

**Interdisciplinary
Research Fuels
Scientific Innovation**

**Proceedings from
the Capra
Interdisciplinary
Healthcare
Symposium 2022**

**School of Health Professions
UT Southwestern Medical Center
6011 Harry Hines Blvd.
Dallas, TX 75235**

Introduction to the Proceedings from the Capra Symposium

The Southwestern School of Health Professions (SSHP) is committed to fostering interdisciplinary research collaborations among its faculty. Accordingly, the Capra Symposium provides a venue for yearly scientific exchanges. It is hoped that through this forum, new collaborations will develop, and established collaborations will continue to thrive. It is also hoped that students will be encouraged to join the faculty in on-going research projects.

- The theme of the Capra Symposium is ***“Interdisciplinary Research Collaboration”***. This means that experts in health professions are encouraged to form research teams. Their goal is to find novel approaches to disease treatment through translational research.
- The Capra Symposium is sponsored by an endowment from the Patricia H. and J. Donald Capra family. The continued support of the Capra family has been seminal to the scientific exchanges of the SSHP faculty. The sponsorship is immensely appreciated and gratefully acknowledged.
- The SSHP provides support to the research program through grants awarded to early career faculty engaged in interdisciplinary research projects. The abstracts in this publication provide an overview of the new projects being developed by the faculty.
- The symposium is organized by the SSHP Research Advisory Committee. This committee also provides peer review of grant proposals submitted by early career faculty. A list of the members of the committee is provided on page 2. Their efforts are greatly appreciated.

2022 - Research Advisory Committee Members

Mu Huang, Applied Clinical Research and Committee Chair

Karen Brewer-Mixon, Applied Clinical Research

Justin Fletcher, Clinical Nutrition

Anne Gilmore, Clinical Nutrition

Tiffany Graham, Prosthetics & Ortho

Bethany Grubb, Physician Asst Studies

Masaki Mizuno, Applied Clinical Research

Gilbert Moralez, Applied Clinical Research

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Scott Smith, Applied Clinical Research

Yi-Ting Tzen, Applied Clinical Research

Gloria Vega, Clinical Nutrition

Jijia Wang, Applied Clinical Research

Hoda Yeganehjoo, Clinical Nutrition

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Kim Hoggatt Krumwiede, Assoc. Dean for Academic Affairs

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Trina Corley (Administrator)

The Patricia H. and J. Donald Capra Endowed Fund in Allied Health Sciences

Dr. Patricia Capra and her late husband, Dr. J. Donald Capra, have had a long-term affiliation with UT Southwestern Medical Center. Dr. Patricia Capra was a faculty member in the Department of Rehabilitation Counseling and Dr. Donald Capra was a Professor of Immunology in Internal Medicine for 23 years. The couple started sponsorship of the Capra Symposium in 1998 and they established the Capra Endowment in 2001.

Dr. J. Donald Capra was recruited to UT Southwestern in 1974 by the late Dr. Donald Seldin and the former Chair of Microbiology, Dr. Johnathan Ur. At UT Southwestern, Dr. Capra conducted his very important work in the field of monoclonal antibody therapy of a number of diseases. He became an international leader in immunology research. He had ample support for research from the National Institutes of Health and he published over 350 research publications and scholarly chapters. He also was the holder of the Edwin L. Cox Distinguished Chair in Immunology and Genetics at UT Southwestern and directed the Molecular Immunology Center from 1990 to 1997. Subsequently, he became President of The Oklahoma Medical Research Foundation where he assembled a formidable research team that was very productive. Dr. Capra became Professor Emeritus in 2006.

It is Dr. Patricia Capra's vision of recognizing and honoring the team approach to healthcare and research that serves as the impetus for this symposium. Clearly, the diagnosis and treatment of any individual is enhanced through inter-professional teamwork, from physicians to physician assistants, to rehabilitation counselors and physical therapists, to prosthetists and orthotists, to clinical nutritionists and radiation therapists. By working together in the endeavors of patient care and scientific research, the field of medicine moves forward, and the lives of the people served benefitted. The annual Capra Symposium embodies and celebrates this spirit.

