

UNIVERSITY OF DAYTON
COLLEGE OF ARTS AND SCIENCES
CURRICULUM VITAE

Name: Carissa M. Krane, PhD

Date: 5/09

School: College of Arts and Sciences

Department: Biology

Date hired at UD: January 1, 2001

Date eligible for tenure: 2008

Date tenured: 2008

Rank:	From:	To:	Institution	Full or Part Time
Instructor	Does not apply.			
Assistant Professor	January 1, 2001	August 2007	University of Dayton	Full Time
Associate Professor	August 2007	Present	University of Dayton	Full Time

I. Professional Training and Experience

A. Academic and Professional Training

1. <u>College or University</u>	<u>Degree</u>	<u>Date</u>
Washington University School of Medicine, St. Louis, MO Division of Biology and Biomedical Sciences: Program in Molecular Genetics	PhD	1996
Marquette University, Milwaukee, WI Biochemistry and Molecular Biology	Honors B.S. <i>Cum Laude</i>	1990

2. Current study: Does not apply

3. Scholastic Honors:

- 1996-2000 New Investigator in the Program of Excellence in Molecular Biology of Heart and Lung Development, (sponsored by the National Heart Lung and Blood Institute, NIH), for training and research support at the University of Cincinnati College of Medicine, Cincinnati, OH
- 1992-1996 National Research Service Award for Pre-Doctoral Training in Molecular Genetics, (sponsored by the National Human Genome Research Institute), for training and research support in the Department of Genetics, Washington University School of Medicine, St. Louis, MO

Note: ¹Papers published between 1994 and 1997 are authored under maiden name, C.M. Smith

1989 Summer Undergraduate Research Fellowship, Southwestern Medical Center, Dallas, TX

4. Professional Progress (Professional Schools): Does not apply

B. Professional Experience

2008 (July-December) Visiting Scholar, Davis Heart & Lung Research Institute, The Ohio State University, Columbus OH; Visiting Associate Professor, Department of Biomedical Engineering, The Ohio State University, Columbus OH

2007-Present Associate Professor, University of Dayton, Department of Biology, Dayton OH

2001-2007: Assistant Professor, University of Dayton, Department of Biology, Dayton, OH

1996-2000 Postdoctoral Assistant, University of Cincinnati, Department of Biochemistry, Microbiology and Molecular Genetics, Cincinnati, OH

1998-2000 Adjunct Assistant Professor, Wright State University, Department of Biology, Dayton, OH

1990-1996 Graduate Research Assistant, Division of Biology and Biomedical Science, Program in Molecular Genetics, Department of Genetics, Washington University School of Medicine, St. Louis, MO

1989 Undergraduate Research Assistant, Marquette University, Milwaukee, WI

1989 Summer Undergraduate Research Fellow, University of Texas Southwestern Medical Center, Dallas, TX

II. Professional Attitudes and Growth

A. Significant Publications in Print¹:

1. Books, Pamphlets, and Monographs: None

2a.) Primary Research Articles :

Rhoads, E., **Krane, C.M.**, and Williams, P.K. (2009) A molecular screening method for *Ambystoma* using mitochondrial DNA. *Conservation Genetics (In Press)*.

Krane, C.M., Deng, B., Mutyam, V., McDonald, C.A., Pazdziorko, S., Mason, L., Goldman, S., Kasaian, M., Chaudhary, D., Williams, C, and Ho, M.W.Y. (2009) Altered regulation of aquaporin gene expression in allergen and IL-13 induced mouse models of asthma. *Cytokine*, **46**:111-118.

Zimmerman, S.L., Frisbee, J., Goldstein, D., West, J., Rivera, K., and **Krane, C.M.** (2007) Excretion and conservation of glycerol, and expression of aquaporins and glyceroporins, during cold acclimation in Cope's gray treefrog *Hyla Chrysoscelis*. *AJP: Regulatory, Integrative, and Comparative Physiology*, 292 (1):R544-R555.

Note: ¹Papers published between 1994 and 1997 are authored under maiden name, C.M. Smith

- Paoletti, D.R., Doom, T.E., **Krane, C.M.**, Raymer, M.L., and Krane, D.E. (2005) Empirical analysis of the STR profiles resulting from conceptual mixtures. *J. Forensic Sci.*, **50**(6):1361-1366.
- Kishore, B.K., **Krane, C.M.**, Miller, R.L., Shi, H., Zhang, P., Hemmert, A., Sun, R., and Nelson, R.D. (2005) P2Y₂ receptor mRNA and protein expression is altered in inner medullas of hydrated and dehydrated rats: relevance to AVP-independent regulation of IMCD function. *Am. J. Physiol., (Renal Phys)*, **288**: F1165-F1172.
- Merves, M., **Krane, C.M.**, Dou, H., Greinwald, J.H., Menon, A.G., and Choo, D. (2003) Expression of aquaporin 1 and 5 in the developing mouse inner ear and audiovestibular assessment of an Aqp5 null mutant. *J Assoc Res Otolaryngol.*, **4**(2):264-275.
- Nejsum, L.N., Kwon, T-H., Jensen, U.B., Fumagalli, O., Frokiaer, J., **Krane, C.M.**, Menon, A.G., King, L.S., Agre, P.C., and Nielsen, S. (2002) Functional requirement of Aquaporin-5 in plasma membranes in sweat glands. *PNAS*, **99**(1):511-516.
- Krane, C.M.**, Fortner, C., Hand, A.E., McGraw, D.W., Lorenz, J.N., Wert, S.E., Towne, J.E., Paul, R.J., Whitsett, J.A., and Menon, A.G. (2001) Aquaporin 5 Deficient Mouse Lungs are Hyperresponsive to Cholinergic-Stimulation. *PNAS*, **98**(24):14114-14119. (See **Commentary**, King, L. (2001) Surprises from airway epithelium. *PNAS*, **98**(25):14192-14194.)
- Krane, C.M.**, Melvin, J. E., Nguyen, H.-V., Richardson, L., Towne, J.E., Doetschman, T., and Menon, A. G. (2001) Salivary Gland Acinar Cells From Aquaporin 5 Deficient Mice Have Decreased Membrane Permeability and Altered Cell Volume Regulation. *J. Biol. Chem*, **276**(26):23413-23420.
- Towne, J.E., **Krane, C.M.**, Bachurski, C.J., and Menon, A.G. (2001) Tumor Necrosis Factor- α Inhibits Aquaporin 5 Expression in Mouse Lung Epithelial Cells. *J. Biol. Chem*, **276**(22):18657-18664.
- Amlal, H., **Krane, C.M.**, Chen, Q., and Soleimani, M. (2000) Early polyuria and urinary concentrating defect in potassium deprivation. *Am. J. Physiol. (Renal Phys)* **279**:655-663.
- Kishore, B.K., **Krane, C.M.**, Di Iulio, D., Menon, A.G., and Cacini, W. (2000) Expression of Renal Aquaporins 1, 2, and 3 in a Rat Model of Cisplatin-induced Polyuria. *Kidney International* **58**: 701-711.
- Kishore, B.K., Ginns, S.M., **Krane, C.M.**, Nielsen, S., and Knepper, M.A. (2000) Cellular Localization of P2Y₂-Purinoreceptor In Rat Renal Inner Medulla and Lung. *American Journal of Physiology: Renal Physiology* **278**: F42-F51.
- Towne, J.E., Harrod, K.S., **Krane, C.M.**, and Menon, A.G. (2000) Decreased expression of AQP1 and AQP5 In mouse lung after acute viral infection. *American Journal of Respiratory Cell and Molecular Biology* **22**(1): 34-44.
- Krane, C.M.**, Towne, J.E. and Menon, A.G. (1999) Cloning and characterization of murine Aqp5: Evidence for a conserved Aquaporin gene cluster. *Mammalian Genome* **10**:498-505.

Smith, C.M., Ma, N.S., Nowak, N., Shows, T., and Gerhard, D.S. (1997) A three megabase contig from D11S987 to MLK3, a gene-rich region in 11q13. *Genome Research* **7**:835-842.

Williams J.B., Rexar B., Sirapurapu S., John, S., Goldstein, R., Phillips J., Haley, L.L., Sait, S.N.J., Shows, T.B., **Smith, C.M.**, and Gerhard, D.S. (1997) The human HNP36 gene is localized to chromosome 11q13 and produces alternative transcripts that are not mutated in multiple endocrine neoplasia type 1 (MEN1) Syndrome. *Genomics* **42**:325-330.

Chesi, M., Bergsagel, P.L., Brents, L.A., **Smith, C.M.**, Gerhard, D.S., and Kuehl, W.M. (1996) Dysregulation of cyclin D1 by translocation into an IgH gamma switch region in two multiple myeloma cell lines. *Blood* **88**:674-681.

Smith, C.M., Wells, S.A., and Gerhard, D.S (1995) Mapping eight new polymorphisms in 11q13 in the vicinity of multiple endocrine neoplasia type 1: Identification of a new distal recombinant. *Human Genetics* **96**:377-387.

Smith, C.M., Bora, P.S., Bora, N.S., Jones, C., and Gerhard, D.S. (1995) Genetic and radiation-reduced somatic cell hybrid sublocalization of the GSTP1 gene. *Cytogenetics and Cell Genetics* **71**:235-239.

Bora, P.S., **Smith, C.M.**, Devor, E.J., Cloninger, C.R., and Gerhard, D.S. (1994) *HinfI* polymorphism detected by FAEEES-III cDNA. *Human Molecular Genetics* **3**(12):2267.

2b.) Peer-Reviewed Invited Reviews

Krane, C.M. and Goldstein, D.L. (2007) Comparative Functional Analysis of Aquaporins/Glyceroporins in Mammals and Anurans. *Mammalian Genome*, **18**:452-462.

Krane, C.M., and Kishore, B.K. (2003) Aquaporins: Membrane Water Channels of The Biological World. *Biologist*, **50**(20): 81-86.

Kishore, B.K., **Krane, C.M.**, Reif, M., and Menon, A.G. (2001) Molecular physiology of urinary concentration defect in elderly population. *International Urology and Nephrology*, **33**(2):235-48.

2c.) Peer-Reviewed Teaching Papers

Krane, C.M. A Capstone Experiential Learning Exercise for Undergraduate Physiology Laboratory Courses. (2005) *Advances in Physiology Education*, **29**(4):208-210.

2d.) Manuscripts Submitted (under review) or in Preparation

Joddar, B., Reen, K. R., Stevenson, M.D., **Krane, C.M.**, Firstenberg, M.F., and Gooch, K.J. Exposure to arterial pO₂ modulates the development of intimal hyperplasia in human saphenous veins ex vivo. (*In preparation*).

Diestelkamp, W., **Krane, C.M.**, and Pinnell, M.F. Design of a factorial experiment with randomization restrictions to assess medical device performance on vascular tissue. (*In preparation for submission to Biotechniques*).

