

## Melissa A. DeMotta, PhD (Fleegal)

Biology Department  
Clarke University  
1550 Clarke Drive  
Dubuque, IA 52001  
Phone: (563) 588-6376  
E-mail: [melissa.demotta@clarke.edu](mailto:melissa.demotta@clarke.edu)

103 Jule Ave  
East Dubuque, IL 61025  
Cell: (618) 975-2851  
Home: (815) 554-0113  
E-mail: [mfleegal@gmail.com](mailto:mfleegal@gmail.com)

### EDUCATION:

PhD	2002	Physiology and Pharmacology Advisor: Dr. Colin Sumners	University of Florida College of Medicine Gainesville, FL 32610
<u>Dissertation Title:</u> Angiotensin II modulation of neuronal intracellular signaling cascades regulates short-term and long-term physiological responses			
	2000	Physiology Course	Marine Biological Laboratory Woods Hole, MA
	1996-1997	Non-Degree	Penn State University College Of Medicine Hershey, PA 17033
BS	1994	Biology	Lebanon Valley College North College Avenue Annville, PA 17003

### ACADEMIC POSITIONS

2015-present	Associate Professor, Clarke University, Biology Dept.
2008-2015	Assistant Professor, Clarke University, Biology Dept.
2007-2008	Research Assistant Professor, St. Louis University, Dept. Internal Medicine, Division of Geriatrics
2006-2008	Postdoctoral Fellow, St. Louis University, Dept. Internal Medicine, Division of Geriatrics, Advisor: William A. Banks, PhD
2003-2006	Postdoctoral Fellow, University of Arizona, Dept. Medical Pharmacology, Advisor: Thomas P. Davis, PhD
2002-2003	Postdoctoral Fellow, University of Florida, Dept. Physiology and Functional Genomics, Advisor: Colin Sumners, PhD
1997-2002	Graduate Assistant, University of Florida, Interdisciplinary Program in Biomedical Sciences: Physiology and Pharmacology, Advisor: Colin Sumners, PhD

### EMPLOYMENT POSTIONS

1994-1997	Jr. Research Technician, Penn State University, College of Medicine, Dept. Anesthesia, Employers: Dr. Ralph Lydic, PhD and Dr. Helen Baghdoyan, PhD
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### TEACHING EXPERIENCE:

#### College and University Teaching

2014-present	Instruct the Introduction to Life Sciences (Biol 101) course for education majors. Clarke University, Dubuque, IA.
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2013-present Instruct courses and laboratory exercises in Biology of the Human Body (Biol 102 and Biol 102L) to non-Biology major students. Clarke University, Dubuque, IA.

2012, 2015-present Instruct Transitions 101 course for incoming freshman. Clarke University, Dubuque, IA.

2008-present Instruct courses and laboratory exercises in Human Physiology (Biol-420 and Biol-420-L) to upper level undergraduates and physical therapy graduate students. Clarke University, Dubuque, IA.

2008-present Instruct courses and laboratory exercises in Exercise Physiology (Biol-425 and Biol-425-L) to upper level undergraduates and physical therapy graduate students. Clarke University, Dubuque, IA.

2008-present Instruct Introduction to Cell Biology and Genetics laboratory course for freshman interested in biology, biochemistry, athletic training and physical therapy. Clarke University, Dubuque, IA.

2013-2015 Instruct a Research Methods course (Biol 486) for upper level biology students. Clarke University, Dubuque, IA.

2008-2012 Instruct courses and laboratory exercises in Neuroscience (Biol-445 and Biol-445-L) and to upper level undergraduates and physical therapy graduate students. Clarke University, Dubuque, IA.

2007-2008 Physiology Instructor: Lecture in "Human Physiology" (PPY254). Lecture on basic human physiology, specifically endocrinology, reproduction, gastrointestinal physiology and metabolism. Course is a requirement for nursing and health professions undergraduates. Saint Louis University, St. Louis, MO.

2007-2008 Physiology Instructor: Give lectures in the course "Drugs We Use and Abuse". Lecture on the physiological effects of different drugs. This course meets a science requirement at Saint Louis University for undergraduate non-science majors. Saint Louis University, St. Louis, MO.

