

Date: September 27, 2018

PERSONAL

Charles A. Downs PhD, ACNP-BC, FAAN

HIGHER EDUCATION

University of Arizona	PhD	08/2011
University of Alabama at Birmingham	MSN	05/2003
University of Alabama at Birmingham	BSN	06/1999

Certifications & Licensure:

Acute Care Nurse Practitioner	ANCC	08/2018-08/2023
RN/APRN	Florida	exp. 07/30/2020
RN/APRN	Arizona	exp. 04/19/2019

EXPERIENCE

2018-present	Associate Professor Assoc. Dean Research	School of Nursing and Health Studies University of Miami Miami, FL
2015-2018	Assistant Professor	College of Nursing The University of Arizona Tucson, AZ
2015-2018	Assistant Professor	Division of Translational & Regenerative Medicine, College of Medicine The University of Arizona Tucson, AZ
2012-2015	Assistant Professor	Nell Hodgson Woodruff School of Nursing Emory University Atlanta, GA
2012-2015	Assistant Professor (Secondary)	Emory University Department of Physiology Atlanta, GA
2011-2012	Postdoctoral Fellow	Emory University Department of Pediatrics/Physiology School of Medicine Atlanta, GA

2009-2012	Instructor (Adjunct)	University of Alabama at Birmingham School of Nursing Birmingham, AL
2006-2009	Instructor	University of Alabama at Birmingham School of Nursing Birmingham, AL
2003-2009	Acute Care NP	Dr. William J. Ferguson Pulmonary and Critical Care Medicine Anniston, AL
1999-2004	Staff/Charge Nurse	University of Alabama at Birmingham Medical ICU/Critical Care Flight Nurse Birmingham, AL

## PUBLICATIONS

### Book chapters published:

1. **Downs, C.A.** & Helms, M.N. (2015). Trans-barrier fluid transport in health and disease. In A. Makanya (Ed.), *The vertebrate blood-gas barrier in health and disease—structure, development and remodeling*. Springer: New York, NY.
2. **Downs, C.A.** (2017). Epithelial sodium channel and lung fluid balance. In V. Sidhaye & M. Koval (Eds.), *Lung Epithelial Biology in the Pathogenesis of Pulmonary Disease*. Elsevier: New York, NY.

### Referred journals:

1. Rodriguez, J., Affuso, O., Azuero, A., **Downs, C.A.**, Turner-Henson, A. & Rice, M. (2018). Infant feeding practices and weight gain in toddlers born very preterm: A pilot study. *Journal of Pediatric Nursing*, 4, 29-35.
2. **Downs, C.A.**, Johnson, N.M., Tsaprailis, G. & Helms M.N. (2018). RAGE-induced changes in the proteome of alveolar epithelial cells. *J Proteomics*, 177: 11-20 PMID: 29448054
3. **Downs, C.A.**, Johnson N.M., Coca, C. & Helms M.N. (2018). Angiotensin II regulates  $\square$ -ENaC in human umbilical vein endothelial cells. *Microvascular Research*; 116:26-33. PMID 29051045
4. **Downs, C.A.** , Dang, V.D., Johnson, N.M., Denslow, M. & Alli, A.A. (2018). Hydrogen peroxide stimulates exosomal cathepsin B regulation of the receptor for advanced glycation end-products (RAGE). *Journal of Cellular Biochemistry*, 119(1): 599-606. PMID: 28618037
5. **Downs, C.A.** Johnson, N.M., Alli, A.A. & Helms, M.N. (2016). Cigarette smoke activation of epithelial sodium channel through Nadph oxidase. *AIMS: Molecular signaling*, 3(3):439.
6. **Downs, C.A.**, Kreiner, L.H., Zhao, X.M. Trac, P., Johnson, N.M., Hanson, J., Brown,