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- Goldstein, D.L., Frisbie, J., Diller, A., Pandey, R., and **Krane, C.M.** Glycerol uptake by erythrocytes from warm- and cold-acclimated Cope's gray treefrogs. (*In preparation for submission to Journal of Experimental Biology*).
- Wilkins, R.J., Amaya, P.F., Pinnell, M.F., and **Krane, C.M.** Experimental approach for measuring viscosity of blood substitutes. (*In preparation for submission to Advances in Physiology Education*).
- Pinnell, M., Gardner, C., Thompson, M., Coleman, J., Wilkins, R., and **Krane, C.M.** Mechanical test methods for assessing porcine carotid and uterine artery burst pressure following ex-vivo ultrasonic ligature seal and transection. (*In Preparation for submission to ASME Journal of Medical Devices*).
- Krane, C.M.**, Mutyam, V., Zimmerman, S.L., Staton, A., Carroll, J., and Kaitlin M. Moredock. Identification and functional analysis of common 3' UTR variants in the human AQP5 gene. (*In preparation*).
- Mauch, T.J., Phan, X.H., **Krane, C.M.**, and Kishore, B.K. Developmental expression pattern of P2Y2 receptor protein in the mesoderm-derived organs (heart, kidney, and adrenals) in the fetal mouse. (*In preparation for submission to Purinergic Signaling*).
- Mauch, T.J., **Krane, C.M.**, Phan, X.H., and Kishore, B.K. Developmental expression pattern of P2Y2 receptor protein in the endoderm-derived organs (GI tract and pulmonary system) of embryonic mouse. (*In preparation for submission to Purinergic Signaling*).

3.) Book and Article Reviews

- 2009 Reviewer, *Cellular and Molecular Life Sciences*
- 2008 Reviewer, *BMC Evolutionary Biology*
- 2007 Reviewer, *Endocrinology*
- 2007 Reviewer, *Molecular Biology Reports*
- 2006-2007 Reviewer, *Journal of Exercise Physiology Online*
- 2005-2006 Reviewer, *Advances in Physiology Education*
- 2005 Reviewer, *Biochimica et Biophysica Acta, Molecular Cell Research*
- 2002 Textbook Reviewer, Human Physiology: The Mechanisms of Body Function, McGraw Hill, Publisher
- 2002 Textbook Reviewer, Discovering Genomics, Proteomics, and Bioinformatics, Benjamin-Cummings, Publisher
- 2001 Reviewer, *The Journal of Biological Chemistry*
- 2001 Reviewer, *Biochimica et Biophysica Acta*

2001 Textbook Reviewer, Human Molecular Genetics, Fitzgerald Science Press, Inc., Publisher

2001 Textbook Reviewer, Genomics, Benjamin-Cummings, Publisher

B. Recent Addresses or Papers

1.) Published Abstracts and Poster Presentations

Gao, Y., Gao, Y., Wheatly, M., and **Krane, C.M.** “Cloning and expression of aquaporin in the antennal gland of crayfish, *Procambarus clarkii*.” Published abstract and poster presentation at the 2009 Experimental Biology Meeting held in New Orleans LA, April 18-22, 2009.

Moredock, K.M., Cirrito, J.R., Holtzman, D.M., and **Krane, C.M.** “Aquaporin-4 expression is altered around the lateral ventricle in correlation with beta amyloid plaque expression in a transgenic mouse model of Alzheimer’s Disease.” Published abstract number 4050 and poster presentation at the 2008 Experimental Biology Meeting held in San Diego, CA, April 5-9, 2008.

Krane, C.M., Zimmerman, S.L., Staton, A., Carroll, J., Azmeh, R., and Moredock, K.M. “Single nucleotide polymorphisms in the 3’UTR of the human aquaporin 5 gene affect gene expression.” Oral presentation and published abstract at the 5th International Conference of Aquaporin, Nara, Japan, July 13-16, 2007.

Krane, C.M., Zimmerman, S.L., Staton, A., Carroll, J., Azmeh, R., and Moredock, K.M. “Evidence for a functional haplotype in the 3’UTR of the hAQP5 gene.” Published abstract and poster presentation at the 2007 Experimental Biology Meeting held in Washington DC, April 28-May 3, 2007.

Azmeh, R., Zimmerman, S.L., and **Krane, C.M.** “Polymorphisms and polyadenylation binding complex in the 3’UTR of AQP5”. Published abstract and poster presentation at the 2007 Tri-Beta Regional Conference held at the University of Dayton in April, 2007.

Moredock, K.M., Zimmerman, S.L., and **Krane, C.M.** “Nucleotide polymorphisms in the human Aquaporin 5 gene affect gene expression.” Published abstract and poster presentation at the 2007 Tri-Beta Regional Conference held at the University of Dayton in April, 2007.

Goldstein, D., and **Krane, C.M.** “Aquaporins and aquaglyceroporins in amphibians, and their role in cold acclimation of gray treefrogs.” Invited podium presentation, at the American Physiological Society Intersociety Meeting: Comparative Physiology 2006: Integrating Diversity to be held in Virginia Beach, VA, October, 2006.

Zimmerman, S.L., Staton, A., Carroll, J., and **Krane, C.M.** “SNPs identified within the human AQP5 gene, a candidate gene for BHR and asthma.” Presented at the poster session at the 47th Annual Short Course in Medical and Experimental Mammalian Genetics, held in Bar Harbor, ME, July, 2006

Goldstein, D.L., Frisbie, J., Diller, A., Carroll, J., and **Krane, C.M.** “Glycerol permeability in erythrocytes from an amphibian that accumulates glycerol in the cold.” Published abstract poster presentation, 2006 Experimental Biology Meeting, San Francisco, CA, April, 2006.

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- Staton, A. A., and **Krane, C.M.** “Differential proteomic expression in Aquaporin 5 transgenic mice.” Published abstract and poster presentation, 2006 Ohio Academy of Science Annual Meeting, UD April, 2006.
- McDonald, C.A., and **Krane, C.M.** “Global Proteomic analysis of lung proteins from Aquaporin-5 knockout mice by 2-D SDS PAGE.” Published abstract and podium talk at the 2006 Ohio Academy of Science Annual Meeting, UD April, 2006.
- Zimmerman, S. L., Goldstein, D.L., Frisbie, J., Diller, A., and **Krane, C.M.** “MIP family members in Cope’s gray tree frog *Hyla chrysoscelis* exhibit tissue-specific and thermal-sensitive gene regulation.” Published abstract and poster presentation at the 2006 Ohio Academy of Science Annual Meeting, UD April, 2006.
- Goldstein, D.L., Frisbie, J., Diller, A., Carroll, J., and **Krane, C.M.** “Glycerol permeability in erythrocytes from an amphibian that accumulates glycerol in the cold.” Presented as a poster at the 2005 Ohio Physiological Society Meeting, held at Wright State University, Dayton, OH, October 28, 2005.
- Zimmerman, S.L., Goldstein, D.L., Frisbie, J., Diller, A., and **Krane, C.M.** “MIP family members in Cope’s gray tree frog *Hyla chrysoscelis* exhibit tissue-specific and thermal sensitive gene regulation.” Presented as a poster at the 2005 Ohio Physiological Society Meeting, held at Wright State University, Dayton, OH, October 28, 2005.
- Deng, B., Williams, C., **Krane, C.M.**, Pazdziorko, S., Jiao, A., Goldman, S., Kasaian, M., Chaudhary, D., Ho, M.W.Y. “Downregulation of AQP5 in asthmatic mouse lung.” Abstract #827.14 Presented as a poster at the 2005 Experimental Biology Meeting and International Congress of Physiological Sciences Meeting, March 31-April 5, 2005 in San Diego, CA.
- Goldstein, D.L., Frisbie, J., and **Krane, C.M.** “Glycerol permeability and aquaporins from a freeze-tolerant amphibian that accumulates glycerol.” Poster # 906.12 Presented as a poster at the 2005 Experimental Biology Meeting and International Congress of Physiological Sciences Meeting, March 31-April 5, 2005 in San Diego, CA.
- Mauch, T.J., Phan, H.X., **Krane, C.M.**, and Kishore, B.K. “Developmental expression pattern of P2Y2 receptor protein in mesoderm-derived organs (heart, kidney, and adrenals) in fetal mouse.” Poster # 487.2 Presented as an oral presentation and poster at the 2005 Experimental Biology Meeting and International Congress of Physiological Sciences Meeting, March 31-April 5, 2005 in San Diego, CA.
- Krane, C.M.**, Phan, H.X., Mauch, T.J., and Kishore, B.K. “Developmental expression pattern of P2Y2 receptor protein in endoderm-derived organs (GI tract and pulmonary system) of embryonic mouse.” Poster # 487.1 Presented as an oral presentation and poster at the 2005 Experimental Biology Meeting and International Congress of Physiological Sciences Meeting, March 31-April 5, 2005 in San Diego, CA.

- Farrell, R.M., and **Krane, C.M.** “Examination of global protein expression in AQP5 deficient mice using 2-D polyacrylamide gel electrophoresis.” Presented as a poster at the Ohio Physiological Society Annual Meeting, held at the University of Cincinnati, College of Medicine, November 12, 2004.
- Staton, A.A., Zimmerman, S.L., and **Krane, C.M.** “Screening the human Aquaporin 5 gene for SNPs using SSCP and real-time PCR.” Presented as a poster at the Ohio Physiological Society Annual Meeting, held at the University of Cincinnati, College of Medicine, November 12, 2004.
- Kloenne, J.A., and **Krane, C.M.** “The global genomic effects of Aquaporin 5 deficiency on the gene expression of water channels, ion channels, and signal molecules in mouse lung.” Presented as a poster at the Ohio Physiological Society Annual Meeting, held at the University of Cincinnati, College of Medicine, November 12, 2004.
- Zimmerman, S.L., Staton, A.A., and **Krane, C.M.** “Identification of a common 3’ UTR haplotype in AQP5, a candidate gene for human asthma.” Presented as a poster at the American Society of Human Genetics Annual Meeting, held in Toronto, Ontario, Canada, October 26-30, 2004.
- Kishore, B.K., **Krane, C.**, Miller R.L., Shi, H., Hemmert, P.Z, and Nelson, R. “Altered expression of P2Y2 receptor mRNA and protein in inner medulla of hydrated and dehydrated rat kidneys: A novel arginine vasopressin-independent regulation of medullary collecting duct function.” Presented at the poster session of the 4th International Symposium of Nucleosides and Nucleotides held at the University of North Carolina Chapel Hill, NC, June 6-9, 2004.
- Kishore, B.K., Phan, H., Mauch, T.J., Shi, H., **Krane, C.** “Expression of P2Y2 receptor protein in embryonic mouse during organogenesis and differentiation: An immunohistochemical study.” Presented at the poster session of the 4th International Symposium of Nucleosides and Nucleotides held at the University of North Carolina Chapel Hill, NC, June 6-9, 2004.
- Goldstein, D., **Krane, C.**, Frisbie, J., and Rivera, K. “Aquaporins in an amphibian that accumulates glycerol during cold acclimation.” Presented at the Poster Session of the 2004 Experimental Biology Meeting, Washington DC, April 17-21, 2004.
- Zimmerman, S.L., and **Krane, C.M.** “Genetic analysis of the human AQP5 gene for potential asthma-predisposition alleles.” Presented at the Poster Session of the 2004 Experimental Biology Meeting, Washington DC, April 17-21, 2004.
- Zimmerman, S.L., **Krane, C.M.** “Mutation Screen Identifies SNPs within the AQP5 Gene of Human Asthmatic Patients”. Poster presentation at the University of Dayton Chapter of SIGMA XI, The Scientific Research Society winter meeting, January 6, 2004.
- Zimmerman, S.L., and **Krane, C.M.** “Mutation Screen Identifies SNPs within the AQP5 Gene of Human Asthmatic Patients.” Presented at the Poster Session of the Ohio Physiological Society Annual Meeting, Case Western Reserve University in Cleveland, OH, December 8, 2003.
- Kolber, B.J., Key, M., Chen, Y., Morris, M., and **Krane, C.M.** “Aquaporin 4 mRNA expression in mouse brain is induced in response to dehydration.” (2003) *The FASEB Journal*, 17(5): A919 (586.2). Presented at the Poster Session of the Experimental Biology 2003 Meeting, San Diego, CA, April 11-15, 2003.

