



Research Strategic Plan 2021-2026

Updated, July 2024

2021 TUCOM Research Annual Report and Strategic Plan

Through achieving research initiatives, we will move forward together by increasing funding to support research that makes a difference in the lives of those we serve and expanding other multiple TUCOM research projects.

STRATEGIC PLANNING PROCESS

The 2021 TUCOM Department of Research Annual Report and Strategic Plan was a collaborative effort between the Department of Research, OMM Department, and Dean's Office from June 2021 – September 2021, with leadership from the Senior Associate Dean. In alignment with the mission, this report encompasses the scope of current research within the COM and highlights the unique strategic goals for future growth and improvement in research and scholarly activity. The Dean issued final approval for the plan on October 25, 2021.

RESEARCH STRATEGIC PLAN 2021-2026

Goals and objectives

1. INCREASE RESEARCH FUNDING

a. BASIC SCIENCE RESEARCH

- i. Grow major funded projects with critical mass (developed in detail in section 2)
- ii. Increase staff support from Office of Sponsored Programs (OSP)
- iii. Develop new physical infrastructure

b. CLINICAL RESEARCH

- i. Expand clinical trial research with additional faculty and staff support
- ii. Expand OMM and/or Ultrasound to assess health outcomes

c. EDUCATIONAL RESEARCH

- i. Continue to grow educational grants. Examples include Health Resources and Services Administration Grants
- ii. Expand interprofessional research to include public health initiatives

2. INCREASE COLLABORATIONS

- i. Increase our current collaborations with other TUC Colleges
- ii. Increase our current collaborations with other TUS colleges:
examples are:
 1. the TUS Seed and Bridge funds which have been obtained by several of our faculty
 2. The MODI (Metabolism, Obesity and Diabetes Initiative) spearheaded by Provost Salomon Amar at TUS
- iii. Increase our current collaborations with other local, national, and international universities

3. INCREASE STUDENT RESEARCH

- a. Augment summer projects for students between first and second year
- b. Augment budgeted stipends for the above
- c. Augment student travel funding for presentations at OMED and professional conferences
- d. Strengthen and augment the MSMHS research initiatives

ANNUAL REPORT WITH STRATEGIC INITIATIVES

Objective: To grow major funded projects with a critical mass of researchers. Integration between focused research, curriculum with emphasis in nutrition, and outreach activities produces students with a distinctive profile.

1. Focused research to attack the metabolic root of chronic disease: metabolic syndrome

TUCOM endeavors to create an environment whereby our college may become a leader in advancing the frontiers of knowledge in nutrition, metabolism and diabetes while translating this excellence into the pedagogical options for our students and clinical practice by fostering an integrated approach of focusing teaching and interaction between basic scientists and clinicians.

For over 15 years our strategic plans have allowed us to create the facilities, environment and infrastructure that *encourages, supports and rewards focused* research in the basic,

clinical and health sciences. The process is linked to faculty adequacy, clear goals, and budget.

Targeted faculty hiring has been successful and allowed for development of a critical mass of researchers under an overarching theme. Curbing the morbidity and mortality associated with the epidemics of obesity and type 2 diabetes necessitates attacking the root, metabolic syndrome, which afflicts over 35% of our population.

Together, our campus is leading research in these areas across the translational spectrum, from animals to clinical studies. Exploring new paradigms including the pathogenesis of fatty liver (NAFLD and NASH), postprandial lipoprotein kinetic studies, fructose restriction intervention, lipoprotein metabolism, intestinal metabolism of fructose and cardiovascular research are among the key components of our bench research activities. These are paralleled with clinical lipidology and diabetes research.

We strongly believe that all these elements associated with an integrated curriculum with emphasis in nutrition, a committed student body and our global health emphasis will potentiate our results and produce medical students with a thorough understanding of metabolism, capable of translating this knowledge to the patient. In recent years, approximately 5-10% of TUCOM students participated in research. With implementation in 2023-2024 of a new student research initiative with dedicated funds to support supplies, student stipends and travel to conferences for presenters, TUCOM supported 27 students engaging in summer research projects, representing a >2-fold increase in participation compared to 2022 and 2023 academic years. Student doctors present at an Annual Research Appreciation Day that has occurred every year for the past 22 years, as well as at national (OMED, AOA Research Conference, SOMA) and international events. In 2024, COM faculty and students presented 67 abstracts at Touro Annual Research Day; 50 of the 67 abstracts (75%) involved 1-4 COM student doctors.

