Spencer C. Cushen

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March 2019

EDUCATION

University of North Texas Health Science Center – Texas College of Osteopathic Medicine

Doctor of Osteopathic Medicine (DO) (In Progress) 2023 *(Expected)*

GPA: 4.00

USMLE STEP 1: Pass (Score – 266) – 6/12/17
[99th Percentile†]

COMLEX Level 1: Pass (Score – 752) – 6/15/17
[98th Percentile‡]

University of North Texas Health Science Center – Graduate School of Biomedical Sciences

Doctor of Philosophy (PhD) (In Progress) 2023 *(Expected)*

Area of Concentration: Integrative Physiology

Dissertation: Trophoblast-induced maternal cardiovascular dysfunction in pregnancy
Thesis Advisor: Styliani "Stella" Goulopoulou, PhD

GPA: 4.00

Baylor University

Bachelor of Science (BS), Biology 2015

Area of Concentration: Pre-Healthcare

Minor: Biochemistry

GPA: 3.68

†, Estimated from US and Canadian first-takers between January 1, 2015 – December 31, 2017, *USMLE Score Interpretation Guidelines*, USMLE.org

‡, Calculated using COMLEX percentile conversion tool, NBOME.org

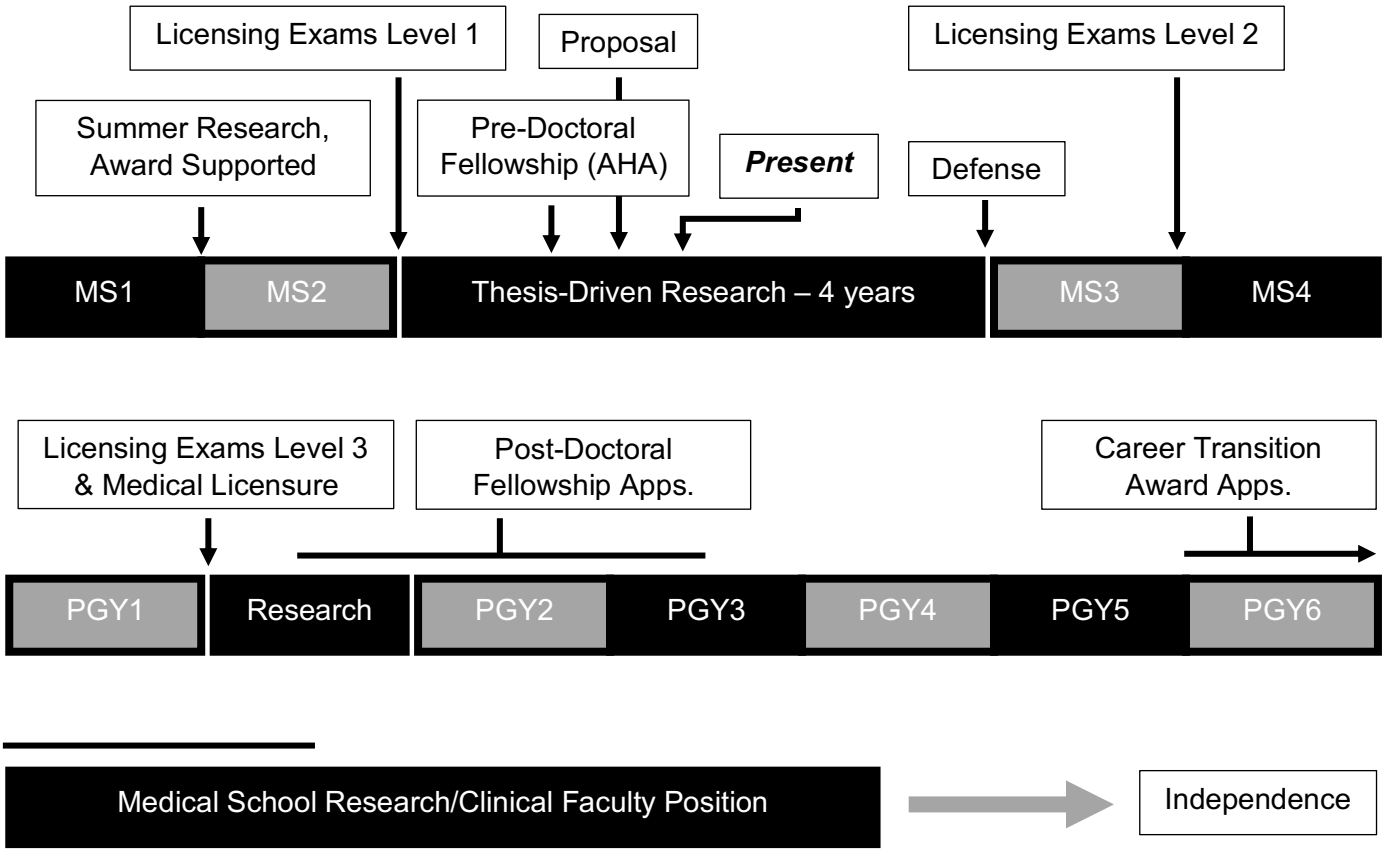
RESEARCH AND CLINICAL INTERESTS CAREER PLAN

I am a fourth-year DO/PhD candidate. I have completed my pre-clinical years of medical school and I am on the second year of my PhD studies under the guidance of Styliani "Stella" Goulopoulou (*see trainee timeline*). My research interest is cardiovascular physiology in pregnancy. My clinical interests include women's health, obstetrics and gynecological pathology, cardiology, and vascular radiology.

My long-term career goals are to become a physician-scientist and devote my research and clinical career to sex differences in cardiovascular health. My short-term career goals are to gain excellent training in question development and testing, technical basic science skills, and medicine. My research goals are to acquire skills to study cardiovascular adaptations to pregnancy through the use of *in vivo*, *ex vivo*, cell culture, and tissue culture techniques. I am confident that these goals will be met with the guidance of my PhD mentor, colleagues, advisory committee, and my personal passion for research and patient care.