The Capra family has attended the annual Capra Symposia since 1998. Dr. Patricia Capra continues her attendance to the events and is a passionate advocate of interdisciplinary collaborations in research. Her welcomed presence at the meetings is a constant reminder of the goals of the symposia.

Capra Symposia Timeline

The target audience of the Capra Symposia is faculty and students of the Southwestern School of Health Professions, members of the UT Southwestern community and other research centers in the Dallas-Fort Worth area.

The support for the symposium has been contingent on development of interdisciplinary research. This objective coincides with SSHP's long-term mission of scholarly activities centered around interdisciplinary healthcare training. In the SSHP, research is viewed as an integral component of inter-professional training.

There is ample evidence that major advances are made in clinical care through the coordinated efforts of researchers from many disciplines. Moreover, most of the current guidelines for clinical practice are based on evidence derived from clinical trials and other research endeavors. These guidelines require inter-professional collaborations of experts in various fields from clinicians, researchers, biostatisticians, health professionals and ethics boards. An aim of the SSHP is to train leaders in health professions that will collaborate extramurally with others and improve inter-disciplinary healthcare delivery.

An overview of the current Capra Symposia and those held in the past decade is presented on the following pages. It provides the scope of research interests of SSHP faculty as well as presentation abstracts for all speakers. The symposia have usually consisted of keynote speakers, presentation of work in progress from research awardees and round table discussions on interdisciplinary topics. Student participation in the latter also has been encouraged to the extent possible. As an exciting new endeavor, the SSHP opened a novel PhD Program in Applied Clinical Research in the fall of 2019.

List of Symposia since 2010

Year

- 2022 "Collaborate: Interdisciplinary Research Impacting Brain Health"
- 2021 "Paradigm Changes During a Pandemic: Influences on Research, Clinical Care and Pedagogy"
- 2020 "Collaborate: New Frontiers in Neurological Research"
- 2019 "Collaborate: Using Team Approaches to Advance Research on Chronic Conditions"
- 2018 "Collaborate: Interdisciplinary Bench Science and Clinical Research"
- 2017 "Collaborate: Transforming Medical Education and Patient Care Through Inter-Professional Research"
- 2016 "21st Century Strategies for Managing Obesity"
- 2015 "Converging on Parkinson's Disease: Interdisciplinary Approaches to Diagnosis and Management"
- 2014 "Lending a Helping Hand: Community Based Medicine and Research"
- 2013 "Multiple Sclerosis: Diagnosis, Treatment & Management"
- 2012 "Stroke: Risks, Recovery and Relationships"
- 2011 "Interrelationships Between Mind, Body & Physical Functioning"
- 2010 "Perspectives on the Diagnosis and Treatment of Cancer"

CAPRA INTERDISCIPLINARY HEALTHCARE SYMPOSIUM
“Collaborate: Interdisciplinary Research Impacting Brain Health”
Southwestern School of Health Professions
Wednesday, February 16, 2022
9:00 am – 12:00 pm
Virtual via Zoom

9:00 - 9:10 a.m. Greetings & Recognitions
Interdisciplinary Grant Program Awardees
“Control Of Blood Pressure By Gut-Derived Toxins In Muscle Sensory Neuron”

Principal Investigator: Rie Ishizawa, PhD, RD, Assistant Instructor, Applied Clinical Research
Co-Principal Investigator: Hoda Yeganehjoo, PhD, RD, Assistant Professor, Department of Clinical Nutrition
Co-Investigator: Masaki Mizuno, PhD, Assistant Professor, Applied Clinical Research

“A Comparison of Energy Expenditure with Level of Amputation in Patients with Diabetes Mellitus”

Principal Investigator: Matthew Johnson, DPM, Assistant Professor, Orthopaedic Surgery
Co-Principal Investigator: Kirsten Tulchin-Francis, PhD, Division Director and Assistant Professor, Texas Scottish Rite and Prosthetics-Orthotics
Co-Principal Investigator: Tiffany Graham, MSPO, CPO, LPO, FAAOP, Assistant Professor, Prosthetics-Orthotics
Co-Investigator: Jijia Wang, PhD, Assistant Professor, Applied Clinical Research
Co-Investigator: Dane Wukich, MD, Professor and Chair, Orthopaedic Surgery