2005-2006 Biology and Chemistry, Adjunct Faculty: Teach "Introduction to Human Anatomy and Physiology". Lecture on basic biology and chemistry subjects to undergraduate and continuing education students. Pima Community College, Tucson, AZ.

2004-2006 Medical Pharmacology: Led discussions based on clinical cases for Graduate and Medical Students in the Medical Pharmacology course at the University of Arizona

2003-2006 Basic Laboratory Training, Molecular Biology Techniques, Tissue Culture Techniques for undergraduates working in the Davis Laboratory. University of Arizona.

2002 Signal Transduction: Taught MAPK signaling in advanced level course for the IDP program at University of Florida

2002 Signal Transduction First Year Core Course: Led discussions based on journal articles on signal transduction for first year IDP students at the University of Florida

1994 Pre-biology course Assistant, Lebanon Valley College: For all incoming students majoring in biology. Was a short course giving all incoming students the necessary biological background to enter the General Biology course.

1992-1994 Tutor for Biology and Chemistry, Lebanon Valley College. Involved both group and individual tutoring for biology and chemistry students.

1991-1993 General Biology Laboratory Assistant, Lebanon Valley College. Involved in setting up and teaching biology labs to undergraduate students in biology.

**Outside Teaching**

2005 Basic Research Statistics. Advanced Science Research Course, Mr. Tim Barry, Instructor, Salpointe High School, Tucson, AZ. Gave lecture on basic statistics for life and physical science research. Met individually with students to assist with statistical analysis of results.

2004-2005 Molecular Biology and Tissue Culture Techniques. Advanced Science Research Course, Mr. Tim Barry, Instructor, Salpointe High School, Tucson, AZ. Gave basic lecture on molecular biology and tissue culture techniques.

**SERVICE**

**UNIVERSITY SERVICE:**

2012-present Institutional Review Board, Clarke University

2016 Cornerstone Summer Taskforce

2016 Meneve Dunham Committee

2013-2015 Program Array Committee, Clarke University

2011-2013 Natural Sciences Division Representative, Advising Committee, Clarke University

2009-2014 Natural Sciences Division Representative, Honors Committee, Clarke University

2010-2011 Chair, Faculty Development Committee, Clarke University

2009-2011 Faculty Development Committee, Clarke University

2000-2002 Department Graduate Student Representative, Dept. of Physiology and Functional Genomics, University of Florida

1999-2002 Graduate Student Representative, College of Medicine Sexual Harassment Committee, University of Florida

1993-1994 Student Representative, Honors Class of 1994, Lebanon Valley College

**DEPARTMENTAL SERVICE**

2010-present Biology Club, Advisor  
2008-present Mary Murphy Lecture Series Committee

#### **COMMUNITY SERVICE**

2014-present Treasurer, Cub Scout Pack 14, East Dubuque, IL.  
2013-present Member of Education Board, St. Peter Lutheran Church, Dubuque, IA.  
2010-present Clarke University Annual STEM Day, Clarke University, Dubuque, IA.  
2008-present Human Body Bee, Clarke University, Dubuque, IA.

#### **PROFESSIONAL EXPERIENCE**

##### **GRANTS AND FELLOWSHIPS**

2016 National Science Foundation. NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM). Title: BIO Connections. PI: Melissa DeMotta. Co-PI: Shaun Bowman. Amount: \$650,000, Submitted: May 2016.

2014 Clarke University Summer Research Grant. Title: APS Institute of Teaching and Learning: Conference to learn and develop new strategies for teaching physiology. Funded.

2014 National Science Foundation. IUSE Grant Application (DUE-TUES Type 1 project). Title: STEM Pathways. PI: Melissa DeMottaDeMotta. Co-PI: Karen Glover. Amount: \$292,889, Submitted: February 2014. Not funded. Plan to resubmit.

2012 National Science Foundation. NSF-STEP Grant Application. Title: Clarke University Steps to Success. PI: Judy Munshower. Co-PI: Sheila Castaneda, Melissa DeMotta, Diana Malone. Amount: \$395,760, Submitted: December 2012. Not funded.

