

BIOGRAPHICAL SKETCH

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NAME Bevensee, Mark Oliver		POSITION TITLE Associate Professor of Cell, Developmental and Integrative Biology (formerly Physiology and Biophysics)	
eRA COMMONS USER NAME (credential, e.g., agency login) Mbevensee			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
University of California, Berkeley, CA	BA	1990	Physiology
Yale University, New Haven, CT	PhD	1996	Physiology
Yale University, New Haven, CT	Postdoc.	2000	Physiology

A. Personal Statement

My laboratory is primarily interested in the cellular and molecular physiology of intracellular pH (pH_i) regulation and acid-base transport in tissues such as brain, kidney, and heart. We are also interested in how acid-base transporters, as well as ion channels such as the epithelial Na⁺ channel (ENaC) contribute to Na⁺ hyperabsorption in mouse models of autosomal recessive polycystic kidney disease (ARPKD). We are characterizing the localization, structure, function, and regulation of bicarbonate-dependent acid-base transporters. My laboratory is well established (with a 14-y history) in using molecular biology and electrophysiological techniques (e.g., 2-electrode voltage clamping, ion-sensitive microelectrodes, and patch clamping) to characterize the structure-function and regulation of transporters heterologously expressed in *Xenopus* oocytes. We also use fluorescence imaging techniques with ion-sensitive dyes to characterize the pH_i physiology of brain and kidney cells, and to elucidate the function of heterologously expressed bicarbonate transporters in transfected mammalian cells. More recently, we are examining hypertension and the acid-base status in a mouse model of ARPKD. Finally, we are developing mouse lines expressing a cell-targeted genetic pH reporter to compare the magnitudes and time courses of in-vivo pH_i changes. We are therefore taking an integrative, interdisciplinary approach from molecular, cellular, and organismal levels to characterize acid-base/ion transport in kidney and other tissues.

B. Positions and Honors**Positions and Employment**

2000-2009	Assistant Professor, Department of Physiology and Biophysics, University of Alabama, Birmingham, AL (UAB)
2005-present	Assistant/Associate Scientist, Nephrology Research and Training Center, UAB
2006-present	Associate Scientist/Scientist, Civitan International Research Center (CIRC), UAB
2006-present	Associate Scientist/Scientist, Center for Glial Biology in Medicine (CGMB), UAB
2007-present	Assistant/Associate Professor, Department of Neurobiology (secondary appointment), UAB
2009-present	Associate Professor, Department of Physiology and Biophysics (primary appointment), UAB. This Department recently merged with the Department of Cell Biology to form the Department of Cell, Developmental and Integrative Biology

Memberships and Other Experience

1995-recent	American Physiological Society
1995-2010	The New York Academy of Sciences
2001-recent	The American Society for Cell Biology
2003-recent	The Society for Neuroscience
2009-present	American Society for Biochemistry and Molecular Biology
2000-2002	Departmental Representative, Basic Sciences Advisory Committee, UAB
2001-2004	Member, Graduate Student Committee, Department of Physiology and Biophysics, UAB