The primary objective of my research project is to examine the role of trophoblast cells, the main cellular unit of the placenta, in the development of maternal cardiovascular dysfunction during pregnancy. My project examines the role of placental stressors in the release of mitochondrial DNA (mtDNA) into the extracellular space. mtDNA is significant because it is immunogenic and inflammatory, found to be increased in the circulatory system in women with pregnancy complications, and our lab has previously shown that an mtDNA mimetic can induce features of cardiovascular dysfunction in pregnant rats. After my proposal defense in January 2018, and my eventual thesis defense, I plan to return to clinic, graduate, and begin residency training in a research focused interventional radiology program.

Trainee Timeline



MS – Medical Student Year

PGY – Post-Graduate Medical Education Year (Residency Training)

HONORS AND AWARDS

UNTHSC – Graduate School of Biomedical Sciences

Finalist, Robert Gunn student award, American Physiological Society	Spring 2019
Graduate Student Association Travel Award	Spring 2019
Caroline tum Suden/Frances Hellebrant Professional Opportunity Award, American Physiological Society	Spring 2019
2nd place for class 3 minute thesis (3MT) competition	Fall 2018
Dual Degree Student Award, GSBS-UNTHSC	Fall 2018 – Spring 2019
Dual Degree Student Award, GSBS-UNTHSC	Summer 2018
Distinction awarded for Oral Qualifying Exam	Summer 2018
Division of Student Affairs Scholarship	Spring 2018
Dual Degree Student Award, GSBS-UNTHSC	Fall 2017 – Spring 2018
Graduate Student Assistanceship	Fall 2017 – Summer 2018

UNTHSC – Texas College of Osteopathic Medicine

Medical Student Government Association Individual Travel Scholarship	Spring 2019
Academic Scholar Award (Maintain ≥ 92.0% average for MS1 & MS2)	Summer 2017
Dual Degree Student Award, TCOM-UNTHSC	Fall 2017 – Spring 2018
Division of Student Affairs Scholarship	Fall 2017 – Summer 2018
APS Excellence in Professional Student (MD or DO) Research Travel Award	Spring 2017
Dean's List (Top 10% of class)	Spring 2017
Selected for Honors Radiology Course (Top 30% of class)	Spring 2017
Honors Research Practicum (Top 10% of class)	Fall 2016
Dean's List (Top 10% of class)	Fall 2016
Institute for Cardiovascular and Metabolic Diseases Summer Research Award	Summer 2016

UNTHSC – Texas College of Osteopathic Medicine (Cont.)