9:15 – 9:45 a.m. **Featured Presentations**
“Microbiome and Brain Health”

Sherwood Brown, MD, PhD – Professor Psychiatry, Chief of the Division of Clinical Neuroscience

9:50 – 10:15 a.m. **Student Abstract Finalists**
“Predictors of One Year Pressure Injury Outcomes in SCI”
Patricia T Champagne, PhD Student in Applied Clinical Research

“High-Density Lipoprotein is Independently Associated with Muscle Mitochondrial Function in Healthy Humans”
John M. Giacona, PhD Student in Applied Clinical Research

10:15 – 10:20 a.m. Break

10:20 – 10:50 a.m. **“Impact of Psychological Treatment of Anxiety in Parkinson’s Disease Patients with Freezing of Gait”**

Karen Brewer-Mixon, Ph.D., CRC., Associate Professor, Applied Clinical Research

Staci Shearin, PhD, PT, NCS, GCS, Associate Professor, Physical Therapy

10:55 – 11:25 a.m. **“Autonomic Nervous System Function Following Moderate to Severe Traumatic Brain Injury”**

Gilberto Moralez, Ph.D., Assistant Professor, Applied Clinical Research

Shannon Juengst, PhD, CRC, Adjunct Associate Professor, Physical Medicine and Rehabilitation

11:25 – 11:30 a.m. Break

11:30 – 11:55 a.m. **Round Table Discussion – “Student Perspectives on Brain Health”**

Applied Clinical Research

Clinical Nutrition

Physical Therapy

Physician Assistant Studies

Prosthetics/Orthotics

11:55 – 12:00 p.m. **Abstract Competition Winner and Closing Remarks**

Student Round Table Panelists:

Applied Clinical Research- Tasha Champagne

John Giacona

Clinical Nutrition-

Brandon Kelly

Physical Therapy-

Richelle Lewis

Thomas Samaan

Physician’s Assistant Studies- Nina Nariman

Quoc-Uy Nguyen

Prosthetics & Orthotics-

Jan Karel Petric

Abstract Competition Submissions

Investigator: Patricia T Champagne, student, Applied Clinical Research (ACR)

Faculty mentors: Yi-Ting Tzen, Assistant Professor, ACR; Wei-Han Tan, Assistant Professor, Physical Medicine & Rehabilitation; Jijia Wang, Assistant Professor, ACR

Title: Predictors of One Year Pressure Injury Outcomes in SCI

Abstract

Research Scope: In the US there are ~250,000-400,000 people living with a spinal cord injury (SCI). More than one third of all people with SCI will develop a pressure injury in their lifetime. Pressure injuries are the leading cause of unexpected hospitalizations after SCI which accounts for a disproportionately high number of hospitalized days. Identifying clinical characteristics and modifiable factors may inform the development of clinically effective and efficient strategies of healthcare utilization.

Research Question/Hypothesis: The purpose of this study is to investigate predictors of wound outcomes at one year of discharge (healed, non-healed, and died with wound) of Veterans with SCI hospitalized with stage 3 or 4 pelvic pressure injuries without flap surgery.

Methods: Retrospective medical record review of patients admitted to the VA North Texas HealthCare System SCI/D unit between January 1, 2013 and December 31, 2018. All patients were divided into three groups based on the wound outcome at one year of discharge. Logistic regression analyses were conducted for the three groups. The predictive model was computed based on the subset of significant variables (backward method with significance level at 0.1), and the area under the receiver operating characteristic curve was calculated using the leave-one-out cross validation method. $P < 0.05$ was considered statistically significant.

Results: Total of 101 wounds were included for analyses. Significant predictors for the healed group are pre-albumin, nonviable cell, antimicrobial, hydrocolloid and alginate dressings (AUC=73.75%). Significant predictors for the non-healed group included intercept, age, albumin, pre-albumin, colostomy, nonviable cell, collagen, vac-instill, antimicrobial, and alginate dressings (AUC=84.24%). Age, Charlson comorbidity score, manual and power pressure relief, nonviable cell and medical grade honey were significant predictors for those who died with a wound (AUC=81.79%).

Conclusions: Clinical characteristics and modifiable factors such as, age, medical comorbidities, nutrition, bowel care, and wound care products are predictors of pressure injury healing. Further investigation on these factors is warranted in utilizing treatment and healthcare recourses for SCI individuals hospitalized with pressure injuries.