- Nejsum, L.N., Kwon, T.-H., Fumagelli, O., Frokiaer, J., Agre, P., Menon, A.G., **Krane, C.M.**, and Nielsen, S. "AQP5 Is Present in the Apical Plasma Membrane of Rat and Mouse Sweat Glands, and Mice Deficient of AQP5 Have Significantly Reduced Sweat Secretion." Presented at the Poster Session of the Non-renal epithelial section at the American Society of Nephrology meeting, San Francisco, CA, October 13-17, 2001.
- Krane, C.M.**, Fortner, C., McGraw, D., Hand, A.R., Lorenz, J., Towne, J.E., and Menon, A.G. "Aquaporin 5 Deficient Mice are Hyperresponsive to Cholinergic-Stimulated Bronchoconstriction." Presented at the Poster Session of the Federation of American Societies for Experimental Biology 2001, Orlando FL, March 31-April 4, 2001.
- Merves, M., **Krane, C. M.**, Menon, A.G., and Choo, D. "Expression of aquaporins 1 and 5 in the developing mouse inner ear." Presented at the Association for Research in Otolaryngology MidWinter Meeting 2001, St. Petersburg Beach, FL, February 4-8, 2001.
- Kishore, B. K., Menon, A.G., and **Krane, C. M.** "Purinergic control of collecting duct water transport: A basis for vasopressin-independent regulation." Molecular Physiology of Renal Transport Post-ASN Meeting, held at the NIH Campus, Bethesda, MD. October 17, 2000.
- Kishore, B.K., Di Iulio, D., Menon, A.G., and **Krane, C.M.** "Altered Abundance and Subcellular Distribution of P2Y2-Purinoceptor Protein in Inner Medulla of Thirsted and Hydrated Rats: Possible Basis for Vasopressin-Independent Regulation of Water Transport." Presented at the 33rd Annual Scientific Meeting of the American Society of Nephrology in Toronto, Ontario, Canada, October, 2000.
- Towne, J.E., **Krane, C. M.**, Harrod, K., and Menon, A.G. "Regulation of AQP5 in murine lung epithelial cells by TNF- α ." Poster presentation at the MIP2000 International Conference on the Molecular Biology and Physiology of Water and Solute Transport held in Goteborg, Sweden, July 1-5, 2000.
- Kishore, B.K., **Krane, C.M.**, Cacini, W., Rouillard, P., and Sands, J.M. "Expression of aquaporin and urea transporter proteins in renal medulla during cisplatin-induced polyuria in rats." Poster presentation at the MIP2000 International Conference on the Molecular Biology and Physiology of Water and Solute Transport to be held in Goteborg Sweden, July 1-5, 2000.
- Kishore B.K., DiIulio, D., Menon, A.G., and **Krane, C. M.** "Expression of P2Y2-purinoceptor mRNA in renal medulla of thirsted and hydrated rats: Possible basis for AVP-independent regulation of water transport." Federation of American Societies for Experimental Biology 2000, San Diego, CA, April 15-18, 2000.
- Kishore B.K., LeBrun, M., Umanath, K., DiIulio, D., **Krane, C. M.**, and Beauchamp, Denis. "Dysregulation of apical Na-K-2Cl cotransporter (BSC1) and AQP3 in renal medulla of rats treated with low doses of gentamicin (GM)" Federation of American Societies for Experimental Biology 2000, San Diego, CA, April 15-18, 2000.
- Kishore, B.K., **Krane, C.M.**, Di Iulio, D., Menon, A.G., and Cacini, W. "Cisplatin(CP)-induced polyuria in rats is associated with down regulation of medullary collecting duct water channels AQP2 and AQP3."

Poster session of the 32nd Annual Meeting of the American Society of Nephrology, held in Miami Beach, FL, Nov. 5-8, 1999.

Kishore, B.K., **Krane, C.M.**, and Cacini, W. "Collecting duct aquaporins in a rat model of cisplatin-induced polyuria." Symposium on the Molecular Physiology of Renal Sodium, Urea, and Water Transporters, held on the NIH Campus, Bethesda, MD, November 3, 1999.

Amlal, H., Kishore, B., **Krane, C.**, and Soleimani, M. "Coordinated downregulation of Apical Na-K-2Cl Cotransporter and Aquaporin 2 (AQP-2) In Potassium Deprivation (KD): A Basis for Nephrogenic Diabetes Insipidus (DI). Poster session of the 31st Annual Meeting of the American Society of Nephrology, Pittsburg, PA, Oct. 25-28, 1998.

Krane, C.M. Attendee, Special Symposium on the "Molecular Physiology of the Urinary Concentrating Mechanism." Sponsored by NHLBI, Bethesda, MD. October 23, 1998.

Krane C.M. and Menon, A.G. "Using Mouse Models to Understand the Role of Aqp5, The Major Water Channel in the Lung." Poster session of the Program of Excellence of Molecular Biology of Heart and Lung Development meeting, National Heart Lung and Blood Institute, Bethesda, MD, May, 1998.

Krane, C.M. and Menon, A.G. "Generation of AQP1, AQP2, AQP3, and AQP5 Knockout Mice". Poster session of the Molecular Physiology of Water Transport, Paris, France, April, 1997.

Krane, C.M., Duffy, J., Shull, G., and Menon, A.G. "Water channels; Potential role in fluid volume regulation and blood pressure control". Poster session, POEMB meeting, MIT, Boston, MA, October, 1996.

Gerhard, D.S., **Smith, C.M.**, Zhu, S. "Isolation of the complete candidate region for multiple endocrine neoplasia, type 1 (MEN1) and the identification of transcribed sequences from within." Cold Spring Harbor Genome Mapping and Sequencing, May, 1996.

Zhu, S., **Smith, C.M.**, Gerhard, D.S. "Isolation of transcribed sequences from a YAC in the MEN1 region with exon amplification." Poster session, Molecular Genetics Retreat, Washington University School of Medicine, St. Louis, MO February 2, 1996.

Smith, C.M. and Gerhard, D.S. "Isolation of the MEN1 candidate region in YACs." Poster session, ASHG meeting, Minneapolis, MN, October 1995. Published abstract #1570, *Am. J. Hum. Genet.* Volume 57, Number 4, October, 1995.

Guida, L.C., **Smith, C.M.**, Charlton, P.A., Kerr, L., Schwartz, S., Munroe, D., Fiedorek, F.T., Gerhard, D.S., and Nicholls, R.D. "Fine resolution genetic mapping of galanin-GMAP (GALN) excludes a candidate gene for multiple endocrine neoplasia type 1 (MEN1)." Poster session, ASHG meeting, Montreal, Quebec, October 1994. Published abstract #1084, *Am. J. Hum. Genet.* Vol. 55, No. 3, September 1994.

Smith, C.M., Bora, P.S., Bora, N.S., Jones, C., and Gerhard, D.S. "Somatic cell hybrid and genetic localization of the gene encoding fatty acid ethyl ester synthase-III to 11q13 between D11S480 and FGF3." Published abstract #2073, *Am. J. Hum. Genet.* Vol. 55, No. 3, September 1994.

Note: ¹Papers published between 1994 and 1997 are authored under maiden name, C.M. Smith

Smith, C.M., Jones, C., and Gerhard, D.S. "C1NH and COX8 map greater than 48 kb apart in 11q12-13 by radiation-reduced somatic cell hybrid and YAC mapping." Poster session of the International Chromosome 11 meeting, St. Johns University, Oxford, England, September, 1994.

Smith, C.M., Lawrence, E., Wells, S.A., and Gerhard D.S. "Genetic analysis of ten new polymorphisms in 11q13 between CD20 and INT2." Poster session, ASHG meeting, New Orleans, LA. October 8, 1993. Published abstract #1080, *Am. J. Hum. Genet.* Vol. 53, No. 3, September 1993.

Smith, C.M., Lawrence, E., and Gerhard, D.S. "Construction of a YAC contig in 11q13." Poster session, Human Chromosome 11 Workshop, San Diego, CA. September 10, 1992.

Zucchi, I., Pilia, G., Little, R.D., Johnson, S., Yoon, J.Y., Reinbold, R., **Smith, C.**, and Schlessinger, D. "YAC-based contigs spanning Xq27.1-q28." Poster session, Cold Spring Harbor Genome Mapping and Sequencing, June, 1991.

2.) Invited Seminars

Krane, C.M. "Aquaporins and Molecular Water Transport". Invited guest lecture for the Molecular Physiology Course (ZOO 470/570) at Miami University, Oxford OH, March, 2009.

Krane, C.M. "Aquaporins: A Cell's Version of Indoor Plumbing." Department of Biology, Wooster College, Wooster, OH, February, 2009.

Krane C.M. "Aquaporins: A Cell's Version of Indoor Plumbing." Department of Human Biology, Kettering Medical Arts, Kettering OH, March 2009.

Krane, C.M. "A role for aquaporins in cold acclimation and freeze tolerance in Cope's gray treefrog, *Hyla chrysoscelis*." Kenyon College, Department of Biology, November, 2008.

Krane, C.M. "The Molecular Waterworks of the Lung: The Physiology and Molecular Genetics of Aquaporins". Invited seminar, Department of Biomedical Engineering, The Ohio State University, September, 2008.

Krane, C.M. "The Molecular Waterworks of the Lung: The Physiology and Molecular Genetics of Aquaporins". Invited seminar, Davis Heart & Lung Research Institute, The Ohio State University, August, 2008.

Krane, C.M. "Aquaporins and Molecular Water Transport". Invited guest lecture for the Molecular Physiology Course (ZOO 470/570) at Miami University, Oxford OH, March, 2008.

Krane, C.M. "A role for aquaporins in cold acclimation and freeze tolerance in Cope's gray treefrog, *Hyla chrysoscelis*." Northern Kentucky University, Department of Biology, September, 2007.

Krane, C.M., Zimmerman, S.L., Staton, A., Carroll, J., Azmeh, R., and Moredock, K.M. "Single nucleotide polymorphisms in the 3'UTR of the human aquaporin 5 gene affect gene expression." Oral presentation and published abstract at the 5th International Conference of Aquaporin, Nara, Japan, July 13-16, 2007.