TCOM Summer Research Fellowship Summer 2016

Dean's List (Top 10% of class) Spring 2016

Inducted into Sigma Sigma Phi Honor Society Spring 2016

Nicholas and Anna Ricco Ethics Essay Competition, 1st Place Spring 2016

TOUCH: Silver Award (50 Hours of community service in medical school year one) Spring 2016

Division of Student Affairs Scholarship Fall 2016 – Spring 2017

TPEG MS2 Resident, Texas State Board of Education Fall 2016 – Spring 2017

TPEG MS1 Resident, Texas State Board of Education Fall 2015 – Spring 2016

Dean's List (Top 10% of class) Fall 2015

Baylor University

Dean's List (GPA >3.7), *5 Semesters* 2011—2015

President's Gold Scholarship Fall 2011 – Spring 2015

RESEARCH TRAINING

University of North Texas HSC

Doctoral Research – Stella Goulopoulou Laboratory

Trophoblast-induced maternal cardiovascular dysfunction in pregnancy Fall 2017 – Present

In preeclampsia there is increased circulating mitochondrial DNA (mtDNA). This is notable because mtDNA mediates sterile inflammation through toll-like receptor 9. We hypothesize that mtDNA is released from the diseased placenta in preeclampsia, travels through the maternal circulation, resulting in increased blood pressure and poor cardiovascular outcomes.

RESEARCH EXPERIENCE

University of North Texas HSC (TCOM)

Medical School years 1-2 Summer Research

Participated in summer research in Goulopoulou Lab — Spring 2016 – Summer 2016

Took part in a study of the effects of aspirin in pregnant, hypertensive rats. Also participated in a study of anti-oxidant regulation on mesenteric arteries in pregnant, hypertensive rats. The anti-oxidant study was supported by an ICMD Summer Research Award, as well as, a TCOM Summer Research Fellowship.

Baylor University

Biology Coursework

Cytoskeleton and Diseases Seminar — Spring 2014

Participated in journal clubs and presentation.

General Biology II augmented with a research project — Spring 2012

Performed research and presented a poster on the effects of sodium fluoride on the reproduction of S. serrulatus, a small near-microscopic Daphnia-like crustacean.

TEACHING / MENTORING EXPERIENCE

Co-Mentor of Maryam Riaz (TCOM Class of 2021) — Summer 2018 – Present

- Facilitated training and project development of Maryam Riaz, a medical student and awardee of funding from the NIH supported Promoting Diversity in Research Training (PDRT). She has been trained in cell culture techniques and her project focuses on HUVEC cell stress and release of mitochondrial DNA.

Center for Academic Performance Tutor – 13 hours — Fall 2017 – Present

- Hematology 1 & 2, 2 h / week, 4 weeks
- Cellular and Molecular Biology, 2 h / week, 2 weeks
- Facilitated workshop on “Priorities, Balance & Boundaries”, 1 h

TCOM Cardiology 1 – 15 hours — Fall 2017, Fall 2018

- Facilitated 1st year medical student cardiac simulation lab, 11 h
- Facilitated 1st year medical student EKG lab, 4 h

American Physiological Society PhUN Week – 4 hours — Fall 2017, Spring 2019

- Taught middle school students about the use of fluorescence in physiology research, 4 h
- Taught 1st graders about the heart, 2 h

TCU / UNTHSC Inter-Professional Education – 8 hours Fall 2017, Fall 2018

- Helped facilitate mock research development with Certified Registered Nurse Anesthetist (CRNA) students, 8 h

ABSTRACTS & POSTER PRESENTATIONS

National

Experimental Biology, Chicago, IL. April 2017

Spencer C Cushen, Oluwatobiloba Osikoya, Styliani Goulopoulou. *L-sulforaphane Decreased contractile response in mesenteric arteries in a rat model of gestational hypertension.*

Supported by: APS Excellence in Professional Student (MD or DO) Research Travel Award

Local

Women's Cardiovascular and Brain Health Symposium, Fort Worth, TX. February 2019

Spencer C Cushen, Oluwatobiloba Osikoya, Alexandra Blessing, Nicole R Phillips, Styliani Goulopoulou. *Placental Exposure to Hypoxia and Oxidative Stress Causes Mitochondrial DNA Release into the Extracellular Space*.