Funding sources: Supported by Grant #3180 from the Paralyzed Veterans of America Research Foundation.

Investigator: John M. Giacona, MPAS, PA-C1,2 Applied Clinical Research Ph.D. Student)

Faculty mentor: Wanpen Vongpatanasin, MD1,3 (Director of Hypertension Section and Professor of Internal Medicine)

Title: High-Density Lipoprotein is Independently Associated with Muscle Mitochondrial Function in Healthy Humans

Affiliations:

Hypertension Section¹, Internal Medicine Department, UT Southwestern Medical Center Department of Applied Clinical Research² School of Health Professions Cardiology Division³, Internal Medicine Department, UT Southwestern Medical Center

Abstract

Research Scope/Background: High-density lipoprotein cholesterol (HDL-C) is well known to play an important anti-atherogenic role via its involvement in reverse cholesterol transport. Prior studies in mice have suggested a novel role of HDL in enhancing muscle mitochondrial function and muscle ATP synthesis during exercise via Apolipoprotein A1 (ApoA-I) induced glucose oxidation. However, the relevance of this finding in humans remains unknown.

Research Question/Hypothesis: We therefore hypothesize that circulating HDL levels and/or function are correlated with muscle mitochondrial function in humans.

Methods: We conducted a cross-sectional study to determine the relationship between levels and function of HDL and skeletal muscle mitochondrial function in 31 healthy adults without diabetes mellitus or cardiovascular disease. To estimate muscle mitochondrial function, we measured the oxygen recovery time constant (Tau) during supra-systolic cuff-occlusions following 2 minutes of rhythmic handgrip exercise at 30% maximal voluntary contraction in the forearm muscle, using near infrared spectroscopy (NIRS). To assess HDL cholesterol efflux capacity (CEC), we used J774 macrophages, radiolabeled cholesterol, and ApoB-depleted plasma to calculate cholesterol efflux normalized to a pooled sample.

Results: Of the 31 subjects, 13 (42%) were female, mean age was 40 +/- 16, mean BMI was 23.9 +/- 3.4 kg/m², and the mean total serum cholesterol was 198.4 +/- 43.1 mg/dL. We found a significant inverse correlation between HDL-C levels and Tau, with a correlation coefficient (r) of -0.51 (p < 0.01, Figure. 1a). As expected, a positive correlation is observed between BMI and Tau (r= 0.50, p < 0.01, Figure 1c). In contrast, no significant correlation between fasting triglyceride, plasma glucose, insulin levels, or HDL efflux function with Tau were found (all p-values > 0.05).

Conclusion: Our study identifies a novel association between circulating HDL-C levels with muscle mitochondrial function. However, the CEC of our sample was not significantly correlated with Tau. Therefore, future investigations with larger studies or

more measures of HDL function and composition may elucidate these findings. The association of HDL-C and muscle mitochondrial function may explain increased prevalence of physical inactivity among populations with low HDL-C, such as those with metabolic syndrome. Additionally, future studies are needed to determine if strategies to improve HDL-C levels will result in improved muscle mitochondrial function and exercise capacity.

Collaborators: Ursa B. Petric¹ (UTSW Medical Student), Suzanne Saldanha, Ph.D.³ (Research Associate), Scott A. Smith, Ph.D.² (Chair and Professor, ACR Department), Anand Rohatgi, MD³ (Professor of Internal Medicine)

Funding Source: R01 HL133179: Preventing Hypertension and Sympathetic Over-Activation by Targeting Phosphate