2. Integrated curriculum with emphasis in nutrition

It is a known fact that biochemistry and physiology, as taught in most medical schools is not given its medical context nor its practical importance and that nutrition is not given its necessary weight. Students at TUCOM are taught biochemistry, nutrition, clinical lipidology and endocrinology by the same clinical researchers that are contributing to current knowledge. They visit their laboratories, and participate in Annual Research Day activities, as well as OMED, which helps them understand *prima facie* the intricate workings of metabolism and its direct clinical application.

Nutrition elective courses are offered for students who desire to get a deeper understanding. To change bias towards obese patients we implemented the Fundamental for an Osteopathic Obesity Designed Study (“FOODS”) in which students are given questionnaires to diagnose obesity prejudice over the span of their curriculum as they receive the integrated pedagogical experiences with emphasis in obesity and metabolism.

The change in their perception is monitored over their curriculum.

Since 2022 there has been targeted hiring of two new faculty specialized in lifestyle medicine (Dr. Traci Stevenson, DO; Dr. Shipra Bansal, MD) to strengthen the delivery of the nutrition curriculum and provide specific clinical teaching experiences that promote a deeper understanding of the obesity and diabetes epidemic, all contributing to the training of a well-informed, curious, and compassionate student body prepared to provide specialized care for this growing cardiometabolic epidemic.

3. Continued growth and development of Osteopathic Research in OMM/OPP

TUCOM strives to maintain excellence and leadership in current OMM/OPP research as well as continued growth and development of projects which uniquely demonstrate the value of the Osteopathic profession. Ongoing research includes investigation on impacts of osteopathic manipulative treatment for patients with gastroparesis, plagiocephaly, breastfeeding difficulties, and autism spectrum disorder. Additionally, TUCOM is helping to lead the field of Osteopathic Research into a new direction with Dr. Wolf's founding of the Conference of Osteopathic Research and Knowledge (CORK). CORK is anticipated to be an annual conference that unites top researchers in the field to support and mentor each other. The inaugural conference is happening June 2024 in conjunction with NYITCOM and will also kick off the 150th year of osteopathic medicine.

Additional data regarding all current TUCOM OMM research, including student projects, is included in Appendix B.

a) RIOT- Reducing Inflammation with Osteopathic Treatment - Melissa Pearce, DO
Melissa G. Pearce, DO led a team to implement and complete this study as conceived by Dr. Michael Clearfield looking at whether subclinical inflammation, as in the setting of diabetes, metabolic syndrome, and obesity, can be reduced by using Osteopathic Manipulative Treatment (OMT). The American Osteopathic Association (AOA) provided grant funding of \$150,000 and the final report was submitted in early 2022 to the AOA. Attempts to publish the results may be sought in the future.

b) OMM & Autism Spectrum Disorder- Kimberly Wolf, DO
Kimberly Wolf, DO partnered with Robert Hendren, DO (Child and Adolescent Psychiatry UCSF) and the Oak Hill School to investigate the benefits of OMT in patients with ASD. Dr. Wolf treated and observed over a dozen patients who were being regularly treated with OMT and witnessed positive improvements in mood, decreased aggression, increased eye contact, reduced stimming behaviors, etc. A case series based on the earliest encounters was published in the International Journal of Osteopathic Medicine in December 2023. There was a plan to move forward with a prospective study, but due to COVID-19 and Dr. Wolf's relocation, that project will not move forward at this time. Dr. Wolf continues to lecture on this work nationally, which has gained a lot of interest. She will be presenting it at the American Academy of Pediatrics' National Conference in fall of 2024. Dr. Wolf is also working with a

team of students from TUCOM and several other osteopathic medical schools to complete a scoping review of body-based complementary and alternative medicine, including OMT, for treating autism spectrum disorder. This will be submitted for publication starting in summer 2024.