Note: ¹Papers published between 1994 and 1997 are authored under maiden name, C.M. Smith

- Krane, C.M.** “A role for aquaporins in cold acclimation and freeze tolerance in Cope’s gray treefrog, *Hyla chrysoscelis*.” Wittenberg University, Department of Biology, Springfield, OH, November 13, 2006.
- Krane, C.M.** “Aquaporins and Molecular Water Transport”. Invited guest lecture for the Molecular Physiology Course (ZOO 470/570) at Miami University, Oxford OH, February, 2006.
- Krane, C.M.** “The Molecular Waterworks of the Lung: The Physiology and Molecular Genetics of Aquaporin 5”. Invited seminar, Department of Biology, Bowling Green State University, March 29, 2006.
- Krane, C.M.** “The Molecular Waterworks of the Lung: The Physiology and Molecular Genetics of Aquaporin 5”. Departmental seminar, Department of Biology, University of Dayton, April 22, 2005.
- Krane, C.M.** “Aquaporins and Molecular Water Transport”. Invited guest lecture for the Molecular Physiology Course (ZOO 470/570) at Miami University, Oxford OH, January 2005.
- Krane, C.M.** “The Molecular Waterworks of the Lung: The Physiology and Molecular Genetics of Aquaporin 5”. Invited departmental seminar, Department of Biology, Kent State University, Akron OH, October 7, 2004.
- Krane, C.M.** “Aquaporins and Molecular Water Transport”. Invited guest lecture for the Molecular Physiology Course (ZOO 470/570) at Miami University, Oxford OH, March 23, 2004.
- Krane, C.M.** “Role of Aquaporin 5 in Pulmonary Physiology and Pathophysiology: Insights from AQP5 Knockout Mice.” Invited seminar, presented at Wyeth Pharmaceuticals in Cambridge MA, September 26, 2003.
- Krane, C.M.** “Role of Aquaporin 5 in Pulmonary Physiology and Pathophysiology: Insights from AQP5 Knockout Mice.” Invited seminar, presented at North Eastern Ohio University College of Medicine, Rootstown, OH, April 28, 2003.
- Krane, C.M.** “Physiology of Human Asthma.” Invited seminar, presented to the American Lung Association of Ohio, *Breath of Hope Event*, Dayton, OH, May 1, 2003.
- Krane, C.M.** “Regulation of Lung Fluid and Pulmonary Mechanics: A Role for Water Channels.” Invited seminar, presented in the Pulmonary Division of the Department of Internal Medicine, at the University of Utah Salt Lake, Salt Lake City Utah, November 21, 2002.
- Krane, C.M.** “Mechanisms of Mammalian Fluid Homeostasis.” Invited guest speaker, The Ohio Physiological Society Annual Meeting, Athens OH, November 9, 2001
- Krane, C.M.** “The role of aquaporin 5 in the maintenance of mammalian fluid homeostasis.” Invited Seminar, Department of Physiology and Biophysics, Wright State University, Dayton, OH, September 13, 2001
- Krane, C.M.,** Melvin, J.E., Nguyen, H.V., Towne, J.E., Doetschman, T., and Menon, A.G. “AQP5 Deficient (-/-) Acinar Cells Have Decreased Membrane Permeability and Altered Cell Volume Regulation.” Invited

lecture at the MIP2000 International Conference on the Molecular Biology and Physiology of Water and Solute Transport, Goteborg, Sweden, July 1-5, 2000.

Krane, C.M. "Regulation of Fluid Homeostasis: A Role for the Aquaporin 5 Water Channel." Sunset Symposium, Program of Excellence in Molecular Biology of Heart and Lung Development. Vontz Center, University of Cincinnati, Cincinnati, OH, March 2000.

Krane, C.M. "Regulation of Fluid Homeostasis: A Role for the Aquaporin 5 Water Channel." University of Dayton, Department of Biology, Dayton, OH. February 10, 2000.

Krane, C.M. "Expression and Tissue Specific Regulation of Aquaporin 5, A Major Water Channel In Mouse Lung and Salivary Gland." Wright State University Department of Biological Sciences Seminar Series, Dayton, OH. May 24, 1999.

Krane, C.M. "The Human Genome Project-From DNA to Cloning Sheep: What does it all mean?" Science Apprenticeship Program (SAP) Wright State University, Dayton, OH. June 1997, 1998, 1999, February 2000.

Krane C.M. and Krane D.E. "Human Genetic Research and Practical Applications." American Association of University Women, Dayton, OH, April, 1997.

Krane, C.M. "Generation of Aquaporin Knockout Mice." Program of Excellence Seminar, University of Cincinnati, Department of Molecular Genetics, Biochemistry and Microbiology, Cincinnati, OH, February, 1997.

Smith, C.M. "Positional cloning of the MEN1 candidate region in 11q13." Program of Excellence Candidate seminar, University of Cincinnati, Cincinnati, OH, March, 1995.

Smith, C.M. "Positional cloning of the MEN1 candidate region in 11q13." Human Genetics Seminar Series, Department of Medicine, Washington University School of Medicine, St. Louis MO, March, 1995.

Smith, C.M. "Identification of transcripts in YAC contig located in 11q13 between PGA and PYGM." The 4th International Workshop on the Identification of Transcribed Sequences, Montreal, Quebec, October, 1994.

Smith, C.M. "Practical Applications of DNA Technology." Office of the Public Defender, St. Louis, MO, August 24, 1994.

Smith, C.M. "Genetic analysis of ten new polymorphisms in 11q13 between CD20 and INT2." Molecular Genetics Retreat, Washington University School of Medicine, St. Louis, MO, October 2, 1993.

C. Research in Progress

Introduction

Asthma is a relatively common, complex genetic disease, which has both inherited and environmental components. Moreover, it is likely that not just one or a few, but rather several genes interact together, and with the environment, to elicit the bronchoconstrictive response, a hallmark of clinical asthma. The physiology of hyperreactivity

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to bronchoconstriction involves many of the known players: the smooth muscle that narrows the airways making it difficult to breathe; the inflammatory cells that are releasing chemicals in response to an allergen—chemicals that elicit the smooth muscle response; receptors on smooth muscle cells that may not respond correctly to the signal to relax; and neurotransmitters and neurological responses that may not be directing the correct response. Recently, using physiological genomics, we were able to identify yet another player in this response—a water channel, that normally functions to help mediate the fluid environment around the cells of the airways, but when mutated, results in bronchial hyperreactivity. Taken together, it is easy to recognize the difficulty in dissecting apart the causes of asthma. Furthermore, the identification of the genes that in general, define complex traits like asthma is confounded by the integration of both environmental and genetic variables which are difficult to tease apart. Thus, the etiology of complex genetic disease remains an unconquered world, even in the post human genome sequencing era. Our ongoing studies examine the contribution of a novel and currently unexplored physiological mechanism of bronchoconstriction seen in conditions of asthma that involves the interplay between the fluid environment of the lung and an important molecule involved in cellular communication. The outcomes of this research will likely result in the characterization of fluid-mediated lung mechanics as it relate to cellular communication which may have implications to the diagnosis and treatment of lung pathologies in humans.

Background

Mammals have evolved an intricate method of sensing changes in the fluid environment that involve alterations in volume or concentration. Such changes are determined by environmental variables such as diet, health, hydration, injury, or stress. Complex physiological mechanisms have evolved to compensate for these changes either acutely, or chronically. Because fluid maintenance is essential for life, perturbations in both fluid volume and electrolyte concentrations involving mutations in water and electrolyte transporting channel molecules result in major human health problems such as hypertension, cardiovascular disease, respiratory distress syndrome in premature infants, chronic obstructive pulmonary disorder (COPD), cystic fibrosis, and asthma. Aquaporins (AQPs) are a family of water channels that provide a route for water transport across the plasma membrane of cells involved in absorptive or secretory processes, as well as in those cells that require the rapid, selective, and regulated movement of water. Of specific interest to the study of asthma is a member of this family, Aquaporin 5 (AQP5), and its functional role in mediating fluid regulatory mechanisms in the lung. AQP5 has recently been shown to be crucial in modulating bronchoconstrictive responses. Previous work using a genetically targeted mouse model in which the water channel Aquaporin 5 was deleted (Krane et al., *J. Biol. Chem.* 2001) showed that aquaporin 5 deficient mice are hyperresponsive to cholinergic-stimulated bronchoconstriction (Krane et al., *P.N.A.S.*, 2001). These data suggest a novel mechanism of water channel-mediated airway responsiveness, and indicate that AQP5 is required for normal airway response to agents that cause bronchoconstriction, a clinical feature of asthma. Interestingly, published genetic linkage studies identify regions of mouse chromosome 15, and human chromosome 12q in which the *Aqp5* gene locus resides as containing loci linked with hyperreactivity to bronchoconstriction and asthma. Thus, independently assessed physiological and genetic data strongly indicate that genetic mutations in the *Aqp5* gene that affect AQP5 function may be responsible for human asthma.

Approach #1: Genetic Analysis of the Aquaporin 5 Gene for Potential Asthma-Predisposition Alleles in Human Asthma Patients

Research Focus:

The objective of our studies is to determine the functional importance of a water channel, Aquaporin 5 (AQP5) in regulating fluid homeostasis in the context of whole animal physiology and pathophysiology. The insights gained from these studies have the potential to aid in the development of novel genetic and therapeutic resources for preventing and/or treating conditions of fluid dysregulation.