2002-2005 Chair, Basic Sciences Advisory Committee, UAB
2005-2007 Member, Integrative Biomedical Sciences (IBS) Curriculum Committee, UAB
2005 *Ad hoc* reviewer, U.S. Civilian Research and Development Foundation 10th Anniversary Junior Scientist Fellowship Program
2006 *Ad hoc* reviewer and then temporary member, Neurotransporters, Receptors, and Calcium Signaling (NTRC) NIH study section
2006-2011 (est.) Member, Neuroscience Curriculum Committee, UAB
2006-2012 Faculty Development Representative, Department of Physiology and Biophysics, UAB
2006-present Director, PCL1170 Renal, Pre-Clerkship Curriculum, School of Medicine, UAB
2007 *Ad hoc* reviewer, The Wellcome Trust
2007-present Member, PCL1110 Fundamentals I Advisory Committee, Pre-Clerkship Curriculum, School of Medicine, UAB
2007-2013 Member, Editorial Board, *American Journal of Physiology: Renal Physiology*
2008 Chair, Scheduling Committee, Pre-Clerkship Curriculum, School of Medicine, UAB
2008 *Ad hoc* reviewer, Translational Research Intramural Grant Program, Center for Clinical and Translational Science (CCTS) Pilot Program, UAB
2008-present Member, Center for Biophysical Sciences and Engineering (CBSE), UAB
2009-present Member, Comprehensive Neuroscience Center, UAB
2009-present Member, Editorial Board, *Journal of Biological Chemistry*
2009-2011 Member, Curriculum Committee for the Pathophysiology and Molecular Medicine (PBMM) Theme, Graduate Biomedical Sciences (GBS), UAB
2009-2010 Member, Faculty Search Committee, Department of Physiology and Biophysics, UAB
2010 Application Review Committee, T35 Short Term Training Program at UAB, Summer 2010
2010-present Member, Cell, Molecular, and Developmental Biology (CMDDB) Training Grant Advisory Committee, UAB
2011-present Member, Student Academic Standing Committee, School of Medicine, UAB
2011-present Member, Technical Standards Advisory Committee, School of Medicine, UAB
2012-2014 Faculty committee/Number, Qualifications, and Functions subcommittee for Liaison Committee for Medical Education (LCME) self-study, School of Medicine, UAB
2012 Peer Reviewer, Polycystic Kidney Disease Panel for the Investigator Initiated Research Award (IIRA) and Technology/Therapeutic Development Award (TTDA) Applications, Peer Reviewed Medical Research Program (PRMRP), American Institute of Biological Sciences
2012 Peer Reviewer, Cancer Pilot Grant, UAB Comprehensive Cancer Center
2012, 2013 Peer Reviewer, Innovative Research Grant–Basic Biology and Biomedical Engineering 2, American Heart Association
2013 Peer Reviewer, Special Emphasis Panel/Scientific Review Group 2013/10 ZRG1 DKUS-L (92), Gastrointestinal, Kidney, Liver, Urology and Toxicology NIH Study Section

Honors

1989-1990 Honors Research Program, Dept. of Physiology, Univ. of California, Berkeley, CA
1995 Caroline tum Suden/Frances A. Hellebrandt Professional Opportunity Award (APS)
1996 “Distinguished” doctoral dissertation, Grad. School Degree Committee, Yale Univ.
2000 Howard Hughes Junior Faculty Development Award, UAB
2005, 2006 Nominated for Argus Award for Best Small Group Leader, 1st year medical students, UAB
2007 Argus Award for Best Small Group Leader, 1st year medical students, UAB
2008 Speaker, Distinguished Seminar Series, Department of Physiology and Membrane Biology, University of California at Davis School of Medicine
2009 Nominated for the Argus Award for Best Module Director, 1st year medical students, UAB
2010 Argus Award for Best Lecturer for the Renal Module, pre-clerkship medical students, UAB
2010 Nominated for the Argus Award for Best MS1 Organ Module Director, pre-clerkship medical students, UAB
2011 Nominated for the Argus Award for Best Lecturer of the Renal Module, pre-clerkship medical students, UAB

- 2012 President's Award for Excellence in Teaching for the Joint Health Science Departments, UAB
- 2012 Member of The Honor Society of Phi Kappa Phi (University of Alabama at Birmingham Chapter)
- 2012 Nominated for the Argus Award for Best MS1 Organ Module Director, Preclerkship medical students, University of Alabama, Birmingham
- 2012 Nominated for the Argus Award for Best Lecturer for MS-1 Renal Module, Preclerkship medical students, University of Alabama, Birmingham
- 2014 Argus Award for Best MS1 Organ Module Director(s), Preclerkship medical students, University of Alabama, Birmingham
- 2014 Nominated for the Argus Award for Best MS1 Organ Module, Preclerkship medical students, University of Alabama, Birmingham