c) Osteopathic Plagiocephaly Treatment of Infants and Neonates (OPT-IN)

Dr. Wolf is conducting a randomized crossover trial in conjunction with Osteopathy's Promise to Children (OPC) comparing the standard of care (repositioning) to OMT for treating infants with plagiocephaly (flat head syndrome). They aim to enroll 122 patients in the study that are under the age of five months at the time of enrollment. Measurements of the patients' Cranial Vault Asymmetry Index (CVAI) and Cranial Index (CI) are being objectively measured and quantified using a new technology known as SoftSpot. This allows for measurements of CVAI and CI not only over time and between visits, but also immediately pre- and post-OMT. In addition to these measurements, head circumference and weight are being monitored as well. Participants are also being asked to complete a survey when the children are 12-months old to assess their overall health and development. Through an anonymous donor, Dr. Wolf has ~\$2.5 million to fund stage one of this study with a plan to launch funded stage 2 which will bring in a helmet arm.

d) UPON (Utilization of Pediatric OMT Now)

Dr. Wolf composed a survey that was launched in March 2023 that evaluated the use of OMT on pediatric patients. It was designed to look at the "supply" and "demand" of pediatric OMT. The survey was distributed through a variety of specialty organizations (including the American Academy of Pediatrics' Section on Osteopathic Pediatricians [AAP SOOPe], the American College of Osteopathic Pediatricians [ACOP], the American Academy of Osteopathy [AAO], and the Osteopathic Cranial Academy [OCA]) and social media osteopathic groups. The survey ended with over 200 respondents, majority of which were attending DOs utilizing pediatric OMT in their practice. The initial poster was presented at the 2024 ACOP's spring conference in Denver, CO and a manuscript is currently being composed with anticipated submission for publication in summer/fall 2024. Dr. Wolf has partnered with students from TUCOM and several other osteopathic schools to present this poster and they are helping with the manuscript as well. The project was also generously supported by Osteopathy's Promise to Children and staff support from Western University of Health Sciences

e) Scoping Review on OMT for the Breastfeeding Dyad

Dr. Wolf has partnered with Drs. Eileen Conaway (Myrtle Beach, SC) and Alice Chen (UCSD) to design a scoping review on the use of OMT to treat the breastfeeding parent and the breastfeeding infant. Conditions covered in the search include latch difficulties, colic, and reflux for the infant along with carpal tunnel, neck pain, and recurrent mastitis for the breastfeeding parent. Initial search was run in June 2023 and the team has worked with several students and residents from various institutions to help with the review utilizing Covidence. The review is nearing completion and aiming for manuscript submission and publication in fall 2024. Additionally, the team was able to publish their protocol on Open Science Framework.

f) Effect of Osteopathic Manipulative Treatment (suboccipital release) on Heart Rate Recovery - Dylan Loquist, OMS1, Ted Wong, PhD, Victor Nuno, DO

Specific Project Aims:

- Examine how (self-applied) suboccipital release OMT influences autonomic balance via parallel changes in heart rate variability (HRV).
- Determine the effectiveness of (self-applied) suboccipital release OMT to facilitate post-exercise heart rate recovery (HRR). To examine these aims, HRR and HRV were assessed in healthy subjects (n = 10-15) after performance of a bout of high-intensity interval training (HIIT) with or without OMT (suboccipital release) administered by a board-certified osteopathic physician. Subjects were recruited from the Touro University California student body. HRR and HRV were measured simultaneously using a mobile heart rate monitoring device (Polar H10®) with data collected and analyzed through pairing with heart rate (Polar Flow® and Polar Beat®) and HRV (Elite HRV®) phone applications linked to online data storage platforms. HRR analysis timeframes were 1 minute after peak exercise (HRR-1) and 2 minutes after peak exercise (HRR-2). HRV was monitored for a period of 5- minutes post-exercise. Both HRR and HRV recovery data were analyzed via a separate data collection bout to isolate recovery data and properly analyze the OMT's effect on HRR/HRV. Data collection is complete, analysis is ongoing, and publication may be sought in the future.