2011 Clarke University Summer Research Grant  
Title: Development of Case Studies to Aid Human Physiology Students in their Understanding and Analysis of Material, Critical Thinking and Application of Knowledge

2004-2007 NRSA Postdoctoral Fellowship (NINDS)  
Title: Effects of Ang II and hypoxia on the blood-brain barrier

2004 American Heart Association Postdoctoral Fellowship (Pacific Mountain Affiliate); Title: Effects of Ang II and hypoxia on the blood-brain barrier

2000-2002 NRSA Predoctoral Fellowship (NIMH)  
Title: Angiotensin II stimulated neuronal Fos and Jun kinase

2000-2002 University of Florida Graduate Fellowship for Outstanding Research

1999-2000 American Heart Association Graduate Student Fellowship (Florida/Puerto Rico Affiliate); Title: Angiotensin II stimulated Fos

and Jun kinase signaling pathways in neurons: Role in norepinephrine synthesis

1999 Medical Guild Mini Grant, University of Florida.

## **STUDENT GRANTS**

2012-13 McElroy Research Grant. Granting Agency: Iowa College Foundation. Title: Does the Nintendo Wii Fit program improve your health? A comparison of traditional cardiovascular exercise and video game exercise on  $VO_{2max}$ , resting RER, resting heart rate and muscle strength. Author: Kaveria Allen. Faculty Advisor: Melissa DeMotta. Not Funded.

2012-13 McElroy Research Grant. Granting Agency: Iowa College Foundation. Title: A Comparison of the Omega-3 Fatty Acids EPA, DHA, and ALA in their Abilities to Decrease Inflammation Associated with Multiple Sclerosis. Author: Leah Fern. Faculty Advisor: Melissa DeMotta. Not Funded.

2011-12 McElroy Research Grant. (Iowa College Foundation) Title: Focus Formula and Methylphenidate Effects on Dopamine Transporter and Receptor Levels in Rat Cortical Neurons. Author: Keysha Schmit. Faculty Advisor: Melissa DeMotta. Funded

## **AWARDS & ACHIEVEMENTS**

2000 Caroline Tum Suden/Frances A. Hellebrandt Professional Opportunity Award for research presented at the FASEB Meeting in San Diego, CA

2000 Scholarship to attend the Physiology Course at the Marine Biological Laboratory in Woods Hole, MA

1994 Graduated with Honors, Lebanon Valley College

1993-1994 Who's Who Among Students in American Universities and Colleges, Lebanon Valley College

1993 Medical Scholarship Award, Lebanon Valley College

1990-1994 Presidential Leadership Scholarship, Lebanon Valley College

## **MEMBERSHIPS**

1996-present Society for Neuroscience

1999-present American Physiological Society

2009-present Iowa Physiological Society

1992-1994 Beta Beta Beta Biological Honor Society

## **MEETINGS ATTENDED**

The APS Institute on Teaching and Learning, June 20-14, 2016, Madison, WI.

The APS Institute on Teaching and Learning, June 23-27, 2014, Bar Harbor, ME.

Clarke Student Academic Conference, April 30, 2014, Clarke University, Dubuque, IA.

Third Annual Iowa Statewide STEM Conference. March 28, 2014, Des Moines, IA.

FASEB Summer Research Conference. Neural Mechanisms in Cardiovascular Regulation. July 14-19, 2013, Gleneden Beach, OR.

Clarke Student Research Conference, April 26, 2013, Clarke University, Dubuque, IA. (Kaveria Allen presented her Capstone Research.)

Service-learning and Civic Engagement as Engaged Scholarship: Benefits to your Work, Students, Institution, Community - and You!, April 12, 2013, Clarke University, Dubuque, IA

Iowa Physiological Society Annual Meeting, September 29, 2012, Des Moines University, Des Moines, IA.

The Teaching Professor Annual Conference, June 1-3, 2012, Washington, D.C.

McElroy Student Research Symposium, May 3, 2012, Wartburg College, Waverly, IA.

Upper Midwest Honors Conference, April 12-14, 2012, Clarke University, Dubuque, IA.

The Teaching Professor Annual Conference, May 20-22, 2011, Atlanta, GA.

Iowa Physiological Society Annual Meeting, October 9, 2010, Des Moines University, Des Moines, IA.

American Chemical Society: Illinois-Iowa Section Dinner and Seminar, April 28, 2010, Clarke College, Dubuque, IA.