In work initiated and conducted at the University of Dayton, we have analyzed the human *Aqp5* gene from normal and asthma patient DNA for single nucleotide polymorphisms that may compromise AQP5 function and thus confer asthma pre-disposition. This research is designed to test the hypothesis that abnormal AQP5 expression and/or function will result in airway hyperresponsiveness under certain pathophysiological conditions, leading to the clinical manifestation of asthma. We characterized the sequence of the Aquaporin 5 gene in DNA from human asthma patients and normal controls for single nucleotide polymorphisms (SNPs) that may confer asthma predisposition. Sarah Zimmerman, a former PhD graduate student in my lab, screened the coding region, and 5' and 3' flanking regions of the

AQP5 gene. Several polymorphisms were identified in the AQP5 gene. Of potential functional significance, two AT-GC transition polymorphisms were identified in the 3' UTR of the AQP5 gene. The G-G allelic combination was found in linkage disequilibrium with a haplotype frequency of 9.5%/10.0%/6.0% in the asthmatic/ Caucasian/ African American populations. The second polymorphism alters a conserved adenosine residue located two nucleotides downstream of the polyadenylation-cleavage site which is considered to be critical in the formation of the polyadenylation complex. The AT-GC transition variant is located within the region of assembly of the polyadenylation complex and may be functionally important in the post-transcriptional regulation of the AQP5 gene. Over the long term, these results have the potential to provide critical information in the development of new treatments for acute and chronic diseases of aberrant fluid regulation in the lung. Abstracts co-authored by several undergraduates have been presented at local, national and international meetings. Most recently,

Approach #2: Mechanism of Fluid-Based Regulation of Lung Mechanics

We do not currently understand *how* AQP5 functions normally in the lung, and *why* disruptions in this water channel results in an asthma-like pathophysiological state in mice. The narrowing of airway diameter during bronchoconstriction is mechanically due to smooth muscle contraction. Therefore, it is not obvious why the disruption of AQP5, a gene expressed in the epithelial cell layer adjacent to the smooth muscle cell layer, results in smooth muscle hyperresponsiveness to bronchoconstriction. We know that the regulation of fluid-mediated lung mechanics is a complex process that involves many proteins and signaling molecules in the lung. AQP5 is only one of many players in this process. However, disruptions in any single molecule in a process can affect the function and regulation of many others involved in the same process. Therefore, we postulate that the absence of AQP5 expression results in changes in gene expression for other genes in the lung. We predict that some genes may be “turned on” or upregulated, whereas others may be “turned off” or downregulated in the lung, in an attempt to maintain overall homeostatic conditions in the lung. Moreover, some genes may undergo alternative post-translational modification. These changes in gene expression affect the ability of the lung (smooth muscle) to respond to stress, since the combination of genes required for optimal function has been altered to compensate for AQP5. However, the question remains; “What are the genetic perturbations or adaptations that are made as a result of the absence of AQP5?” Experimentally, we can exploit the AQP5 deficient mouse to identify known and novel genes that are involved in the functional role of AQP5. We are currently using state of the art tools to examine the transcriptome and proteome of the lungs of mice deficient in AQP5. We have used microarrays to examine transcriptional profiling and have identified approximately 300 genes whose expression is up or downregulated more than 3 fold in the presence/absence of AQP5. Undergraduates have generated the majority of results on this project. Casey McDonald, a former MS student, identified several proteins by 2D gel electrophoresis which are differentially regulated in AQP5 knockout mice. We are currently collaborating with a group at OSU to identify the nature of these proteins. The results of this work are likely to help us to identify the important players responsible for mediate normal and abnormal lung mechanics. We anticipate that the identification of these proteins will lead us to a better understanding of the physiological basis of fluid mechanics in the lung. In the long-term, these results may provide novel and improved drug targets for the treatment and diagnosis of asthma.

Ongoing Collaborative Research: The following briefly describes ongoing collaborations and undergraduate/graduate student involvement in research opportunities.

David Goldstein, PhD, Chair, Department of Biology, Wright State University, Dayton, OH

In 2002, I entered into a research collaboration with Dr. David Goldstein at WSU to clone and characterize aquaglyceroporins from tree frogs (*Hyla chrysoscelis*). We were recently awarded a \$420K grant from the NSF to support this collaborative work. A manuscript describing the cloning, tissue expression, and thermal regulation of three aqua/aquaglyceroporins in *H. chrysoscelis*, is currently in press in the *American Journal of Physiology*. A copy of this paper is included in the supplemental folder. Former UD PhD graduate student Sarah Zimmerman, and former UD undergraduate Kevin Rivera are co-authors on this paper. Undergraduate student Alison Staton is acknowledged for her technical assistance. In addition, we have co-authored several abstracts that were presented as posters at Experimental Biology Meetings in 2004-2006.

Melisa Ho, PhD, Research Scientist, Wyeth Pharmaceuticals, Boston, MA

In 2003, Melisa Ho, PhD, a research scientist from Wyeth Pharmaceuticals, Boston MA contacted me with regard to interest in the AQP5 story as it relates to asthma. Since that time, we have entered into a formal collaborative agreement, sharing ideas, experimental results and reagents prepared at the University of Dayton to pursue questions of the role of aquaporins in the lung. Our collaborative work has resulted in the submission of a co-authored abstract presented as a poster at the 2005 Experimental Biology meeting held in San Diego, CA. A co-authored manuscript describing the results of this work has been re-submitted to *Cytokine*. Casey McDonald, a former MS student in my lab is a co-author on this paper, and undergraduate Premed major Julie Carroll, and biology majors Anne Klapheke and Emily Kitchin are acknowledged for her technical assistance.

Bellamkonda K. Kishore, M.D., PhD, Research Associate Professor, University of Utah, Salt Health Science Center, Salt Lake City, Utah

B.K. Kishore is a long-time collaborator. We have continued our very productive collaboration by co-authoring a published manuscript, two peer-reviewed topical reviews, and several abstracts presented at meetings as oral presentations. I also serve as a consultant on his NIH grant 5R01DK061183-04 “P2U(P2Y2)-PURINOCEPTOR AND WATER TRANSPORT IN RAT KIDNEY”. Two co-authored papers in the field of fluid transport regulation in the kidney are in preparation.

INTERDISCIPLINARY COLLABORATION: Khalid Lafdi, UDRI and Roger Wills, PhD, UDRI

In May, 2005, I entered into a collaborative pilot project with Dr. Roger Wills of UDRI and Dr. Andrew Sarangan, UD Optoelectronics to examine the use of oxide nanotubes as vectors in DNA transfer into mammalian cells. Preliminary results lead to the submission of an R21 exploratory grant from the NIH, in February 2006 which was not funded.

INTERDISCIPLINARY COLLABORATION: Margaret Pinnell, PhD, UD Mechanical Engineering and Ethicon Endo-Surgery Inc.

In December, 2005, I entered into a collaborative pilot project with Dr. Margaret Pinnell, Mechanical Engineering, and Ethicon Endo-Surgery Inc. We recently completed interdisciplinary work on a contract (\$67K) with Ethicon Endo-Surgery which includes two undergraduate students (Mercedes Thompson, Premedicine major, and Courtney Gardner, Chem Engineering major) and the use of the NEST facilities. A second phase of funding (\$115K) was awarded for 2007-2008. Undergraduate Biology majors Anne Klapheke and Emily Kitchin and Chemical Engineering students Kevin Timms, Eric Whitney, and Courtney Gardner participated in this research.

D. Creative Arts: Artistic Exhibitions, Performances, Composition: Does not apply.

E. Grants and Contracts

1. External Research Grants (Awarded)

2005-2009 **Title:** “Aquaporins and osmoregulation in freeze-tolerant amphibian.”
 Funding Agency: NSF
 Date Submitted: January 12, 2005
 Role: Co-Principal Investigator
 Status: Awarded, 4 years

2004-2008 **Title:** “Role of Aquaporin 5 (AQP5) in Lung Fluid Homeostasis”
 Funding Agency: NIH/NHLBI: Academic Research Enhancement Award Program
 Date Submitted: September 25, 2003
 Role: Principal Investigator
 Status: Awarded, 4 years

2002-2004 **Title:** “Genetic Analysis of the Aquaporin 5 Gene for Potential Asthma-Predisposition Alleles in Human Asthma Patients”
 Funding Agency: American Lung Association
 Date Submitted: November, 2001
 Role: Principal Investigator
 Status: Awarded, 2 years

2. Industrial Contracts (Awarded):

2008-2009 **Title:** “Assessing the feasibility of intraluminal ultrasonic tissue welder.”
 Funding Agency: Ethicon Endosurgery
 Date Submitted: July, 2008
 Role: Co-Principal Investigator
 Status: Awarded

2007-2008 **Title:** “Assessing the causes of variability in seal quality and tissue changes resulting from the use of the Ethicon harmonic R surgical system.”
 Funding Agency: Ethicon Endosurgery
 Date Submitted: May, 2007
 Role: Co-Principal Investigator
 Status: Awarded, 15 months

2006-2007 **Title:** “Assessing the causes of variability in seal quality and tissue changes resulting from the use of the Ethicon harmonic R surgical system”
 Funding Agency: Ethicon Endosurgery
 Date Submitted: May, 2006
 Role: Co-Principal Investigator
 Status: Awarded, 1 year

3. Internal Research Grants (Funded):

2008 **Title:** “Integrating Synergistic Research Opportunities for Graduate and Undergraduate Research Projects in Bioengineering”
 Funding Agency: 2008 Graduate School Faculty Fellows Program
 Date Submitted: March 14, 2008
 Role: Co-Principal Investigator
 Status: Awarded, 3 months

2005 **Title:** “Oxide Nanotubes”
 Funding Agency: OBR
 Date Submitted: May 2005
 Role: Co-Principal Investigator
 Status: Awarded

- 2004 **Title:** “Functional Analysis of a Human Water Channel Nucleotide Variant”
Funding Agency: Research Counsel Seed Grant, University of Dayton
Date Submitted: November, 2003
Role: Principal Investigator
Status: Awarded
- 2003 **Title:** “Characterization of the Physiological Mechanisms Involved in Lung Function”
Funding Agency: Women’s Center Summer Research Grant Program, University of Dayton
Date Submitted: March 10, 2003
Role: Principal Investigator
Status: Awarded
- 2003 **Title:** “Expression Profiling of Mouse Transcripts Involved in Lung Fluid Regulation”
Funding Agency: Research Counsel Seed Grant, University of Dayton
Date Submitted: October, 2002
Role: Principal Investigator
Status: Awarded
- 2002 **Title:** “Mechanism of Fluid-Based Regulation of Lung Mechanics”
Funding Agency: Research Counsel Seed Grant, University of Dayton
Date Submitted: November, 2001
Role: Principal Investigator
Status: Awarded
- 4. External Research Grants (Submitted):**
- 2009-2012 **Title:** “Regulation and role of aquaporins in freeze-tolerant amphibian.”
Funding Agency: NSF
Date Submitted: January, 2009
Role: Co-Principal Investigator
Status: Pending
- 2010 **Title:** “Ex vivo bioprocess fluid flow system for assessment of host-implant interactions.”
Funding Agency: NIH/SBIR
Date Submitted: April 3, 2009
Role: Senior/Key Personnel
Status: Pending
- 5. External Research Grants (Not Funded):**
- 2009 **Title:** “Regulation of aqua/glyceroporins in freeze-tolerant amphibian.”
Funding Agency: NSF
Date Submitted: July, 2008
Role: Co-Principal Investigator
Status: Not Funded
- 2006 **Title:** Deoxyribonucleic Acid-Based Sensors CBT
Funding Agency: U.S. Army Research Office
Date Submitted: June, 2006

Role: Consultant
Status: Not Funded

- 2006 **Title:** Biomimetically formed silica nanoparticles as nucleic acid delivery vehicles
Funding Agency: NIH/NIGMS
Date Submitted: February 18, 2006
Role: Principal Investigator
Status: Not funded
- 2005 **Title:** The Unique Mechanisms of Biological Responses to Bioactive Nanostructures
Funding Agency: NSF Nanoscale ID Res. Team (NIRT), ANN Program
Date Submitted: November 29, 2005
Role: Co-Principal Investigator
Status: Not funded
- 2005 **Title:** Post-Transcriptional Analysis of 3'UTR Nucleotide Variation in the Aquaporin 5 Gene
Funding Agency: NSF: MCB-Genes and Genome Systems
Date Submitted: July 12, 2004
Role: Principal Investigator
Status: Not Funded
- 2003 **Title:** "Mechanisms of Aquaporin-Mediated Mammalian Fluid Homeostasis: Aquaporins in RAS-Mediated AVP Regulation."
Funding Agency: National Kidney Foundation
Date Submitted: April 10, 2003
Role: Principal Investigator
Status: Not Funded
- 2002 **Title:** "Mechanism of AQP5-Dependent Airway Responsiveness"
Funding Agency: Sandler Program for Asthma Research
Date Submitted: February, 2002
Role: Principal Investigator
Status: Not Funded
- 2002 **Title:** "Mechanism of AQP5-Dependent Regulation of Smooth Muscle Tone"
Funding Agency: National Science Foundation Faculty Early Career Development Grant
Date Submitted: July, 2002
Role: Principal Investigator
Status: Not Funded

6. Internal Education Grants (Funded):

- 2008 **Title:** "Interdisciplinary Biological Systems Engineering as a Model for Curricular Development in Bioengineering"
Funding Agency: LTC Innovations Grant
Date Submitted: January 2008

Role: Co-PI
Status: Awarded

2001 **Title:** “Implementation of Experiential and Interactive Tools for Enhanced Student Learning in Physiology”
Funding Agency: Fund for Educational Development Grant, University of Dayton
Date Submitted: October, 2001
Role: Principal Investigator
Status: Awarded

7. External Education Grants (Not Funded):

2007 **Title:** Interdisciplinary Biological Systems Engineering as a Model for Curricular Development in Bioengineering
Funding Agency: Proctor and Gamble Higher Education Fund
Date Submitted: October 2007
Role: Co-PI (submitted with Dr. Robert Wilkens, Associate Professor, CME)
Status: Not funded.

