMC3746739
7. Abbott, R.D., Koptiuch, C. Iatridis, J.C., **Howe, A.K.**, Badger, G.J., Langevin, H.M.. (2013) Stress and matrix-responsive cytoskeletal remodeling in fibroblasts. *J. Cell. Physiol* **228**:50-7. PMC3414643
8. Abbott, R.D., **Howe, A.K.**, Langevin, H.M., Iatridis, J.C.. (2012) Live free or die: Stretch-induced apoptosis occurs when adaptive reorientation of human annulus fibrosus cells is restricted. *Biochem Biophys Res Commun.* **421**:361-6. PMC3348381
9. Caldwell, G., **Howe, A.K.**, Nickl, C., Dostmann, W., Ballif, B., and Deming, P.. (2012) Direct modulation of the Protein Kinase A catalytic subunit α by receptor tyrosine kinases. *J. Cell Biochem.* **113**:39-48
10. McKenzie, A., Campbell, S.L. and **Howe, A.K.**. (2011) Protein Kinase A activity and anchoring are required for ovarian cancer cell migration and invasion. *PLoS ONE* **6**(10):e26552
11. **Howe, A.K.**. Second messenger cross-talk in cell migration. (2011) *Curr. Opin. Cell Biol.* **23**:554-61.
12. Cassavaugh, J., Hale, S.A., Wellman, T.L., **Howe, A.K.**, Wong, C., Lounsbury, K.M.. (2011) Glycogen synthase kinase 3 β (GSK3 β) targets hypoxia inducible factor-1 α (HIF-1 α) for proteasomal degradation during hypoxia. *J. Cell. Biochem.* **112**:3882-90
13. Langevin H.M., Bouffard N.A., Fox J.R., Palmer B.M., Wu J., Iatridis J.C., Barnes W.D., Badger, G.J., and **Howe, A.K.**. (2010) Fibroblast cytoskeletal remodeling contributes to connective tissue tension. *J. Cell. Physiol.* **226**:1166-75.
14. Langevin, H.M., Storch, K.N., Snapp, R.R., Bouffard, N.A., Badger, G.J., **Howe, A.K.**, Taatjes, D.J.. (2010) Tissue stretch induces nuclear remodeling in connective tissue fibroblasts. *Histochem Cell Biol.* **133**:405-15.
15. Rivard, R.L., Birger, M., Gaston, K.J., and **Howe A.K.**. (2009) AKAP-independent localization of type-II protein kinase A to dynamic actin microspikes. *Cell Motil Cytoskel.* **66**:693-709
16. Deming, P.B., Campbell, S.L., Baldor, L.C., and **Howe, A.K.**. (2008) Protein Kinase A regulates 3' phosphatidylinositide dynamics during PDGF-induced membrane ruffling and chemotaxis. *J. Biol. Chem.* **283**:35199-211.