Iowa Physiological Society Annual Meeting, Drake University, Des Moines, IA, May 2, 2009.

Young Professionals Symposium (2<sup>nd</sup> Annual Meeting), Sponsored by Young Professionals of Dubuque, November 13, 2008.

#### **ONLINE COURSES, WEBINARS AND WORKSHOPS**

Workshop on using Brainshark and Camtasia, Clarke University, June 4, 2013.

Magna Online Seminar, "Considering the Courage and Practice of Teaching", January 7, 2013.

Sloan-C Online Seminar, "Increasing Feedback & Decreasing Workload", June 12, 2012.

Magna Online Seminar, "Active Learning that Works: What Students Think", May 8, 2012.

Online Seminar, "Using Collaboration Technologies to Engage Students of All Ages & Experience", May 22, 2012.

American Institute of Biological Sciences Webinar "But There's No Room! Designing Syllabi to Incorporate Cases", February 26, 2010.

#### **INVITED TALKS:**

1. **Fleegal, MA**, LK Borg, I Butler and TP Davis. Differential regulation of protein kinase C following hypoxia and post-hypoxic reoxygenation in endothelial cells of the blood-brain barrier. 7<sup>th</sup> symposium of "Signal Transduction in the Blood-brain Barrier", Potsdam, Germany, 2004.

#### **INVITED REVIEWS AND BOOK CHAPTERS:**

1. Sumners, C, **MA Fleegal**, and M Zhu. Angiotensin AT<sub>1</sub> receptor signalling pathways in neurons. *Clin Exp Pharmacol Physiol* 29(5-6): 483-90, 2002.
2. **Fleegal, MA**, S Hom and TP Davis. Molecular modulation of the blood-brain barrier during stroke, 387-408. In "The Blood-Brain Barrier and its Microenvironment", E. de Vries and A. Prat, Ed., Taylor and Francis, New York, 2005.

#### PEER REVIEWED JOURNAL ARTICLES:

1. Roth, MT, **MA Fleegal**, R Lydic, and HA Baghdoyan. Pontine acetylcholine release is regulated by muscarinic autoreceptors. *NeuroReport* 7: 306, 1996.
2. Baghdoyan, HA, R Lydic, and **MA Fleegal**. M2 muscarinic autoreceptors modulate acetylcholine release in the medial pontine reticular formation. *J Pharmacol Exp Ther* 286: 1446-1452, 1998.
3. Busche, S, S Gallinat, **MA Fleegal**, MK Raizada, and C Sumners. Novel role of macrophage migration inhibitory factor in angiotensin II regulation of neuromodulation in rat brain. *Endocrinology* 142(11): 4623-30, 2001.
4. Marcus, J, SL Karackattu, **MA Fleegal**, and C Sumners. Cytokine-stimulated inducible nitric oxide synthase expression in astroglia: role of mitogen activated protein kinases and nuclear factor-kappaB. *Glia* 41(2): 152-60, 2003.
5. **Fleegal, MA**, and C Sumners. Drinking behavior elicited by central injection of Angiotensin II: Roles for protein kinase C and Ca<sup>2+</sup>/calmodulin dependent protein kinase II. *Am J Physiol Regul Integr Comp Physiol* 285(3): R632-40, 2003.
6. **Fleegal, MA**, and C Sumners. Angiotensin II induction of AP-1 in neurons requires stimulation of PI3-K and JNK. *Biochem Biophys Res Commun* 310(2):470-477, 2003.
7. **Fleegal, MA**, S Hom, LK Borg and TP Davis. Activation of PKC modulates blood-brain barrier endothelial cell permeability changes induced by hypoxia and post-hypoxic reoxygenation. *Am J Physiol Heart Circ Physiol* 289(5): H2012-9, 2005.
8. Hom, S, **MA Fleegal**, RD Egleton, CR Campos, BT Hawkins and TP Davis. Comparative changes in blood-brain barrier and cerebral infarction in SHR and WKY rats. *Am J Physiol Regul Integr Comp Physiol*, 292 (5): R1881-92, 2007.
9. Banks, WA, S Dohgu, R Nakaoke, JL Lynch, **MA Fleegal-DeMotta**, MA Erickson, and TQ Vo. Nitric oxide isoenzymes regulate LPS-enhanced insulin transport across the blood-brain barrier. *Endocrinology*, 149(4):1514-23, 2008.
10. **Fleegal-DeMotta, MA**, S Dohgu and WA Banks. Angiotensin II modulates BBB permeability via activation of the AT<sub>1</sub> receptor in brain endothelial cells. *J Cereb Blood Flow Metab* 29: 640-47, 2009
11. Jaeger, LB, S Dohgu, R Sultana, JL Lynch, JB Owen, MA Erickson, GN Shah, TO Price, DA Butterfield, **MA Fleegal-DeMotta** and WA Banks. Lipopolysaccharide alters the blood-brain barrier transport of amyloid  $\beta$  protein: A mechanism for inflammation in the progression of Alzheimer's disease. *Brain, Behavior and Immunity* 23: 507-517, 2009.
12. Jaeger, LB, S Dohgu, MC Hwang, SA Farr, MP Murphy, **MA Fleegal-DeMotta**, JL Lynch, SM Robinson, ML Niehoff, SN Johnson, VB Kumar and WA Banks. Testing the neurovascular hypothesis of Alzheimer's disease: LRP-1 antisense reduces blood-brain barrier clearance and increases brain levels of amyloid-beta protein and impairs cognition. *J Alzheimers Dis* 17(3): 553-70, 2009.