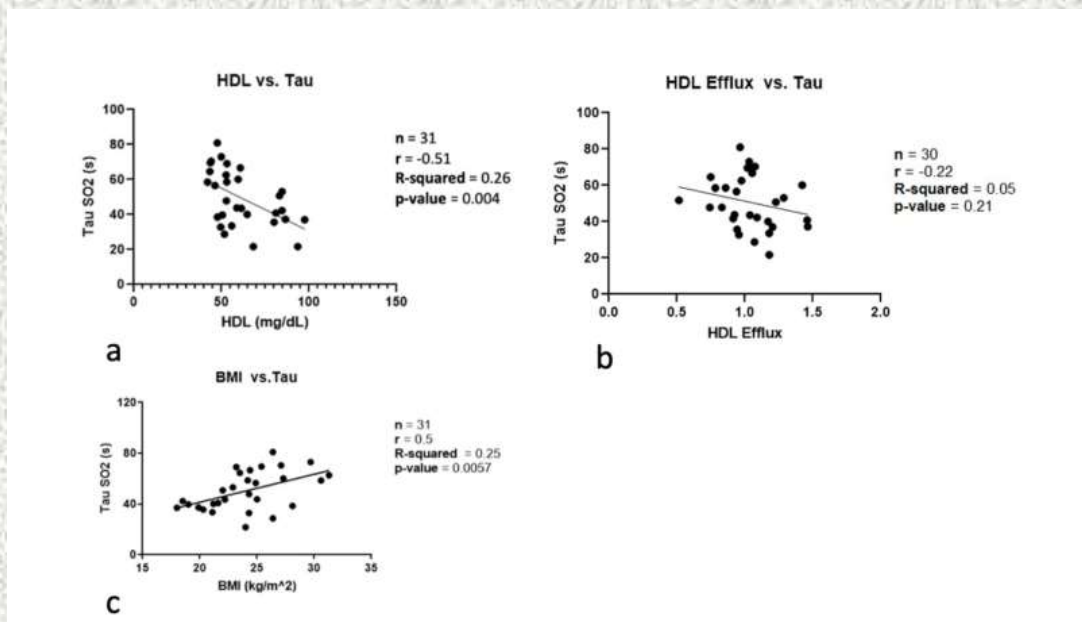


Figure. 1 Scatter plots showing correlations of (a) fasting serum HDL (mg/dL), (b) cholesterol efflux capacity, and (c) BMI (kg/m²), with oxygen recovery time constant (Tau).

Investigator: Tiffany Graham, Assistant Professor, Prosthetics and Orthotics

Title: A Comparison of Energy Expenditure with Level of Amputation in Patients with Diabetes Mellitus

Investigators:

Matthew Johnson, DPM; Department of Orthopaedic Surgery (PI)

Kirsten Tulchin-Francis, PhD; Texas Scottish Rite Movement Science (co-PI)

Jijia Wang, PhD; Department of Applied Clinical Research (co-I)

Dane Wukich, MD; Department of Orthopaedic Surgery (co-I)

Abstract

Research Scope: Diabetes Mellitus leads to more lower extremity amputations in the United States than any other factor. Lower extremity amputations can occur on many levels, from single digit amputations to complete leg amputation and may include joint disarticulations. Previous studies have shown the transfemoral amputation to have higher metabolic costs than the transtibial amputation, but the differences between a transtibial amputation and the transmetatarsal amputation, both common procedures in the diabetic populations, has not been examined. Empirical evidence shows transmetatarsal amputees have lower activity levels than transtibial amputees, and transfemoral amputees have lower activity levels than transtibial amputees. Surgical best practice has been to preserve as much of the limb as possible, but this creates an interesting juxtaposition between empirical evidence of transmetatarsal amputees' and transtibial amputees' potential for unlimited community ambulation.

In this study, we will assess metabolic differences and patient-reported outcome differences between the transmetatarsal amputation (TMA) and transtibial amputation (TTA), and compare these results to an age-matched control group for persons with Diabetes Mellitus. The target number of subjects is 45 persons with Diabetes Mellitus (15 with TTA, 15 with TMA, and non-amputated control group). Subjects will undergo a six minute walk test, and two surveys: The Foot and Ankle Ability Measure (FAAM) and the Patient-Reported Outcomes (PRO) Measurement Information System (PROMIS). Results will expose trends and provide pilot data for use in a larger future study which may have the potential to influence surgical best practices and treatment decision-making.