- L.A. & Helms, M.N. (2015). Oxidized glutathione (GSSG) inhibits epithelial sodium channel activity in primary alveolar epithelial cells. *American Journal of Physiology: Lung Cellular and Molecular Physiology*, 308(9):L943-52. PMID: 25713321
7. Amiri, A., Pryor, E., Rice, M. **Downs, C.A.**, Turner-Henson, A., McGregor, G., Fanucchi, M.V., Schwiebert, L. (2014). Formaldehyde exposure level during pregnancy and possible residential sources, *The American Journal of Maternal and Child Nursing*, 40(3):180-5. PMID 25919211
  8. **Downs, C.A.** & Faulkner M.S. (2014). Toxic stress, inflammation and symptomatology of chronic complications in diabetes. *World Journal of Diabetes*, 6(4):554-65. PMID: 25987953
  9. **Downs, C.A.**, Kriener, L.H., Johnson, N.M., Goodson, M.C. & Helms, M.N. RAGE regulates lung fluid balance through PKC-gp91<sup>phox</sup> signaling to alveolar epithelial sodium channels. (2014). *American Journal of Respiratory Cell and Molecular Biology*, 52(1):75-87. PMID:24978055
  10. Gammon, S.T., Foje, N., Brewer, E.M., Owers, E., **Downs, C.A.**, Budde, M.D., Leevy, W.M. & Helms, M.N. (2014). Pre-clinical anatomical, molecular and function imaging of the lung with multiple modalities. *American Journal of Physiology: Lung Cellular and Molecular Physiology*, 306(10):L897-914. PMID: 24658139.
  11. **Downs, C.A.** & Helms, M.N. (2013). Regulation of ion channels by oxidants. *American Journal of Physiology: Lung Cellular and Molecular Physiology*, 305(9):L595-603. PMID: 24014684.
  12. Liu, L. Trac, D., Pao, A.C., Park, M., **Downs, C.A.**, Ma, H.P. & Helms, M.N. (2013). Fulvene-5 inhibition of Nadph oxidases attenuate activation of epithelial sodium channels in A6 distal nephron cells. *American Journal of Physiology: Renal Physiology*, 305(7):F995-F1005. PMID: 23863470.
  13. **Downs, C.A.**, Kriener, L.H., Trac, D.Q. & Helms, M.N. (2013). Acute effects of cigarette smoke extract on alveolar epithelial sodium channel activity and lung fluid clearance. *American Journal of Respiratory Cellular and Molecular Biology*, 49(2), 251-259. PMID:23509726.
  14. **Downs, C.A.**, Kumar, A., Kreiner, L.H., Johnsons, N.M. & Helms, M.N. (2013). H<sub>2</sub>O<sub>2</sub> regulates lung ENaC via ubiquitin-like protein Nedd8. *Journal of Biological Chemistry*, 288(12), 8136-45. PMID:2362276.
  15. **Downs, C.A.**, Trac, D.Q., Kreiner, L.H., Eaton, A.F., Johnson, N.M., Brown, L.A. & Helms, M.N. (2013). Ethanol alters alveolar fluid balance via Nadph oxidase (NOX) signaling to epithelial sodium channels (ENaC) in the lung. *PLoS ONE*, 8(1):e54750 PMID: 23382956
  16. **Downs, C.A.**, Trac, D.Q., Brewer, E. Brown, L.A. & Helms, M.N. (2012). Chronic alcohol ingestion changes the alveolar epithelium. *Biomedical Research International*, e470217. PMID:23509726
  17. **Downs, C.A.**, Kreiner, L. Ling, Y., Eaton, D.C., Jain, L. & Helms, M. (2012).  $\beta$ -adrenergic agonists differentially regulate highly selective and non-selective epithelial sodium channels to promote alveolar fluid clearance *in vivo*. *American Journal of Physiology: Lung Cellular and Molecular Physiology*, 302(11):L1167-78. PMID:22505670
  18. **Downs, C.A.**, Montgomery, D.W., & Merkle, C.J. (2011). Age-related differences in cigarette smoke extract –induced production of H<sub>2</sub>O<sub>2</sub> by lung endothelial cells.