4. Continued Growth and Expansion of Anatomy Research

The TUCOM Anatomy team is developing a strong research program that is focused along two tracks: 1) the discovery of new knowledge of the biomechanics of the masticatory apparatus and 2) educational pedagogy. Drs. Teaford and Taylor, who joined TUCOM in 2015 and 2016, respectively, both study craniodental evolution in primates and other mammals. The bulk of their research has emphasized the biomechanics of the masticatory apparatus and dental microwear in evolutionary contexts, with a relatively modest amount of educational and translational/clinical work. When Dr. T. Smith joined TUCOM in 2020, he broadened and strengthened the anatomy research program by bringing much-needed expertise in educational pedagogy related to medical education in general and to anatomy education more specifically. The most recent hire of Dr. A. Smith in 2024 further strengthens the research program in craniodental biomechanics and evolution by bringing expertise in state-of-the-art methods of data collection and analysis and in furthering the potential for translational/clinical research.

Dr. Theo Smith

The Smith lab examines anatomical and medical educational practices through a variety of lenses, from qualitative narrative inquiry to assessment of knowledge development through educational technology. Current projects examine the use of virtual reality and 3D printing in medical education, creation and evaluation of LGBTQIA+ Health resources for medical education, and investigation and creation of inclusive anatomical resources. Dr. Smith is also currently a co-investigator on the Portfolios of People: Advancing Anatomical Representation Together (POP AART) project funded by the American Association for Anatomy.

Recent Publications:

- **Smith, T.C.** (2022). Re-examining our roots: Queer history and anatomy. *The Anatomical Record* 305, 968-982. <https://doi.org/10.1002/ar.24859>
- Husmann, MR, **Smith, T.C.** (2021). Do students know what they think they know?: Evaluating the relationships between online practice questions, knowledge monitoring, and course outcomes. *College Teaching* 70, 482-492. DOI: 10.1080/87567555.2021.1981213
- **Smith, T.C.**, Hechtel, L. (2019) Erectile dysfunction and the baculum. *Evolution, Medicine, and Public Health* 2019, 147-148. <https://doi.org/10.1093/emph/eoz023>
- **Smith, T.C.**, Husmann, P. (2019). Build-a-pelvis: A low-cost modeling activity to improve medical students' understanding of perineal anatomy. *Medical Science Educator* 29, 905-908. DOI 10.1007/s40670-019-00782-6.

Dr. Amanda Smith

Dr. Smith joined the TUCOM Anatomy faculty in Summer 2024. She is a broadly trained biological anthropologist and anatomist who specializes in feeding biomechanics. Her research combines advanced medical imaging and reconstruction, 3D modeling and structural analysis. She is an expert in finite element analysis (FEA), an engineering technique used to examine how objects of complex design respond to loads and applies this technique to answer questions about anatomical form-function relationships. Much of her work has focused on evolutionary biomechanics but in the last few years she has increasingly applied her expertise to address practical clinical problems such as diagnostic visualization of anatomical structures and planning of surgical procedures. Some of her recent and ongoing collaborative projects investigate the mechanics of alveolar cleft defects and repair, ontogenic changes in orofacial function, orbital fracture mechanics, lower limb mechanics and bony microstructure, pelvic shape and birthing stress, and mandibular form-function relationships.

Recent Publications:

- Oguma Watanabe, L.N., Rossi, A.C., **Smith, A.L.**, Ferreira-Pileggi, B.C., Prado, F.B., Freire, A.R. (2024). Three-dimensional characteristics of zygomatic arch morphology and its relation to the articular eminence in a Brazilian population. *Eur. J. Anat.* <https://doi.org/10.52083/HTWU4773>
- **Smith, A.L.**, Davis, J., Panagiotopoulou, O., Taylor, A.B., Robinson, C., Ward, C. V., Kimbel, W.H., Alemseged, Z., Ross, C.F. (2023). Does the model reflect the system? When 2D finite element analysis isn't "good enough." *Royal. Soc. Int. Foc.* 198, rsif.2022.0536. <https://doi.org/10.1098/rsif.2022.0536>
- Ledogar, J., Senck, S., Villmoare, B.A., **Smith, A.L.**, Weber, G.W., Richmond, B.G., Dechow, P.C., Ross, C.F., Grosse, I.R., Wright, B.W., Wang, Q., Byron, C., Benazzi, S. Carlson, K.J., Carlson, K.B., Pryor McIntosh, L.C., van Casteren, A., Strait, D.S. (2022). Mechanical compensation in the evolution of the early hominin feeding apparatus. *Proc. Royal Soc. B.* 289, 35703052. <https://doi.org/10.1098/rspb.2022.0711>
- **Smith, A.L.**, Robinson, C., Taylor, A.B., Panagiotopoulou, O., Davis, J., Ward, C.V., Kimbel, W.H., Zlemseged, Z., Ross, C.F. (2021). Comparative biomechanics of the *Pan* and *Macaca*

mandibles during mastication: Finite element modeling of loading, deformation and strain regimes *Royal. Soc. Int. Foc.* 11, rsfs.2021.0031. DOI: 10.1098/rsfs.2021.0031

Dr. Andrea Taylor

The Taylor lab studies the biomechanics and evolution of primate feeding-system morphology, with a particular focus on musculoskeletal morphology and how primates meet the competing demands for bite force and gape. She is currently working on two projects. One aims to understand the relationship between fiber types in primate chewing muscles and chewing muscle performance (funded by NSF BCS 1719743). The other project combines experimental, ecological, and morphological data to address how changes during development influence feeding behavior, feeding-system morphology, and feeding performance in tufted capuchins, a hard-object feeding model primate (funded by NSF BCS 1944915).

Recent Publications:

- Holmes, M.A., Terhune, C.E., Chalk-Wilayto, J., Yoakum, C., Taylor, P., Ramirez, R., Solís, M.P., Polvadore, T.A., Ross, C.F., **Taylor, A.B.**, Dutra Fogaça, D., Laird, M.F. (2024). Ontogenetic changes in jaw leverage and skull shape in tufted and untufted capuchins. *Journal of Morphology* 285, e21705. <https://doi/10.1002/jmor.21705>.
- Laird, M., Polvadore, T.A., Hirschhorn, G.A., McKinney, J.C., Ross, C., **Taylor, A.**, Terhune, C., Iriarte-Diaz, J. (2024). Tradeoffs between bite force and gape in *Eulemur* and *Varecia*. *Journal of Morphology* 285, e21699. <https://doi/10.1002/jmor.21699>
- **Taylor, A.B.**, Terhune, C.E., Ross, C.F., Vinyard, C.J. (2024). The impact of measurement technique and sampling on estimates of skeletal muscle fibre architecture. *The Anatomical Record*. <https://doi.org/10.1002/ar.25415>
- Laird, M.F., Iriarte-Diaz, J., Byron, C.D., Granatosky, M.C., **Taylor, A.B.**, Ross, C.F. (2023). Gape drives regional variation in temporalis architectural dynamics in tufted capuchins. *Philosophical Transactions of the Royal Society B Biological Sciences*, 378, rstb.2202.0550. <https://doi.org/10.1098/rstb.2022.0550>