C. Selected Peer-reviewed Publications

1. Bevensee MO, Schmitt BM, Choi I, Romero MF & Boron WF. An electrogenic Na⁺-HCO₃⁻ cotransporter (NBC) with a novel COOH-terminus, cloned from rat brain. Am. J. Physiol.: Cell Physiol. 278: C1200-C1211, 2000.
2. McAlear SD*, Liu X*, Williams JB, McNicholas-Bevensee CM & Bevensee MO. Electrogenic Na/HCO₃ cotransporter (NBCe1) variants expressed in *Xenopus* oocytes: Functional comparison and roles of the amino and carboxy termini. J. Gen. Physiol. 127: 639-658, 2006. *equal contributors. PMID: PMC2151535
3. Olteanu D, Yoder BK, Liu W, Croyle MJ, Welty EA, Rosborough K, Wyss JM, Bell PD, Guay-Woodford LM, Bevensee MO, Satlin LM & Schwiebert EM. Heightened ENaC-mediated sodium absorption in a murine polycystic kidney disease model epithelium lacking apical monocilia. Am. J. Physiol.: Cell Physiol. 290: C952-C963, 2006.
4. McAlear SD & Bevensee MO. A cysteine-scanning mutagenesis study of transmembrane domain 8 of the electrogenic Na/bicarbonate cotransporter NBCe1. J. Biol. Chem. 281: 32417-32427, 2006. Erratum in: J. Biol. Chem. 282:15940, 2007.
5. Banizs B, Komlosi P, Bevensee MO, Schwiebert EM, Bell PD & Yoder BK. Altered intracellular pH regulation and Na⁺/HCO₃⁻ transporter activity in choroid plexus of the cilia defective *Tg737^{orpk}* mutant mouse. Am. J. Physiol.: Cell Physiol. 292:C1409-C1416, 2007.
6. Liu X, Williams JB, Sumpter BR & Bevensee MO. Inhibition of the Na/bicarbonate cotransporter NBCe1-A by diBAC oxonol dyes relative to niflumic acid and a stilbene. J. Membr. Biol. 215:195-204, 2007.
7. Bevensee MO & Boron WF. Effects of hypoxia on intracellular-pH regulation in astrocytes cultured from rat hippocampus. Brain Res. 1193C:143-152, 2008. PMID: PMC2483307
8. Majumdar D, Maunsbach AB, Shacka JJ, Williams JB, Berger UV, Schultz KP, Harkins LE, Boron WF, Roth KA & Bevensee MO. Localization of electrogenic Na/bicarbonate cotransporter NBCe1 variants in rat brain. Neuroscience 155:818-832, 2008. PMID: PMC2711903
9. Wu J, McNicholas CM & Bevensee MO. Phosphatidylinositol 4,5-bisphosphate (PIP₂) stimulates the electrogenic Na/bicarbonate cotransporter NBCe1-A expressed in *Xenopus* oocytes. Proc. Natl. Acad. Sci., U.S.A. 106:14150-14155, 2009. PMID: PMC2729035
10. Wang W, Wu J, Bernard K, Li G, Wang G, Bevensee MO & Kirk KL. ATP-independent CFTR channel gating and allosteric modulation by phosphorylation. Proc. Natl. Acad. Sci., U.S.A. 107:3888-3893, 2010. PMID: PMC2840504
11. Lee S, Lee HJ, Park HJ, Yang HS, Thornell IM, Bevensee MO & Choi I. Na/bicarbonate cotransporter NBCn1 in the kidney medullary thick ascending limb cell line is upregulated under acidic conditions and enhances ammonium transport. Exp. Physiol. 95:926-937, 2010. PMID: PMC2923243
12. Majumdar D & Bevensee MO. Na-coupled bicarbonate transporters of the Slc4 family in the nervous system: function, localization, and relevance to neurologic function. Neuroscience 171:951-972, 2010. PMID: PMC2994196
13. Olteanu D, Liu X, Liu W, Roper VC, Sharma N, Yoder BK, Satlin LM, Schwiebert EM & Bevensee MO. Increased sodium/hydrogen exchange activity on the apical surface of a cilium-deficient cortical collecting duct cell model of polycystic kidney disease. Am. J. Physiol.: Cell Physiol. 302:C1436-C1451, 2012. PMID: PMC3361997