2005 **Title:** Computational Life Science and Undergraduate Research
Funding Agency: HHMI Undergraduate Science Education Competition, 2006
Date Submitted: October 17, 2005
Role: Program Faculty Participant
Status: Not Funded

2001 **Title:** “Undergraduate Biology Research Program”
Funding Agency: Howard Hughes Medical Institute 2002 Undergraduate Biological Sciences Education Program
Date Submitted: October, 2001
Role: Co-Author of the proposal; UBRP Corporate Coordinator
Status: Not Funded

F. Patents and Inventions:

Invention Disclosure:

Title: Aquaporin-5(AQP5) Knock-Out Mouse Model
Inventors: Anil Menon and Carissa Krane
Invention Disclosure Number: 103-057

G. Membership in Learned Societies

American Association for the Advancement of Science	1998-Present	Member
American Physiological Society	1998-Present	Member
American Society of Human Genetics	1996-Present	Member
Federation of American Societies for Experimental Biology	1998-Present	Member

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Ohio Physiological Society	2000-Present	Member
Sigma Xi	2003-Present	Member

H. Meetings of Professional Associations:

Federation of American Societies for Experimental Biology, American Physiological Society Annual Meeting, April, 2008, San Diego, CA, *Poster Presentation, Attendee.*

The 5th International Conference of Aquaporin, July 2007, Nara Japan, *Oral Presentation, Attendee.*

Federation of American Societies for Experimental Biology, American Physiological Society Annual Meeting, April, 2007, Washington DC, *Poster Presentation, Attendee.*

Tri-Beta Regional Meeting, University of Dayton, April, 2007, *Attendee.*

115th Annual Ohio Academy of Science Annual Meeting, University of Dayton, April, 2006. *Co-chair, presenter, All-Academy Lecturer host, and Nano-symposium organizer.*

Federation of American Societies for Experimental Biology, American Physiological Society Annual Meeting, April, 2006, San Francisco, CA. *Attendee.*

American Society of Human Genetics Annual Meeting, October, 2005 in Salt Lake City, UT. *Attendee.*

Project Kaleidoscope (PKAL) Faculty for the 21st Century National Assembly. Representative for the College of Arts and Sciences, Department of Biology. Meeting held in Dallas, TX, October 15-17, 2004.

Ohio Physiological Society, November 12, 2004, UCCOM, Cincinnati, OH. *Poster presentations, Attendee.*

Federation of American Societies for Experimental Biology, American Physiological Society Annual Meeting, April, 2004, Washington DC, *Poster Presentation, Attendee.*

Federation of American Societies for Experimental Biology, American Physiological Society Annual Meeting, April, 2003, San Diego, CA. *Poster presentation, Attendee.*

Ohio Physiological Society, November 15, 2002, NEOUCOM, Rootstown, Ohio. *Attendee.*

Federation of American Societies for Experimental Biology, American Physiological Society Annual Meeting, April, 2002, New Orleans, LA. *Attendee.*

Ohio Physiological Society, November 9, 2001, Ohio University, Athens, Ohio. *Invited Speaker, Attendee*

Federation of American Societies for Experimental Biology, American Physiological Society Annual Meeting, April, 2001, Orlando, FL. *Award Recipient, Poster Presentation, Attendee.*

MIP2000 International Conference on the Molecular Biology and Physiology of Water and Solute Transport, Goteborg, Sweden, July 1-5, 2000. *Invited Speaker, Attendee.*

Sunset Symposium, Program of Excellence in Molecular Biology of Heart and Lung Development. Vontz Center, University of Cincinnati, Cincinnati, OH, March 2000. *Invited Speaker, Attendee.*

I. Honorary Degrees, Professional Honors & Awards

- 2009 Recipient of 2008 Outstanding Teaching Award in the College of Arts and Sciences, University of Dayton.
- 2005 Elected Honorary member of Alpha Epsilon Delta, the Premedical Honor Society by undergraduate student members, for recognition of teaching, mentorship, and advising, as a premedical advisor; University of Dayton, May, 2005.
- 2003 Elected an Honorary member of Beta Beta Beta, the Biological Honor Society by undergraduate student members, in recognition of outstanding teaching and service; University of Dayton, December 5, 2003.
- 2001 Caroline tum Suden/Frances A. Hellebrandt Professional Opportunity Award for Meritorious Research, American Physiological Society, Women in Physiology Committee, awarded at the Federation of American Societies in Experimental Biology annual meeting, 2001, Orlando FL.

J. Leave of Absence:

May 16-December 31, 2008, Sabbatical Leave
 February 28-May 15, 2005, Maternity Leave of Absence

III. Performance of Non-Instructional Duties:

A. General Service

1. **Academic Administration:** None

2. **Non-Academic Administration** (such as offices in scholarly or professional organizations):

<u>Name of Organization</u>	<u>Position</u>	<u>Nature of Duties</u>	<u>Date</u>
Sigma Xi, UD Chapter	Past President	Awards Committee	2007-2008
Sigma Xi, UD Chapter	President	Programming, Member recruitment	2006-20007
Sigma Xi, UD Chapter	Vice-President	Programming Awards Committee	2005-2006
Sigma Xi, UD Chapter	Treasurer	Finances, Plan and organize Banquet and Poster Sessions	2003-2005

3. **University-wide committees**

<u>Name of committee</u>	<u>Dates</u>
Hull Fellowship Review Panel	2008
Honors Thesis Review Committee	2008-present
Berry Scholar Interviewer	2007
Bioengineering Working Group	2007-2008
First-Year Reading (Price of a Dream) Facilitator	2007
Bioengineering Search Committee	2007-2008

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Honors and Scholars Task Force	2006-2008
First-Year Reading (<u>Enough</u>) Facilitator	2006
IACUC, Chair	2006-Present
IACUC Vivarium Subcommittee, Chair	2006-Present
Ohio Academy of Science 2006 Meeting, Co-Chair	2005-2006
Center for Tissue Regeneration Steering Committee	2005-Present
University of Dayton, Teaching Fellow	2002-2003
Midterm Instructional Diagnosis Facilitator	2002-2004
Faculty Advisor, Student Service Organization: Healing Hearts	2002-2007
Graduate Faculty Status	2002-Present

4. College Committees

<u>Name of Committee</u>	<u>Dates</u>
JAMS Selection and Interview Committee	2006-Present
Biochemistry Search Committee	2006
College of Arts and Sciences Spring Open House	2006-2007
Project Kaleidoscope: Faculty for the 21 st Century: Representative: Biology Department	2004-2005
Pre-Medical Advising Committee	2002-Present
Pre-Medical Scholarship Subcommittee	2002-2004
Advisory Committee, Louis Stokes Alliances for Minority Participation (LSAMP)	2004-2006
LSAMP Mentor	2004-2007

5. Departmental Committees

<u>Name of Committee</u>	<u>Dates</u>
Departmental Bylaws Subcommittee	2008-Present
Community Ecology Search Committee	2007-2008
Environmental Ecology Search Committee	2007-2008
Chair, Biology Dept Retreat	2007
Cell Biology Search Committee	2006-2007
Chair, BS/MS Committee	2006-2008
Chair, Undergraduate Curriculum/Assessment	2006-Present
Chair, Career Development Committee	2006-Present
Biology Representative to Honors Convocation	2006
Biology/Sociology Panel Participant, Dr. Troy Duster	2005
Graduate Recruitment Committee	2004-2006
Biology Dept. Web Content Committee	2004-2005
Physiology/Cell Biology Faculty Search Committee	2004-2005
Host, 2003 Nobel Laureate in Chemistry, Dr. Peter Agre	2003
UD Open House Biology Department Representative	2003-2007
Ad Hoc MS/PhD Bypass Committee	2003
Careers in Biology Seminar Series Coordinator	2002-Present
Graduate Assessment Committee	2002-2005, 2008-Present
Graduate Admissions Committee	2001-2007, 2008-Present

Chair, Undergraduate Recruitment Committee	2003-2007
Undergraduate Recruitment Committee	2001-2003
Chair, Tactics and Strategy for Undergrad Recruitment: Subcommittee	2002-2003
Ad Hoc Graduate Grievance Committee	2002
Bioinformatics Faculty Search Committee	2002
Undergraduate Curriculum Assessment Committee	2001-2002

6. Non-University Committees (governmental, educational, etc.)

<u>Agency</u>	<u>Nature of Work</u>	<u>Dates</u>
US EPA	EPA STAR Grant Reviewer	2004
NSF	Ad Hoc Grant Reviewer	2007-present
NSF	Grant Reviewer	2007-present
NIH	Grant Reviewer	2008-present

7. Other Activities on Behalf of the University

Co-Host, Sigma Xi sponsored Distinguished Speaker, Dr. Vivian Pinn. March 7, 2008.

Faculty Development Workshop: “Balancing the demands of teaching, service and research”. Invited panelist, September 2007.

Breakfast with the Deans’. Invited speaker—research and scholarship, October, 2007.

Honors/Scholars Program Special Programming: Graduate school selection, admissions, and what to expect. Invited panelist, May 2007, October 2007.

Faculty Advisor for Service Outreach Projects in Physiology. Collaboration between the Dayton Public Schools and the UD chapter βββ students. 2002-2003.

Faculty Exchange Seminar: “Impact of the Human Genome Project on Scholarship and Learning” Co-presented with David Wright, PhD (Biology), and Shirley Wright, PhD (Biology) November 5, 2001.

Special Topics Seminar: “Physiology of Addiction”, Special Seminar Presented by Cheryl Smith, R.N. from Turning Point Miami Valley Hospital, October 19, 2001 Organized for BIO 403, BIO403L, AED, and βββ students.