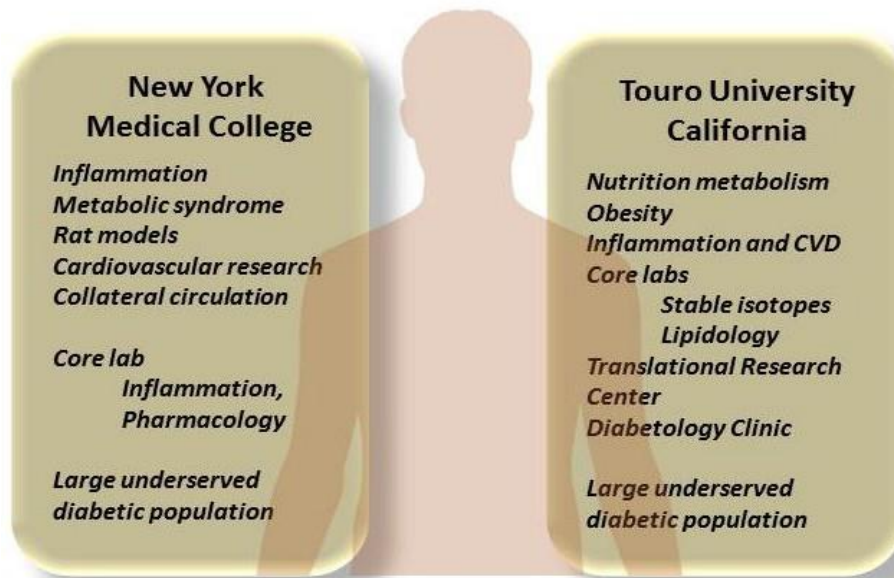
Dr. Mark Teaford

The Teaford lab uses microscopic wear patterns on teeth to gain a better understanding of the diet and paleobiology of our ancestors. His next experimental project will involve Brazilian laboratory primates fed foods of different properties with the aim of documenting interspecific differences in feeding and tooth wear.

Recent Publications:

- **Teaford, M.F.**, Ungar, P.S., Grine, F.E. (2023). Changing perspectives on early hominin diets. *PNAS* 120, e2201421120.
- **Teaford, M.F.**, Ungar, P.S., Vinyard, C.J., Ross, C.F., Laird, M.F. (2021). Grit your teeth and chew your food: Implications of food material properties and abrasives for rates of dental microwear formation in laboratory *Sapajus apella* (Primates). *Palaeogeogr. Palaeoclimatol. Palaeoecol.* 583, 110644.

5. Consolidation of present collaborative structures



One of our strategies to grow our research footprint has been to expand on our core critical mass of skills and equipment to tackle key issues in nutrition and public health that have a bearing on the current epidemics of obesity, diabetes, and their correlates on cardiovascular disease. This focus is aligned with the tenets of the osteopathic profession that focus on prevention of disease by appropriate nutritional and lifestyle advice as well as practice anchored around a public health message.

This expansion should occur at the local level, with new hires and new labs developed and by integrating our research efforts with NYMC as we have competitive counterparts that carry research that complements ours: inflammation and metabolic syndrome, as shown in the Figure above.

Two NIH-funded laboratories on campus function as a tight unit with our Metabolic Research Center that carry out bench research on human intervention studies to unravel the mechanisms of NAFLD, metabolic syndrome dyslipidemia and postprandial lipoprotein metabolism, all key components of atherogenesis.

- **Stable isotopes mass spectrometry laboratory.** Beyond providing state-of-the-art, user-friendly services the laboratory enables education and consultation for the design of translational clinical studies using stable isotopes. We have both experience and special expertise for complex kinetic studies to assess carbohydrate, lipid, and lipoprotein metabolism. The Mass Spectrometry Core is equipped with six GC-MS instruments and one triple quadrupole LC-MS/MS instrument. Kinetic measurements currently performed in the Mass Spectrometry Core Lab include:
 - Endogenous glucose production

- Gluconeogenesis and glycogenolysis
- Lipolysis (Ra glycerol and Ra palmitate)
- *De novo* lipogenesis
- Lipoprotein kinetics (ApoB48 and ApoB100)
- Triglyceride production

Personnel:

Director: Professor Jean-Marc Schwarz, PhD.

Laboratory Manager: Sergiu P. Paliu, Ph.D.

Over the past 15 years our work has shown that high fructose and sugar containing beverage/diets cause hepatic fat accumulation and production, which lead to increased risk of diabetes and cardiovascular disease. Using State-of-the-art stable isotope tracer methodology, we have uncovered that the liver conversion of sugar to fat (de novo lipogenesis, DNL) may be a fundamental mechanism linking diet, sugar, and insulin resistance to the metabolic syndrome at the origin of diabetes and CVD. This methodology can be applied in different research directions from fundamental mechanistic clinical studies to public and global health approaches. This methodology can be further developed to better understand the metabolic stages from pre-diabetes to diabetes. By identifying the tissue/organ at the origin of the glucose metabolic defect and targeting the most effective treatment to prevent the progression from pre-diabetes to diabetes.