17. Phalen, T.J., Weirather, K., Deming, P.B., Anathy, V., **Howe, A.K.**, van der Vliet, A., Jonsson, T., Poole, L., and Heintz, N.H.. (2006) Hyper-oxidation governs structural transitions in peroxiredoxin II oligomers that correlate with cell cycle arrest and recovery. *J. Cell Biol.* **175**:779-789.
18. Langevin, H.M., Bouffard, N.A., Badger, G.J., Churchill, D.L., **Howe, A.K.**. (2006) Subcutaneous tissue fibroblast cytoskeletal remodeling induced by acupuncture: Evidence for a mechanotransduction-based mechanism. *J Cell Physiol.* **207**:767-774.
19. **Howe, A.K.**, Baldor, L.C., and Hogan, B.P. (2005) Spatial regulation of cAMP-dependent protein kinase during chemotaxis. *Proc. Natl. Acad. Sci. USA* **102**:14320-14325.
20. Stanley, A.C., Lounsbury, K.M., Corrow, K., Callas, P.W., Zhar, R., **Howe, A.K.**, Ricci, M.A. (2005) Pressure elevation slows the fibroblast response to wound healing. *J. Vasc. Surg.* **42**:546-551.
21. Langevin, H.M., Bouffard, N.A., Badger, G.J., Iatridis, J.C., and **Howe, A.K.**. (2005) Dynamic fibroblast cytoskeletal response to subcutaneous tissue stretch *ex vivo* and *in vivo*. *Am. J. Physiol. Cell Physiol.* **288**:C747-756.
22. **Howe, A.K.** (2004) Regulation of actin-based cell migration by cAMP and PKA (Review). *Biochim. Biophys. Acta* **1692**:159-174.
23. Juliano, R.L., Reddig, P., Alahari, S., Edin, M., **Howe, A.**, Aplin, A.. (2004) Integrin regulation of cell signaling and motility. *Biochem Soc Trans.* **32**:443-6.
24. Goldfinger, L.E., Han, J., Kiosses, W.B., **Howe, A.K.**, and Ginsberg, M.H.. (2003) Spatial restriction of β 4-integrin phosphorylation regulates lamellipodial stability and β 4 α 1-dependent cell migration. *J. Cell. Biol.* **162**:731-741.
25. **Howe, A. K.**, Hogan, B.P., and Juliano, R.L.. (2002) Regulation of vasodilator-stimulated phosphoprotein phosphorylation and interaction with Abl by protein kinase A and cell adhesion. *J. Biol. Chem.* **277**: 38121-38126
26. **Howe, A.K.**, Aplin, A.E., and Juliano, R.L.. (2002) Anchorage-dependent ERK signaling - mechanisms and consequences. *Curr. Opin. Genet. Dev.* **12**:30-35.
27. **Howe, A.K.**. (2001) Cell adhesion regulates the interaction between Nck and p21-activated kinase. *J. Biol. Chem.* **276**:14541-14544.
28. Edin, M., **Howe, A.K.**, and Juliano, R.L.. (2001) Inhibition of PKA negatively regulates fibroblast motility. *Exp. Cell Res.* **270**:214-222.
29. Juliano, R.L., Aplin, A.E., **Howe, A.K.**, Short, S., Lee, J.W., and Alahari, S.. (2001) Integrin regulation of receptor tyrosine kinase and G protein-coupled receptor signaling to mitogen-activated protein kinases. *Meth. Enzymol.* **333**:151-63.
30. **Howe, A.K.** and Juliano, R.L.. (2000) Regulation of anchorage-dependent signal transduction by protein kinase A and p21-activated kinase. *Nature Cell Biol.* **2**:593-600.
31. Juliano, R.L., Aplin, A.E., **Howe, A.K.**, Lin, T., and Chen, Q. (1999) Methods for study of integrin regulation of MAP kinase signaling cascades. In *Signaling Through Cell Adhesion Molecules* (J.-L. Guan, ed), pp117-128, CRC Press, Boca Raton.
32. Aplin, A., **Howe, A.K.**, and Juliano, R.L.. (1999) Cell adhesion molecules, signal transduction, and cell cycling. *Curr. Opin. Cell. Biol.* **11**:737-744.
33. Aplin, A.E., **Howe, A.**, Alahari, S. and Juliano, R.L.. (1998) Signal transduction from cell adhesion receptors - the role of integrins, cadherins, selectins, and Ig-CAMs. *Pharm. Rev.* **50**:197-263.
34. **Howe, A.**, Aplin, A.E., Alahari, S. and Juliano, R.L.. (1998) Integrin signaling and cell growth control. *Curr. Opin. Cell Biol.* **10**:220-231.
35. **Howe, A.** and Juliano, R.L.. (1998) Distinct mechanisms mediate the initial and sustained phases of integrin-mediated activation of the Raf/MEK/mitogen-activated protein kinase cascade. *J. Biol. Chem.* **273**:27268-27274.

36. **Howe, A.**, Gaillard, S., Bennett, J.S., and Rundell, K.. (1998) Cell cycle progression in monkey cells expressing simian virus 40 small t antigen from adenovirus vectors. *J. Virol.* **72**:9637-9644.
37. Lin, T., Chen, Q., **Howe, A.**, and Juliano, R.. (1997) Cell anchorage permits efficient mitogenic signaling between Ras and its downstream kinases. *J. Biol. Chem.* **272**:8849-8852.
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Manuscripts in Revision/in Progress

1. McKenzie, A., Hicks, S., Berwin, B., **Howe, A.K.**. Extracellular matrix tension regulates ovarian cancer cell migration and spheroid disaggregation. (in revision)
2. McKenzie, A., Williams, T. F., **Howe, A.K.**. Cellular tension regulates protein kinase A activity during cell migration. (in revision)
3. Cunniff, B., McKenzie, A., Heintz, N.H., and **Howe, A.K.**. Localized energy sensing targets mitochondria to the leading edge of migrating cells. (in revision)