B. Professional Activities in the Community (consultative work, public speaking, community and professional organizations, etc.) Name the group and indicate the extent of your participation.

Miami Valley Tech Fest Volunteer, “Physiology in Action”, Sinclair Community College, Dayton, OH February 21-22, 2004

Invited Guest Speaker, Dayton Honors Seminar, University of Dayton, 1999-2005, 2007

Note: ¹Papers published between 1994 and 1997 are authored under maiden name, C.M. Smith

Invited Guest Speaker, STREAMS Program, for Minority Student Involvement in Science, Wright State University, July 1997-2005.

Invited Guest Speaker, Science Apprenticeship Program, for Minority Student involvement in Science, Wright State University, July 1997-2001

C. Student Teaching/Mentorship information:

1. Peer-Reviewed Teaching Papers

Krane, C.M. A Capstone Experiential Learning Exercise for Undergraduate Physiology Laboratory Courses. (2005) *Advances in Physiology Education*, **29**(4):208-210.

2. Honorary Degrees/Awards by Student Groups for Teaching, Mentorship and Service

2005 Elected Honorary member of Alpha Epsilon Delta, the Premedical Honor Society by undergraduate student members, for recognition of teaching, mentorship, and advising, as a premedical advisor; University of Dayton, May, 2005.

2003 Elected an Honorary member of Beta Beta Beta, the Biological Honor Society by undergraduate student members, in recognition of outstanding teaching and service; University of Dayton, December 5, 2003.

3. Undergraduate Advising and Mentorship:

Berry Scholar/Honors Thesis Advisor

- | | |
|-----------|--|
| 2007-2008 | Kaitlin Moredock, "Expression of Aqp1 and Aqp4 in choroid plexus, astrocytes, and hippocampus in a transgenic mouse model of Alzheimer's Disease." |
| 2007-2008 | Peter Amaya, (Co-thesis advisor with Dr. Robert Wilkens, CME), "An investigation of the rheological properties of selected blood substitutes and the thermal conductivity of porcine blood vessels." |
| 2003-2006 | Alison Staton, "Plasma Membrane Protein Expression of Cholinergically-Stimulated AQP5-Deficient Mice." |
| 2003-2005 | Ryan Farrell, "The Impact of AQP5 Deficiency on Global Protein Expression in Mouse Lung." |
| 2002-2005 | Julie Kloenne, "The Global Genomics Effects on Aquaporin 5 Deficiency on the Gene Expression of Water Channels, Ion Channels, and Signal Molecules in Mouse Lung." |
| 2003-2004 | Kristen Debes, "The Development of a Rat Model to Investigate Pelvic Organ Prolapse." Research conducted in the laboratory of Dr. Pamela Moalli, Magee Women's Hospital, Pittsburgh, PA. |

2002-2004 Stacy Smoltz, “Functional Genomic Analysis of Global Gene Expression Changes in Aquaporin 5 Deficient Mice.”

Honors Students Symposium Presentations

- 2008 Kaitlin Moredock, “Aquaporin-4 Expression is Altered Around the Lateral Ventricle in Correlation with Beta Amyloid Plaque Expression in a Transgenic Mouse Model of Alzheimer’s Disease.”
- 2008 Peter Amaya, “Properties of Arteries and Blood and Their Potential Impact on Ultrasonic Scalpel Performance.”

Undergraduate Student Laboratory Mentorship

2008-present Danyell Lewis (PSS)
2008-present Ellen Vanderburgh (HSS)
2008-present Matthew Puccetti (BIO/CHM)
2008-present Shannon Hallinan (BIO)
2008-present Alice Begovich (CME)
2007-present Eric Whitney (CME)
2007-present Kevin Timms(CME)
2007-2008 Andrea Varney (BIO)
2007-2008 Peter Amaya (CME)
2007-2008 Anne Klapheke (BIO)
2006-2008 Emily Kitchin (BIO)
2006-2008 Kaitlin Moredock (BIO/PSY)
2006-2008 Courtney Gardner (CME)
2007 Zenar Tekeste (LSAMP)
2007 Katie Klopp (BIO)
2006-2007 Mercedes Thompson (MED)
2005-2007 Roua Azmeh (BIO)
2005-2006 Julie Carroll (MED)
2003-2006 Alison Staton (BIO)
2003-2005 Ryan Farrell (BIO)
2002-2005 Julie Kloenne (BIO)
2002-2004 Stacy Smoltz (BIO)
2002-2004 Kristin Debes (BIO)
2001-2003 Benedict Kolber (BIO)
2001-2003 Katherine Kopec (BIO)
2001-2003 Sarah Maggio (BIO)
2001-2003 Melissa Piechowski (BIO)
2002-2003 Nicholas Varvel (BIO)
2001-2002 Lisa Bauer (BIO)
2001-2002 Mark Rastetter (BIO)
2001-2002 Katie Ford (BIO)
2001-2002 Suzanne Sunnenberg (BIO)

Learn Lead and Serve Award Mentor

- 2009-2010 Matthew Puccetti, “Frozen Frogs, Lunch Club, and Summer Camp: Integrating STEM Leadership, Service, and Research”
Funded, \$2500
- 2005-2006 Sarah Edwards, “The role of p53 in Tax induced Tumors.”
Funded, \$2500.
- 2004-2005 Alison Staton, “Maintenance of fluid equilibrium: Effects of Aquaporin 5 deficiency on ion channel expression.”
Funded, \$2500.
- 2003-2004 Stacy Smoltz, “Functional Dynamics of Lung Mechanics.”
Funded, \$2500.
- 2002-2003 Benedict Kolber, “Experiential Learning in Physiology: Neurological Control Mechanisms in Fluid Equilibrium.”
Funded, \$2255.
- 2002-2003 Nicholas Varvel, “Effects of tonicity on the physiology of smooth muscle.”
Funded, \$2000.
- 2001-2002 Mark Rastetter, “The role of Aquaporin 5 in Murine Lung Homestasis.”
Funded, \$2500.

Faculty Advisor: UD Annual Stander Symposium Undergraduate Research Forum

- 2009 Jared Crasto
2009 Kevin Timms
2008 Anne Klapheke
2008 Eric Whitney
2008 Kevin Timms
2008 Emily Kitchin
2008 Jeff James
2008 Kaitlin Moredock
2008 Courtney Gardner
2008 Peter Amaya
2007 Mercedes Thompson (MED)
2007 Courtney Gardner (CME)
2007 Kaitlin Moredock (BIO)
2007 Roua Azmeh (BIO)
2006 Sarah Edwards (BIO)
2006 Alison Staton (BIO)
2006 Julie Carroll (MED)
2005 Sarah Edwards (BIO)

- 2005 Ryan Farrell (BIO)
- 2005 Aaron Fields (BIO)
- 2005 Julie Kloenne (BIO)
- 2005 Alison Staton (BIO)
- 2004 Stacy Smoltz (BIO)
- 2004 Kristen Debes (BIO)
- 2004 Colleen Droste (BIO)
- 2003 Benedict Kolber (BIO)
- 2003 Melissa Piechowski (BIO)
- 2003 Sarah Maggio (BIO)
- 2003 Nicholas Varvel (BIO)
- 2002 Lisa Bauer (BIO)
- 2002 Kara Stencel (BIO)
- 2002 Mark Rastetter (BIO)
- 2001 Andrew Weise (BIO)

Undergraduate Student Awards

- 2008 John E. Dlugos, Jr. Memorial Award of Excellence to the Outstanding Senior Majoring in Biology awarded to graduating Senior, Kaitlin Moredock, for research conducted in my laboratory. Kaitlin was also the recipient of the Mann Award from the College of Arts and Sciences for top graduating senior in the College.
- 2008 Sigma Xi Undergraduate Award for Research Excellence, awarded to Kaitlin Moredock for research conducted in my laboratory.
- 2008 P.K. Bajpai Award for Undergraduate Research Excellence Awarded to Graduating Senior, Anne Klapheke, for her research project conducted in my research laboratory.
- 2007 John C. Johnson Award for Excellence in Student Research, 2nd Place, presented to Kaitlin Moredock, for her poster entitled, “Nucleotide polymorphisms in the human aquaporin 5 gene affect gene expression” presented at the Tri-Beta Regional Conference, held at the University of Dayton, April, 2007.
- 2007 American Physiological Society Undergraduate Summer Research Fellowship Award to Kaitlin Moredock for her the research proposal entitled “Expression of AQP1 and AQP4 in choroid plexus, astrocytes, and hippocampus in a transgenic mouse model of Alzheimer’s Disease” for research performed in my research laboratory.
- 2007 P.K. Bajpai Award for Undergraduate Research Excellence Awarded to Graduating Senior, Roua Azmeh, for her research project conducted in my research laboratory.
- 2006 John E. Dlugos, Jr. Memorial Award of Excellence to the Outstanding Senior Majoring in Biology awarded to graduating Senior, Alison Staton, for research conducted in my laboratory. Alison was also co-recipient of the Mann Award from the College of Arts and Sciences for top graduating senior in the College.

- 2006 Sigma Xi Undergraduate Award for Research Excellence, awarded to Alison Staton for research conducted in my laboratory.
- 2005 Stander Symposium “Best Poster in the Biomedical Sciences” Award to Alison Staton for her poster entitled, “Using SSCP and Real-Time PCR to Screen the Human Aquaporin 5 Gene” for work conducted in my research laboratory
- 2005 P.K. Bajpai Award for Undergraduate Research Excellence Awarded to Graduating Senior, Ryan Farrell, for honors thesis research project conducted in my research laboratory
- 2005 P.K. Bajpai Award for Undergraduate Research Excellence Awarded to Graduating Senior, Julie Kloenne, for honors thesis research project conducted in my research laboratory
- 2004 John J. Comer Biomedical Undergraduate Research Award to the Undergraduate Student who Best Demonstrated Research Excellence in the ‘Biomedical Sciences’ as a Biology Major, Awarded to Graduating Senior Stacy Smoltz, for honors thesis research project conducted in my research laboratory
- 2004 American Physiological Society Summer Undergraduate Research Fellowship Award to Alison Staton for her the research proposal entitled “Maintenance of fluid equilibrium: Effects of aquaporin 5 deficiency on ion channel expression” for research performed in my research laboratory.
- 2004 Stander Symposium Outstanding Research Award Exemplifying Student Faculty Collaboration for poster entitled “Global gene expression changes on lung mechanics from AQP5 deficiency” awarded to Stacy Smoltz for her thesis research project conducted in my research laboratory.
- 2003 P.K. Bajpai Award for Undergraduate Research Excellence Awarded to Graduating Senior, Nick Varvel, for independent research project conducted in my research laboratory
- 2003 John E. Dlugos, Jr. Memorial Award of Excellence to the Outstanding Senior Majoring in Biology awarded to graduating Senior, Benedict Kolber, for research conducted in my laboratory. Ben was also the co-recipient of the Mann Award from the College of Arts and Sciences for the top graduating senior in the college.
- 2003 Stander Symposium Poster Presentation Award, awarded to Melissa Piechowski for her independent research project conducted in my research laboratory
- 2002 American Physiological Society Summer Undergraduate Research Fellowship Award to Benedict Kolber for research proposal entitled “Methods of Aquaporin homeostasis: A link between Aquaporins and RAS mediated AVP regulation” for research performed in my research laboratory.
- 2002 P.K. Bajpai Award for Undergraduate Research Excellence Awarded to Graduating Senior, Mark Rastetter for independent research project conducted in my research laboratory 2001-2002