Investigator: Rie Ishizawa, PhD, RD, Department of Applied Clinical Research

Faculty mentors:

Title: The Role of Gut-Derived Toxin in Blood Pressure Control in Obesity

Abstract

Research Scope: Obesity can be induced by high-fat diet and is associated with an increased number of gut gram-negative bacteria. The bacterium produces a toxic substance known as lipopolysaccharide (LPS). LPS is shown to trigger cardiovascular system dysfunction. It is plausible that the induction of LPS by high-fat diet may impact blood pressure (BP) response, contributing to the abnormal circulatory responses in obesity. Thus, we hypothesize that abnormal BP response to exercise in obesity results from an increased gut gram-negative bacterial LPS by high-fat diet. Additionally, dietary fiber has shown to reduce the negative-bacterial LPS, thus, as an intervention we also hypothesize that dietary fiber can improve the abnormal circulatory response in obesity by reducing LPS from gut negative bacteria. The study also suggests that gut microbiota and its endotoxin, LPS, might be contributing factors to obesity-related cardiovascular dysfunction. Our findings could lead to the development of effective strategies that reduce the global burden of obesity-induced cardiovascular complications in this high-risk population.

Current Specific Aims: The current proposal aims to examine the mechanisms of gut gram-negative bacterial LPS that play role in inducing abnormal autonomic cardiovascular control in high-fat diet induced obesity.

Methods Employed in the Research: To test our hypothesis, we will perform experiments to determine whether LPS augments neuronal and BP responses to mechanical stimulation in skeletal muscle afferents via mechanosensitive ion channel Piezo1 (Measurements: BP in decerebrated rats, neuronal responses in muscle-nerve preparation, and Piezo1 protein levels and Ca^{2+} concentration in neuronal cell line 50B11). We will also perform tests to examine whether abnormal neuronal and BP responses to mechanical stimulation in high-fat treated obesity rats (10% fat, 70% carbohydrate, and 20% protein for 8-9 weeks) can be ameliorated by dietary fiber chitin (Measurements: BP in decerebrated rats, neuronal responses in muscle-nerve preparation, and Piezo1 protein levels in neuronal cell bodies).

Collaborations:

Co-Investigator: Hoda Yeganehjoo, PhD, RD, Department of Clinical Nutrition
<https://profiles.utsouthwestern.edu/profile/118790/hoda-yeganehjoo.html>

Collaborators: Masaki Mizuno, PhD, Department of Applied Clinical Research
<https://profiles.utsouthwestern.edu/profile/107580/masaki-mizuno.html>

Bibliography:

Rie Ishizawa, PhD, RD, Department of Applied Clinical Research
<https://profiles.utsouthwestern.edu/profile/182066/rie-ishizawa.html>,
PubMed: <https://www.ncbi.nlm.nih.gov/myncbi/rie-ishizawa.1/bibliography/public/>

KEYNOTE SPEAKER

E. Sherwood Brown, M.D., Ph.D. M.B.A



Title: “Microbiome and Brain Health”

Biography

E. Sherwood Brown, M.D., Ph.D. M.B.A., is Professor of Psychiatry with Tenure, the Lou and Ellen McGinley Distinguished Chair in Psychiatric Research and Aradine S. Ard Chair in Brain Research, Vice Chair for Clinical Research, Chief of the Division of Clinical Neuroscience, and Director of the Psychoneuroendocrine Research Program at The University of Texas Southwestern Medical Center. He received B.A. and Ph.D. degrees in Chemistry from Texas Christian University. He received an M.D. degree from the University of Texas Medical School at Houston, and completed a psychiatry residency, on the research track, at UT Southwestern Medical Center followed by a research fellowship. He also completed an M.B.A., with Healthcare Organization Leadership Concentration, at the University of Texas at Dallas. He is board certified in psychiatry and consultation-liaison psychiatry and is Secretary of the Academy of Consultation-Liaison Psychiatry.

He serves on several journal editorial boards including *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging* and *Journal of Affective Disorders*, and is Editor-in-Chief of the *Journal of Dual Diagnosis*. Dr. Brown’s research focuses on comorbidities of mood disorders including medical illness and substance abuse. He has had numerous grants from NIH and private foundations, including grants from NIAAA and NIDA examining the treatment of patients with bipolar disorder and substance dependence, a grant from NHLBI examining the treatment of depressed asthma patients, NIA exploring neurosteroid treatments for peri-menopausal depression and NIMH examining the effects of stress and corticosteroids on the human brain. He has published over 200 research papers, books, chapters, reviews and editorials.