Women's Cardiovascular and Brain Health Symposium, Fort Worth, TX. February 2019

Ryan T Nguyen, **Spencer C Cushen**, Nicole Phillips, Styliani Goulopoulou. *Mitochondrial oxidative stress and extrusion of mitochondrial DNA from endothelial cells: implications for maternal endothelial dysfunction in preeclampsia.*

OUT For Health, Fort Worth, TX. February 2019

Spencer C Cushen, Oluwatobiloba Osikoya, Alexandra Blessing, Nicole R Phillips, Styliani Goulopoulou. *Placental Exposure to Hypoxia and Oxidative Stress Causes Mitochondrial DNA Release into the Extracellular Space*.

COSGP Winter Meeting – Research Symposium, Fort Worth, TX. January 2019

Spencer C Cushen, Oluwatobiloba Osikoya, Alexandra Blessing, Nicole R Phillips, Styliani Goulopoulou. *Placental Exposure to Hypoxia and Oxidative Stress Causes Mitochondrial DNA Release into the Extracellular Space*.

COSGP Winter Meeting – Research Symposium, Fort Worth, TX. January 2019

Maryam Riaz, **Spencer C. Cushen**, Nicole R. Phillips, Styliani Goulopoulou. *Inhibition of Mitochondrial Respiratory Chain Complex I Induces Vascular Endothelial Cell Apoptosis and Release of Mitochondrial DNA.*

Research Appreciation Day, Fort Worth, TX. April 2018

Spencer C Cushen, Alexandra Blessing, Sarika Chaudhari, Shruti Patil, Nicole Phillips, Styliani Goulopoulou. *Trophoblast cells exposed to hypoxia and oxidative stress release mitochondrial DNA and undergo apoptosis.*

Research Appreciation Day, Fort Worth, TX. April 2017

Spencer C Cushen, Oluwatobiloba Osikoya, Styliani Goulopoulou. *L-sulforaphane Decreased contractile response in mesenteric arteries in a rat model of gestational hypertension.*

PROFESSIONAL MEMBERSHIPS

Society for Experimental Biology and Medicine Fall 2018 – Present

Society of Interventional Radiology Spring 2018 – Present

American Physiological Society Fall 2017 – Present

American Heart Association Spring 2016 – Present

Sigma Sigma Phi Honor Society Spring 2016 – Present

COMMITTEES & SERVICE

Graduate School and Research

Judge for Fort Worth Regional Science and Engineering Fair Spring 2019

Judged microbiology science fair projects of high school and middle school students.

Manuscript Reviewer Spring 2018 – Present

Assisted with manuscript reviews under the supervision of my PhD advisor (Journals: *Hypertension*, *Experimental Biology and Medicine*, *AJP-Regulatory, Integrative and Comparative Physiology*)

American Physiological Society PhUN Week Fall 2017

Taught middle school students about physiology and the use of the property of fluorescence in science. – 4 hours

Medical Student Government Association (MSGA) & Class of 2019 Officer

Treasurer Spring 2018 – Spring 2019

Propose, defend, and maintain budget. Responsible for day-to-day payments for medical school student government. Member of student fee committee.

Elections Chair Spring 2018 – Spring 2019

Ensure that each medical student class has fair and unbiased elections procedures for their class officer positions.

Class of 2019 Representative and Research Committee Member Fall 2016 – Present

Represent the voice of the class of 2019 during student government meetings with dean of medical school and university president. Vote on travel and poster scholarship applications, as well as proposed measures that impact the Texas College of Osteopathic Medicine (TCOM).

American Physician Scientists Association (APSA) *(Local Chapter)*

Treasurer Fall 2018 – Present

Propose, defend, and maintain budget. Responsible for day-to-day payments for APSA.

Medical School *(in general)*

Fall 2018 – Spring 2019

Finance Chair for COSGP Winter Meeting

Organized budget and expenses for local meeting that brings in students from out of state.