Undergraduate Student Advising:

Winter 2001: 16 Biology Majors

Fall	2001:	17 Biology Majors
Winter	2002:	29 Biology Majors
Fall	2002:	6 Premed Majors, 28 Biology Majors
Winter	2003:	8 Premed Majors, 32 Biology Majors
Fall	2003:	10 Premed Majors; 32 Biology Majors
Winter	2004:	8 Premed Majors; 28 Biology Majors
Fall	2004:	10 Premed Majors; 21 Biology Majors
Winter	2005:	10 Premed Majors; 21 Biology Majors
Fall	2005:	17 Premed Majors; 13 Biology Majors
Winter	2006:	17 Premed Majors; 13 Biology Majors
Fall	2006:	55 Premed Majors; 13 Biology Majors
Winter	2007:	22 Premed Majors; 24 Biology Majors
Fall	2007:	68 Premed Majors; 20 Biology Majors
Winter	2008:	22 Premed Majors; 24 Biology Majors
Fall	2008:	Sabbatical Leave
Winter	2009:	22 Premed Majors; 24 Biology Majors

4. Graduate Student Advising and Mentorship:

Doctoral Dissertation

2007 Zimmerman, Sarah “Molecular Genetic and Functional Analyses of Aquaporins In Vivo and In Vitro”. Defended April, 2007, PhD degree awarded in May 2007.

Masters Thesis

2006 McDonald, Casey “Analysis of lung protein expression in Aquaporin 5 knockout and IL-13 treated asthmatic mouse models”. Defended in August, 2006, MS degree awarded in August, 2006.

Graduate Student Awards:

2009 PhD Candidate, Venkateshwar Mutyam, UD Graduate Student Summer Fellowship Award for the proposal entitled “Changes in the expression levels of Aquaporins/Glyceroporins lead to altered freeze tolerance in Cope’s gray treefrog *Hyla chrysoscelis*.”

2009 PhD Candidate Venkateshwar Mutyam, The Graduate Teaching Award of Excellence to a Teaching Assistant for Outstanding Teaching of Advanced Biology Laboratory Classes, Awarded by the UD Biology Department.

2009 PhD Candidate Venkateshwar Mutyam, The John J. Comer Graduate Student Research Award of Excellence to the Biology Graduate Student who best demonstrated research excellence in the Biomedical Sciences, Awarded by the UD Biology Department.

2008 PhD Candidate, Venkateshwar Mutyam, UD Graduate School Dean’s Summer Fellowship Award for the proposal entitled, “DNA variations within the human Aquaporin 5 water channel gene may alter gene expression.”

- 2006 PhD Candidate, Sarah Zimmerman, Invited attendee to the 47th Annual Short Course in Medical and Mammalian Genetics, held in Bar Harbor, ME, July, 2006.
- 2006 MS Candidate, Casey McDonald, UD Graduate Student Summer Fellowship Award for the proposal entitled, “Cytoplasmic protein expression and membrane composition of mice lacking aquaporin-5 in lung tissue.”
- 2006 PhD Candidate, Sarah Zimmerman, UD Graduate Student Summer Fellowship Award for the proposal entitled, “Characterization of three novel members of the MIP family identified in *Hyla chrysoscelis*.”
- 2005 MS Candidate, Casey McDonald, UD Graduate Student Summer Fellowship Award for the proposal entitled, “Protein expression of mice lacking water channels in lung tissue.”
- 2005 PhD Candidate, Sarah Zimmerman, UD Graduate Student Summer Fellowship Award for the proposal entitled, “Expression Analysis of a Common 3’UTR Polymorphism within the Human AQP5 Gene.”
- 2004 PhD Candidate, Sarah Zimmerman, UD Graduate Student Summer Fellowship Award for the proposal entitled, “Functional Analysis of 3’ UTR Nucleotide Variants within the Human Aquaporin 5 Water Channel Gene.”
- 2003 PhD Candidate, Sarah Zimmerman, UD Graduate Student Summer Fellowship Award for the proposal entitled, “Physiological Mechanisms of Airway Disease.”
- 2003 MS Candidate, Lara Barnett, UD Graduate Student Summer Fellowship Award for the proposal entitled, “Mechanism of Fluid-Based Regulation of Lung Mechanics.”
- 2002 PhD Candidate, Sarah Zimmerman, UD Graduate Student Summer Fellowship Award for the proposal entitled, “Physiological Mechanisms of Airway Disease.”
- 2002 MS Candidate, Lara Barnett, UD Graduate Student Summer Fellowship Award for the proposal entitled, “Mechanism of Fluid-Based Regulation of Lung Mechanics.”

Graduate Faculty Mentor:

- 2007-Present Venkateshwar Mutyam, PhD candidate
 2001-2007 Sarah Zimmerman, Doctoral Degree, May 2007
 2004-2006 Casey McDonald, Masters of Science Degree, August 2006
 2001-2003 Lara Barnett, Masters of Science candidate

Graduate Advisory Committee Member:

- 2008-Present WSU PhD candidate, Robert Wysong
 2007-Present WSU MS candidate, Yang Gao
 2006-Present PhD candidate, Tracy Collins
 2007 PhD candidate, Lei Jiang
 2006-2008 MS candidate, Meagan Roddy
 2004-2006 PhD candidate, Amy Beumer
 2003-2006 PhD candidate, Mindy Call

- 2003-2006 PhD candidate, Chris Noriega,
 2001-2006 PhD candidate, Vandana Sharma
 2001-2006 PhD candidate, Laura Stolle
 2001-2006 PhD candidate, Matthew Grogg
 2001-2005 MS candidate, Nicole Humston
 2001 PhD candidate, Jim Kerschen
 1998 Qualifying Exam Committee Member, Doctoral Candidate, Susan Foley, Graduate Program in
 Molecular Genetics in Nursing, University of Cincinnati, College of Nursing, Cincinnati, OH

Graduate Student Stander Symposium Advisor:

- 2009 Venkateshwar Mutyam “DNA mutations within the Human Aquaporin 5 water channel gene may alter gene expression.”
- 2006 Sarah Zimmerman “MIP Family Memembers in Cope's Grey Tree Grog Hyla Chrysoscelis Exhibit Tissue-Specific and Thermal Sensitive Gene Regulation.”
- 2005 Sarah Zimmerman “Polymorphisms identified in the Human AQP5 Gene of Human Asthma Patients.”

5. Teaching Overview

Interdisciplinary Course

CME499/585 & BIO 596 Transport Phenomena in Biological Systems

A team taught course in Biological Systems Engineering geared for upper level undergraduate/graduate students is being co-developed by Dr. Robert Wilkens, Associate Professor, CME, and Dr. Carissa Krane, Associate Professor, BIO. The course will cover the three core areas of Transport Phenomena (Momentum, Heat, and Mass) as applied to two key biological systems: the respiratory system and cardiovascular system. The pedagogical teaching/learning approaches will include didactic lectures, class discussions, Jig Saw peer instruction, class projects, experiential learning and laboratory experimentation. The learning outcomes will support cross-training of scientists in the language and mechanistic approaches employed by engineers, whereas engineering students will be exposed to the terminology and scientific methods associated with physiological and biomedical processes. In addition to cross-training, students will be taught to work in multidisciplinary teams and how to apply a systems approach to problem solving through integrative hands-on experiential and experimental laboratory exercises. The design and implementation of the course will serve as a model for the development of an interdisciplinary team-based curriculum in bioengineering. The faculty teaching this course will report the outcomes of the approaches used, the learning outcomes, the advantages/limitations of the model, and curricular recommendations to faculty in the related fields through workshops and publications. The target student population is a blend of upper level undergraduate and graduate students in science and engineering whose majors or degrees are in chemical engineering, mechanical engineering, bioengineering, biology, chemistry, biochemistry and premedicine. The anticipated number of students in the class is 45. Student learning will be improved by a hands-on laboratory experience, applying systems thinking, and learning from other majors. Further, they will be actively engaged in peer and instructor facilitated learning at a high level which emphasizes content integration. The course itself will leave a lasting impact on the respective departments as a model of how to address advanced coursework in such a highly technical subject area while also establishing a permanent course in bioengineering. Educational grant support for the development of this course is partially funded through the LTC Innovations Grant Program.

Courses Taught at the University of Dayton

BIO 403 “Physiology I”, 3 credit hour lecture course. Jr/Sr level elective for BIO, EVB, MED, DEN, BCM, CME, PSY majors.

BIO 403L “Physiology Laboratory”, 1 credit hour laboratory course. Jr/Sr level elective for BIO, EVB, MED, DEN, BCM, CME, PSY majors.

BIO 404 “Physiology II”, 3 credit hour lecture course. Jr/Sr level elective for BIO, EVB, MED, DEN, BCM, CME, PSY majors.

BIO 312 “Genetics”, 3 credit hour lecture course. Sophomore level requirement for BIO, EVB, E11 majors; elective for MED, DEN and other majors.

BIO 299 “Sophomore Seminar”, 1 credit hour sophomore level required course for BIO and EVB majors.

BIO 420 “Senior Seminar”, 1 credit hour senior level required course for BIO and EVB majors.

BIO 421 “Biological Problems”, 1 credit hour BIO major independent research project.

BIO 477 “Honors Thesis: Independent Research”, 3 credit hour honors thesis supervision.

BIO 478 “Honors Thesis: Independent Research”, 3 credit hour honors thesis supervision.

BIO 596/CME499/CME 595 “Transport Phenomena in Biological Systems”

BIO 596 “Mechanisms of Fluid Homeostasis”, 2 credit hour graduate seminar course.

BIO 596 “Physiological Genomic Analysis of Complex Disease”, 1 credit hour graduate seminar course.

BIO 596 “Proteomics and Physiology”, 2 credit hours, graduate seminar course

BIO 422 “Cystic Fibrosis in Perspective: Clinical Features, Genetics, Prenatal Diagnosis, and Genetic Counseling”, 2 credit hour course, BIO major permission only, undergraduate independent study course.

BIO 422 “Special Topics in Physiology”, 1 credit hour course, BIO major permission only, undergraduate independent study course.

BIO 601 “Graduate Seminar”, 1 credit hour graduate seminar course

Courses Taught at Wright State University, Department of Biology, Dayton, OH:

BIOL 421/701 “Human Genetics For Educators and Health Professionals”, 3 credit hours for Non-Biology Majors, Spring Quarter, Wright State University, Department of Biological Sciences, Dayton, OH. 1998-2000

BIOL 426/626 "Human Molecular Genetics", 4 credit hours for Biology Majors, Spring Quarter, Wright State University, Department of Biological Sciences, Dayton, OH. 1999-2000.