13. Ali, AK, WA Banks, VB Kumar, GN Shah, JL Lynch, SA Farr, **MA Fleegal-DeMotta** and JE Morley. Nitric Oxide activity and isoenzyme expression in the senescence-accelerated mouse p8 model of Alzheimer's disease: Effects of anti-amyloid antibody and antisense treatments. *J Gerontol A Biol Sci Med Sci* 64: 1025-30, 2009.
14. Dohgu, S, **MA Fleegal-DeMotta** and WA Banks. Lipopolysaccharide-enhanced transcellular transport of HIV-1 across the blood-brain barrier is mediated by luminal microvessel IL-6 and GM-CSF. *J Neuroinflammation*. 2011 Nov 30;8(1):167, doi:10.1186/1742-2094-8-167, 2011.

## ABSTRACTS

1. Capece, ML, **MA Fleegal**, HA Baghdoyan, and R Lydic. The regulation of arousal states by transmembrane signal transduction systems altering pontine cholinergic neurotransmission. *Association of University Anesthesiologists Abstracts*: 62, 1995.
2. Capece, ML, **MA Fleegal**, HA Baghdoyan, and R Lydic. Transmembrane signal transduction systems mediating cholinergic REM sleep generation. *Society for Neuroscience Abstracts* 21: 2068, 1995.
3. Roth, MT, **MA Fleegal**, R Lydic, and HA Baghdoyan. Muscarinic autoreceptors modulate acetylcholine (ACh) release in cat medial pontine reticular formation (mPRF). *Society for Neuroscience Abstracts* 22: 1988, 1996.
4. Capece, ML, **MA Fleegal**, HA Baghdoyan, and R Lydic. Cyclic AMP and protein kinase A in the pontine reticular formation contribute to cholinergic rapid eye movement (REM) sleep generation. *Society for Neuroscience Abstracts* 22: 374, 1996.
5. Kshatri, AM, **MA Fleegal**, HA Baghdoyan, and R Lydic. Cholinomimetics, but not morphine, evoke antinociception from pontine reticular regions generating REM sleep. *Society for Neuroscience Abstracts* 23: 2132, 1997.
6. Baghdoyan, HA, **MA Fleegal**, and R Lydic. Acetylcholine (ACh) release in the medial pontine reticular formation (mPRF) is regulated by M2 muscarinic autoreceptors. *Society for Neuroscience Abstracts* 23: 2131, 1997.
7. Lydic, R, **MA Fleegal**, C Burak, and S Mortazavi. NMDA channel blockers applied to the medial pontine reticular formation (mPRF) decrease acetylcholine (ACh) release, inhibit REM, and depress respiratory rate. *Society for Neuroscience Abstracts* 24 1998.
8. **Fleegal, MA** and C Sumners. Angiotensin II (Ang II) stimulates c-Jun NH2-Terminal Kinase (JNK) via a phosphatidylinositol 3-kinase (PI3K) dependent pathway. *FASEB J* 14: 442.14, 2000.
9. **Fleegal, MA** and C Sumners. Angiotensin II (ANG II) stimulates neuronal c-Jun expression and c-Jun NH<sub>2</sub>-Terminal Kinase (JNK) via different intracellular signaling pathways. *Society for Neuroscience Abstracts* 26: 149.18, 2000.
10. Busche, S, S Gallinat, **MA Fleegal**, MK Raizada and C Sumners. Angiotensin II increases expression of macrophage migration inhibitory factor (MIF) in rat brain neurons. *FASEB J* 15: 632.2, 2001.
11. **Fleegal, MA** and C. Sumners. Angiotensin II activation of CdC42 involves a phosphatidylinositol 3-kinase dependent pathway in neurons. *Society for Neuroscience Abstracts* 27: 43.4, 2001.
12. Broxson, CS, RS Erdem, **MA Fleegal**, A Pachori, PJ Scarpace, C Sumners, MJ Katovich and N Tumer. Angiotensin II reduces adrenal medullary tyrosine hydroxylase and dopamine beta hydroxylase gene expression, in vivo, in rats. *Society for Neuroscience Abstracts* 27: 837.11, 2001.