- Microvascular Research*, 82(3), 311-317. PMID: 22001394
19. **Downs, C.A.**, Montgomery, D.W., & Merkle, C.J. (2011) Cell culture models using primary rat alveolar type I cells. *Pulmonary Pharmacology and Therapeutics*, 24(5), 577-586. PMID: 21624488
  20. Morrison, H.W. & **Downs, C.A.** (2011). Immunological methods for nursing research: From cells to systems. *Biological Research for Nursing*, 13(3), 227-234. PMID: 21454330
  21. **Downs, C.A.** (2011). Functional assessment of chronic obstructive pulmonary disease. *Journal of the American Academy of Nurse Practitioners*, 23(4), 161-167. PMID: 21489009
  22. Kang, D.H., Rice, M., Turner-Henson, A.T., Park, N.J., & **Downs, C.A.** (2010). Stress and inflammation: a biobehavioral approach for nursing research. *Western Journal of Nursing Research*, 36(6), 730-760. PMID: 20624936
  23. **Downs, C.A.** & Morrison, H. (2010). Beyond the PhD: Putting the right tools in your research toolbox. *Biological Research for Nursing*, 13(1), 5-14. PMID: 20026452
  24. Appel, S.J. & **Downs, C.A.** (2008). Understanding acid-base balance. *Nursing*, 38, 9-11.
  25. Vance, D. E., Ross, L.A., & **Downs, C.A.** (2008). Self-Reported cognitive ability and global cognitive performance in adults with HIV. *Journal of Neuroscience Nursing*, 40, 6-13. PMID: 18330405
  26. Appel, S.J. & **Downs, C.A.** (2007). Steady a disturbed equilibrium: Accurately interpret the acid-base balance of acutely ill patients. *Men in Nursing*, 3(3), 33-39.
  27. Appel, S.J. & **Downs, C.A.** (2008). Steady a disturbed equilibrium: Accurately interpret the acid- base balance of acutely ill patients. *Nursing 2008*, 2 (4), 45-53. PMID:18797369
  28. **Downs, C.A.** & Appel, S.J. (2007). Chronic obstructive pulmonary disease: Diagnosis and management. *Journal of the American Academy of Nurse Practitioners*, 19 (3), 126-132. PMID: 17341279

## PROFESSIONAL

### Active:

1R01NR016957-01A1	Downs (PI)	04/18-01/23
Using Proteomics to develop personalized health strategies for ARDS in model systems		
25% effort		
The aim of this study is characterize post translational modifications (PTM) of critical signaling proteins involved in the evolution and resolution of lung injury and to test the ability of a novel compound to reverse oxidant-mediated PTM changes in critical signaling proteins.		
Total cost: \$1.6 million		

### Completed (last 5 years):

Parker B Francis Fellowship	Downs (PI)	06/14-09/17
RAGE Regulation of ENaC and Pulmonary Function		
Direct costs: \$156, 000.00		
75% Effort		
UAHS Career Development Award	Downs (PI)	09/16-08/18

RAGE-mediated effects on the lung proteome  
 Total cost: \$225,000.00  
 75% Effort

Dean's Research Development Award Proteomic Studies of Neurocognitive Symptoms Direct costs: \$10,000.00	Downs (PI)	2014-2015
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University Research Committee Cigarette Smoke Induced Regulation of RAGE Direct costs: \$30,000	Downs (PI)	2014-2015
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Emory University Woodruff Scholar Early Independence Award The Role of Alcohol in RAGE-mediated Regulation of Lung Fluid Balance Direct costs: \$50,000.00	Downs (PI)	2015- 2016
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Editorial responsibilities:

2013-present	Editorial Board, Journal of Air & Waterborne Disease
2014-present	Editorial Board, Jacobs Journal of Pulmonology
2015-present	Consulting Editor, International Journal of Chronic Obstructive Pulmonary Disease

Professional and Honorary Organizations:

2006-present	Western Institute of Nursing, Member
2011-present	Southern Nursing Research Society, Member
2015-present	American Nurses Association, Member
2011-2015	American Physiological Society, Member
2006-present	American Thoracic Society, Member
2006-2011	American Society of Cell Biology, Member

Honors and Awards:

2015	Fellow of the American Academy of Nursing
2014	Woodruff Early Investigator Award, Emory University
2014-2017	Parker B. Francis Fellow
2013	D. Jean Wood Award, Southern Nursing Research Society
2012	Pat A. Perry Biological Nursing Research Award, Western Institute of Nursing Research
2012	Outstanding Dissertation Award, College of Nursing, Tucson, AZ
2011	Alumni Council Award, College of Nursing, Tucson, AZ
2010	Beverly McCord Dissertation Scholarship Recipient, Tucson, AZ
2009	Beverly McCord Dissertation Scholarship Recipient, Tucson, AZ
2006-2007	Fellowship, Minority Nursing, Tucson, AZ
2006-2007	Fellowship, The Graduate College, Tucson, AZ
2006-2011	Dean's List, The University of Arizona, Tucson, AZ

## Post-Doctoral Fellowships:

2011-2012 Department of Physiology School of Medicine, Emory University Atlanta, GA

## Other Professional Activities:

## Invited presentations:

1. **Downs, C.A.** (September, 2017). RAGE induced changes in the proteome of alveolar epithelial cells. College of Medicine Research Seminar, University of Arizona, Tucson, AZ.
2. **Downs, C.A.** (July, 2016). Oxidative regulation of ENaC in tight epithelial and vascular endothelial cells. Telluride Epithelial Cell Biology and Physiology Workshop, Telluride, CO.
3. **Downs, C.A.** (August, 2014). Immunological regulation of ENaC and lung fluid. Telluride Epithelial Cell Biology and Physiology Conference, Telluride, CO.
4. **Downs, C.A.** (October, 2013). Regulation of Epithelial Sodium Channels and Lung Fluid Balance by Oxidants. University of Maryland, Baltimore, MD.
5. **Downs, C.A.** (April, 2013). Molecular Mechanisms of Oxidative Stress and Ion Channels. Experimental Biology, APS Cellular and Molecular Physiology Section, Boston, MA.
6. **Downs, C.A.** (May, 2012). Invited Presenter. Cigarette-Smoke Extract-Induced Oxidants Regulate Epithelial Sodium Channels: Do NADPH Oxidase 4 Play a Role? Physiology Seminars. Nox Talks, Department of Cardiology, School of Medicine, Emory University, Atlanta, GA.
7. **Downs, C.A.** (May, 2012). Invited Presenter. Cigarette-Smoke Extract-Induced Oxidants Regulate Epithelial Sodium Channels: Do NADPH Oxidase 4 Play a Role? Physiology Seminars. Department of Physiology, School of Medicine, Emory University, Atlanta, GA.
8. **Downs, C.A.** (February, 2012). Invited Presenter. X-ray Interpretation. Georgia Chapter of the Gerontological Advanced Practice Nurses Association third annual conference. Atlanta, GA.
9. **Downs, C.A.** (November, 2011). Invited Presenter. UAB School of Nursing, Leadership in Child Health Nursing Workshop. Birmingham, AL.
10. **Downs, C.A.** (March, 2009). Invited Presenter. Myths, Mysteries and New Developments in Emphysema. 28<sup>th</sup> Annual High Sierra Critical Care Conference, Reno NV.
11. **Downs, C.A.** (February, 2006). Invited presenter. Radiography for Nurses. UAB Comprehensive Nursing Conference, Birmingham, AL.
12. **Downs, C.A.** (February, 2005). Invited presenter. The Bare Bones of Chest X-Ray Interpretation. UAB Cardiovascular Nursing Conference, Birmingham, AL.
13. **Downs, C.A.** (September, 2004). Invited presenter. Sedation in the Intensive Care Unit. Northeast Alabama Regional Medical Center, Anniston, AL.
14. **Downs, C.A.** (September, 2004 and January, 2005). Invited presenter. Pulmonary Review RN Refresher Course. University of Alabama at Birmingham Hospital and Clinics, Birmingham, AL.