Board preparation panels Fall 2017, Spring 2018

Discussed study strategies with more junior medical students on how to successfully prepare for USMLE Step 1 and COMLEX Level 1 medical licensing exams. – 3 hours

Evidence-based medicine Fall 2016

During 2nd year of medical school, I realized it would be helpful to have access to high quality evidence-based medicine resources for 2nd year students. I discussed this with our class president, and we subsequently brought this to our dean, who authorized subscriptions of UpToDate for all 2nd years. The following year this led to a campus-wide subscription. In this small way I increased access to evidence-based medicine on our campus.

Community

Cowtown Marathon racecourse medical volunteering, 8 h	Spring 2019
Fort Worth Botanic Garden, 4 h	Fall 2018
AHA Tarrant County Heart Walk, 2 h	Fall 2018
Tarrant County Foodbank, 6 h	Spring 2017
Cowtown Marathon Medical Tent volunteering, 4 h	Spring 2017
TCOM Fall Festival, 4 h	Fall 2016
Tee of Fore TCOM fundraiser, 2 h	Fall 2016
TCU Frogs for a Cure fundraiser, 4 h	Fall 2016
Cooked meals at Ronald McDonald House, 4 h	Spring 2016
Community Hospice of Texas, 50 h	Fall 2015 – Spring 2016
Relay for Life (American Cancer Society), 19 h	Spring 2013 & Spring 2014
Lunch packing for food insecure middle school students in Waco ISD (Pack of Hope), 11 h	Fall 2013 – Spring 2015
Doris Miller Veterans Affairs Medical Center, 8 h	Fall 2014 – Spring 2015
Providence Hospital ER transport volunteering, 14 h	Fall 2014 – Spring 2015

GRANTS / FELLOWSHIPS

Active Awards

AHA Pre-Doctoral Fellowship (18PRE33960162) Spring 2018 – Present

Title: *"Trophoblast-induced maternal cardiovascular dysfunction in pregnancy"*
Percentile Rank: 0.19%, Priority Score: 1.32

Submitted Awards

Foundation for Women's Wellness Fellowship Summer 2018

Unfunded

Osteopathic Scholars in Cancer Research Fellowship Spring 2018

Supported by Cancer Prevention Institute of Texas (CPRIT) & UNTHSC
Relinquished due to overlap with AHA fellowship

NIH Promoting Diversity in Research Training Spring 2017

Unfunded

AHA Student Scholarship in Cardiovascular Disease Spring 2016

Unfunded

WORKSHOPS

Grant writing workshop Fall 2017

SPECIAL COURSEWORK & ADDITIONAL TRAINING

Special Problems BMSC 6391: **Absolute quantification PCR** Fall 2018

Longitudinal family medicine clinical rotation Fall 2018 – Present

This is a bi-monthly rotation where I see patients under the supervision of Damon Schranz, DO in order to keep my clinical skills up to date.

Literature searching course Summer 2018

Longitudinal family medicine clinical rotation Fall 2017 – Spring 2018

See above. Under supervision of Kim Pham, DO

PUBLICATIONS

Published

Ahmed H, Hannan JL, Apolzan JWP, Osikoya O, **Cushen SC**, Romero SA, and Goulopoulou S, **A free-choice high-fat high-sucrose diet induces hyperphagia, obesity, and cardiovascular dysfunction in female cycling and pregnant rats**. *AJP-Reg.* 2019. Published ahead-of-print.

Chaudhari S, **Cushen SC**, Osikoya O, Jaini PA, Posey R, Mathis KW and Goulopoulou S. **Mechanisms of Sex Disparities in Cardiovascular Function and Remodeling.** *Compr Physiol*. 2018;9:375-411.

Cushen SC and Goulopoulou S. **New Models of Pregnancy-Associated Hypertension**. *Am J Hypertens*. 2017;30:1053-1062.

REFERENCES

Name	Institution	Relationship	Email	Phone
Styliani "Stella" Goulopolou, PhD.	UNTHSC	Thesis Advisor	Styliani.Goulopoulou@unthsc.edu	817-735-2973
Michael Smith, PhD.	UNTHSC	DO/PhD Program Director	MichaelL.Smith@unthsc.edu	817-735-2514