14. Thornell IA, Wu J, Liu X & Bevenssee MO. PIP₂ hydrolysis stimulates electrogenic Na⁺-bicarbonate cotransporter NBCe1-B and -C variants expressed in *Xenopus laevis* oocytes. J. Physiol., 590:5993-6011, 2012. PMID: PMC3530112
15. Zhang S, Skinner D, Hicks SB, Bevenssee MO, Sorscher EJ, Lazrak A, Matalon S, McNicholas CM & Woodworth BA (*in press*). Sinupret[®] activates CFTR and TMEM16A-dependent transepithelial chloride transport and improves indicators of mucociliary clearance. PLoS ONE DOI:10.1371/journal.pone.0104090

D. Research Support

Ongoing

14GRNT2048002 Bevenssee (PI) 07/01/14 – 06/30/16

American Heart Association (Southeast Affiliate)

Molecular Physiology of Na/Bicarbonate Cotransporters

The major goals of this project are to test the hypotheses that *i*) transmembrane domains 1, 3, 5, 8, and 12 of the Na/bicarbonate cotransporter NBCe1 forms the ion translocation pathway, and *ii*) the state of transporter activity alters the ion translocation pathway of NBCe1.

Role: PI

12IRG9210005 Bevenssee (PI) 01/01/12 – 12/31/14

American Heart Association

Currently: NCE

Influence of Neuronal Activity and Ischemia on the pH of Mouse Brain Cells: An In-Vivo Study with a Genetic pH Reporter

The major goals of this project are to develop novel reporter mouse lines expressing the conditional knock-in pH sensor pHluorin and compare the magnitudes and time courses of *in-vivo* pH_i changes of neurons and astrocytes during changes in brain activity or global ischemia.

Role: PI

Completed (during the last 3 years)

R01 DK067343 E. Schwiebert (PI) ('05-'07) 09/01/05 – 08/31/12

NIH/NIDDK Bevenssee (PI) ('07-'12)

Ion Transport Dysregulation in Cilium-deficient ARPKD

The major goal of this project is to test the hypothesis that the loss of apical central monocilium-derived signals causes upregulated epithelial Na⁺ channel (ENaC) and Na-H exchanger (NHE)-mediated Na⁺ absorption and resultant hypertension. The following two questions are addressed. 1) Are upregulated ENaC and NHEs the cause of sodium hyperabsorption and resultant hypertension in mouse models/cell monolayers that have lost monocilia? 2) How does loss of the monocilium cause upregulated Na⁺ absorption?

Role: Collaborator ('05-'07), PI ('07-'12)

2 R01 NS046653-06A2 Bevenssee (PI) 08/05/09 – 07/31/12

NIH/NINDS

Na/Bicarbonate Cotransporters in Brain

The major goals of this project are to examine and characterize 1) phosphatidylinositol 4,5-bisphosphate (PIP₂) stimulation of intracellular pH regulation and acid extrusion (particular bicarbonate dependent) in astrocytes and neurons from rat hippocampus, and 2) regions/residues of NBCe1 variants responsible for functional regulation by the amino termini and modulation by PIP₂.

Role: PI

R01 NS018400-24A2 Boron (PI); Bevenssee (Prog. Dir.) 09/30/08 – 08/31/11

NIH/NINDS

Molecular Physiology of Bicarbonate Transport in the Brain

The major goals of this project are to characterize the function and regulation (e.g., by AID and IRBIT) of wild-type and modified bicarbonate transporters heterologously expressed in *Xenopus* oocytes using the macropatch technique in conjunction with pH-sensitive microelectrodes to measure transporter-influenced cytosolic surface pH. We will also help establish the macropatch technique in the Boron laboratory.

Role: Project Director of subaward