### **Peer Reviewed Papers/Podium Presentations**

1. **Downs, C.A.** (September, 2018). Functional genomics: deciphering the receptor for advanced glycation end-products in health and disease. Council for the Advancement of Nursing Science, Washington, DC.
2. Menon, U., Cohn, E.G., **Downs, C.A.**, Gephart, S.M., & Kue, J. (September, 2018). Synthesis: Precision health research and implementation reviewed through five synergistic principles. Council for the Advancement of Nursing Science, Washington, DC.
3. **Downs, C.A.** & Carrington J.M. (September, 2018). Framework to guide doctoral education of precision health. Council for the Advancement of Nursing Science, Washington, DC.
4. **Downs, C.A.** (May, 2017). Integration of OMICs and big-data in PhD program curriculum. Western Institute of Nursing, Denver, CO.
5. **Downs, C.A.** (April, 2016). Using proteomics to demonstrate the physiological significance of a biomarker in ARDS. WIN Communicating Nursing Research, Anaheim, CA.
6. **Downs, C.A.** (February, 2013). Cigarette smoke extract-induced oxidants regulate epithelial sodium channel (ENaC) activity in lung alveolar cells. Southern Nursing Research Society Annual Conference, Little Rock, AR.
7. **Downs, C.A.**, Montgomery, D.W. & Merkle, C.J. (April, 2012). Cigarette smoke extract-induced changes in telomere biology in alveolar cells. Western Institute of Nursing Conference, Portland, OR.
8. **Downs, C.A.**, Merkle, C.J., & Montgomery, D.W. (April, 2010). Plate based assays to measure reactive oxygen species. Western Institute of Nursing Conference, Glendale, AZ.
9. **Downs, C.A.** (February, 2010). Stress and inflammation in COPD: A theme for biobehavioral research. Southern Nursing Research Society Conference, Austin, TX.
10. **Downs, C.A.**, Merkle, C.J., Insel, K., & Montgomery, D.W. (April, 2009). Telomere length as a measure of aging. Western Institute of Nursing Conference, Salt lake City, UT.
11. **Downs, C.A.** (May, 2005). The Bare Bones of Chest Radiograph Interpretation. American Association of Critical Care Nurses, New Orleans, LA.

### **Peer Reviewed Posters**

1. Amiri, A., Fanucchi, M., Pryor, E., Schwiebert, L., **Downs, C.A.**, Rice, M. & Turner-Henson, A. (October, 2013). Formaldehyde exposure during pregnancy. EPA Protecting Children's Health for a Lifetime: Environmental Research Meets Clinical Practice and Public Policy Meeting, Washington, DC.
2. **Downs, C.A.**, Kreiner, L.H., Trac, D.Q. & Helms, M.N. (May, 2013). Cigarette smoke extract increases epithelial sodium channel activity in alveolar cells to promote lung fluid clearance *in vivo*. American Thoracic Society, Philadelphia, PA.
3. Johnson, N.M., **Downs, C.A.**, Kreiner, L.H. & Helms, M.N. (April, 2013). H<sub>2</sub>O<sub>2</sub> regulates lung ENaC via ubiquitin-like protein Nedd8. Experimental Biology, Boston,

MA.

4. **Downs, C.A.**, Montgomery, D.W. & Merkle, C.J. (April, 2012). Cigarette smoke extract-induced injury in alveolar cells in model systems. Experimental Biology, San Diego, CA.
5. **Downs, C.A.**, Kriener, L.H. & Helms, M.N. (May, 2012).  $\beta$ -adrenergic receptor stimulation increases epithelial sodium channel (ENaC) activity through different transduction pathways in alveolar epithelial type 1 and type 2 cells. American Thoracic Society, San Francisco, CA.
6. **Downs, C.A.**, Montgomery, D.W. & Merkle, C.J. (November, 2011). Age-related differences in cigarette smoke extract-induced changes in H<sub>2</sub>O<sub>2</sub> production in lung microvascular endothelial cells. Society for Free Radicals in Medicine and Biology, Atlanta, GA.
7. **Downs, C.A.**, Montgomery, D.W. & Merkle, C.J. (December, 2010). Alveolar type I cells suppress cigarette smoke extract-induced production of hydrogen peroxide by microvascular endothelial cells. American Society for Cell Biology, Philadelphia, PA.
8. **Downs, C.A.**, Merkle, C.J. & Montgomery, D.W. (December, 2009). Establishment of an *in vitro* model using rat alveolar type I and microvascular endothelial cells. American Society for Cell Biology, San Diego, CA.
9. **Downs, C.A.**, Montgomery, D.W. & Merkle, C.J. (April, 2009). Development of an alveolar model system. Western Institute of Nursing, Salt Lake City, UT.
10. Galles, L., Merkle, C.J., **Downs, C.A.** & Montgomery, D.W. (April, 2009). Modification of a telomere length assay for studies in aging rat models. Western Institute of Nursing, Salt Lake City, UT.
11. Gautney, L.J. & **Downs, C.A.** (March, 2007). Poster Presentation with student. Family Presence During Resuscitation and Invasive Procedures. UAB Comprehensive Nursing Conference, Birmingham, AL.
12. Preston, S. & **Downs C.A.** (March, 2007). Poster Presentation with student. Prevention of Atrial Fibrillation After Cardiac Surgery. UAB Comprehensive Nursing Conference, Birmingham, AL.
13. Simpkins, R. & **Downs C.A.** (March, 2007). Poster Presentation with student. Insulin Therapy: Overcoming Barriers to Success. UAB Comprehensive Nursing Conference, Birmingham, AL.
14. Campbell, J. & **Downs, C.A.** (March, 2007). Poster Presentation with student. Do Nurses Support Family Presence During Resuscitation? UAB Comprehensive Nursing Conference, Birmingham, AL.
15. **Downs, C. A.** (June, 2006). Presentation. Pharmacological Update on COPD. American Academy of Nurse Practitioners, Dallas, TX.