13. **Fleegal, MA** and C Sumners. Drinking induced by CNS injection of Angiotensin II involves activation of PKC and CAMKII. *Society for Neuroscience Abstract Viewer/Itinerary Planner*, 42.14, 2002, CD-ROM.
14. **Fleegal, MA**, W Zheng and C Sumners. Ang II stimulation of the AP-1 transcription factor involves activation of PI3-K and JNK. 2003 Experimental Biology meeting abstracts [on CD-ROM]. *FASEB J*, 17: 73.9, 2003.
15. **Fleegal, MA** and C Sumners. Neuronal intracellular signaling molecules and the angiotensin II-induced drinking response. 2003 Experimental Biology meeting abstracts [on CD-ROM]. *FASEB J*, 17: 588.3, 2003.
16. **Fleegal, MA**, S Hom, LK Borg and TP Davis. Hypoxia and Hypoxia/Reoxygenation Differentially Regulate PKC Expression in Endothelial Cells of the BBB. 2005 Experimental Biology meeting abstracts [on CD-ROM]. *FASEB J* 19: 126.7, 2005.
17. Hom, S, RD Egleton, **MA Fleegal**, CR Campos and TP Davis. Alterations in NHE-1 ion transporter expression and ischemic brain infarct volume during development in a genetic model of hypertension. 2005 Experimental Biology meeting abstracts [on CD-ROM]. *FASEB J* 19: 126.9, 2005.
18. **Fleegal, MA**, C Quigley, RD Egleton, H Brooks and TP Davis. Hypoxia and post-hypoxic reoxygenation alter mRNA expression of claudin-1,-3 and -5 in endothelial cells of the BBB. 2006 Experimental Biology meeting abstracts [on CD-ROM]. 2006
19. Hawkins, BT, **MA Fleegal**, G McCaffrey, and RD Egleton. Contributions of hyperglycemia and gelatinase activity to increased blood-brain barrier permeability in experimental diabetes. *Society for Neuroscience Abstracts*, 2006.
20. **Fleegal-DeMotta, MA**, S Doghu, and WA Banks. Angiotensin II modulates TEER and <sup>125</sup>I-albumin permeability in endothelial cells of the BBB. 7<sup>th</sup> Cerebral Vascular Biology International Conference Program and Abstracts, 182, 2007.
21. Doghu, S, **MA Fleegal-DeMotta**, and WA Banks. Transcellular transport of HIV-1 across the blood-brain barrier enhanced by lipopolysaccharide: The role of brain endothelial cell-derived IL-6 and GM-CSF and p38 mitogen activated protein kinase (MAPK) signaling pathway. 7<sup>th</sup> Cerebral Vascular Biology International Conference Program and Abstracts, 233, 2007.
22. Schmit, K and **MA DeMotta**. The Effects of Focus Formula™ and Methylphenidate on Dopamine Transporters and D<sub>2</sub> Receptor Expression in Cell Cultured Rat Cortical Neurons. 2011-12 R.J. McElroy Student/Faculty Research Symposium, 2012.