#### Teaching:

Teaching specialization: primary teaching responsibilities in the doctoral programs (PhD and DNP). While at University of Arizona, I led the development of a substantive area within the PhD in Nursing program that focused on the intersection of biobehavioral research and precision health. The courses developed focused on cellular and molecular biology/physiology (NURS 747), methodology (including systems biology; NURS 748), and the application to relevant



nursing phenomena of interest (e.g. symptoms; NURS 749). Additionally, I have taught Pathophysiology (RN-BSN program, UAB), advanced pathophysiology (MSN, UAB), research methods (RN-BSN program, UAB), integrated pharmacology and pathophysiology (BSN, accelerated BSN, Emory University), and advanced pharmacology (MSN, Emory University) to support the undergraduate and graduate programs at UAB and Emory University

#### Thesis and Dissertation Advising:

1. PhD Committee Member, Formaldehyde exposure in pregnancy, Azita Amiri\* (UAB); completed 2014
2. PhD Committee Member, Very-low birth weight and CV risk in children, Jeannie Rodriguez\* (UAB); completed 2015
3. PhD Committee Member, Epigenetics of heart failure, Brittany Butts\* (Emory University) 2013-2015
4. DNP Committee Member, COPD readmissions, Ronald Klug (UA), 2018
5. DNP Chair, Social support in COPD, Tina Nyguen (UA), 2018
6. DNP Committee Member, Lung recruitment maneuvers in donors, Ben Bergstrom (UA), 2018
7. PhD Committee Member, Biochemical and inflammatory changes in stroke, Melissa McElroy (UA), 2018.

(\*) student has matriculated

#### SERVICE

##### University Committee and Administrative Responsibilities:

2018-present	Associate Dean for Research, School of Nursing & Health Studies
2016-2018	PhD Curriculum Committee, College of Nursing, University of Arizona
2012-2015	PhD Program Committee, School of Nursing, Emory University

##### Community Activities:

2015-2019	Development Committee, Western Institute of Nursing
2014-2018	Communications Committee, Southern Nursing Research Society
2013-2015	Treasurer, Southern Nursing Research Society
2012-2018	Finance Committee, Southern Nursing Research Society
2005-2008	Central Alabama Nurse Practitioner Association, Membership Chairman, Birmingham, AL
2002-2003	Advanced Practice Advisory Committee, American Association of Critical Care Nurses, Anaheim, CA
ongoing	<u>Journal Reviewer:</u> AJP Lung Cell and Molecular Physiology, American Journal of Respiratory Cell and Molecular Biology, Heart & Lung, Journal of Chronic Obstructive Pulmonary Disease, Journal of the American Academy of Nurse Practitioners; Microvascular Research AJP Cell and Molecular Physiology; Biological Nursing Research;

Air & Waterborn Disease; Jacob's Journal of Pulmonology