The laboratory employs techniques that allow the study of triglyceride rich lipoprotein metabolism and clinical chemistry using the Randox Rx Imola.

The core has developed:

- An immunoaffinity procedure to separate chylomicrons from VLDL for the study of postprandial lipoprotein metabolism

The laboratory carries the following methods:

- All apolipoproteins ELISAs, gut hormone ELISAs, apolipoprotein profiles (Western)
- Sequential flotation density ultracentrifugation
- Small dense LDL by gradient gel electrophoresis (tube- Lipoprint)
- HDL sub-fractions by gradient gel electrophoresis (Lipoprint)

Personnel:

Director: Grace Marie Jones, Ph.D.

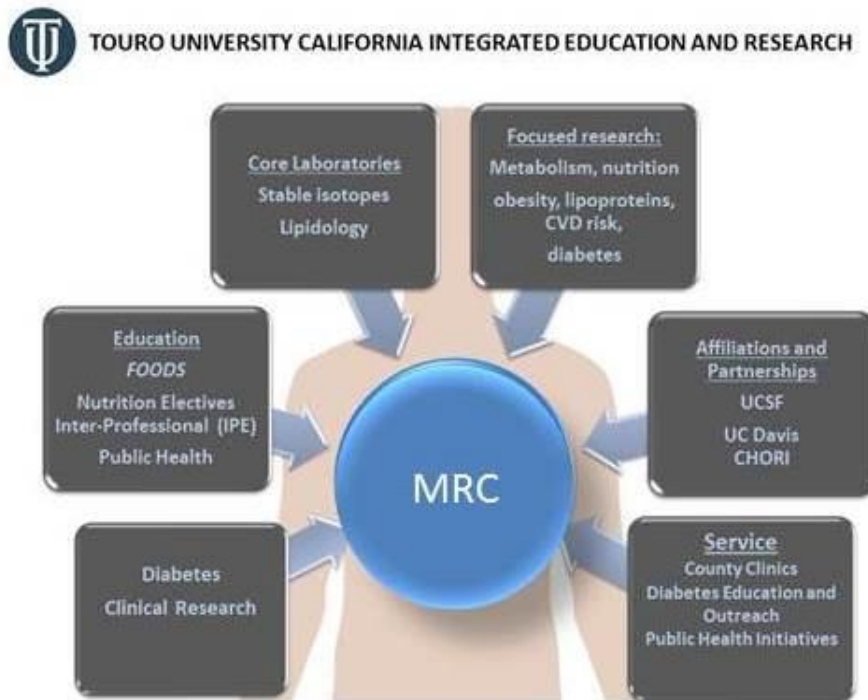
Lab Manager: Jocelyn Rojas, M.S.

- **Metabolic Research Center**

In an effort to promote human research studies and clinical trials on campus, we developed a Metabolic Research Center which started operations 9 years ago, ensuring that promising findings in the lab are applied to volunteer participants and the community in the fastest, safest and most efficient way possible.

This philosophy drives its collaborative, fast-track approach to advancing cutting-edge disciplines that help change paradigms and have a real potential to deliver prevention and a cure. The broad interplay among basic and clinical research, training as well as clinical and community-based activities under a cohesive, interactive, and unified group facilitates exponential growth of our research footprint.

The MRC not only provides a unique opportunity to consolidate and expand our existing collaborations with Bay Area institutions, it also performs studies for hire, and catalyzes the formation of a metabolic translational research group and further fosters collaborations as well. At present, faculty from UCSF such as Dr. Robert Lustig, and from UC Davis, Dr. Kimber Stanhope are Adjunct Faculty, bringing their expertise and studies to Touro University California. Initially, this new unit will be suited for outpatient clinical research studies, with eventual options to also conduct short inpatient studies. The association of this research clinic with an existing stable isotope mass spectrometry core, a clinical research core, a clinical chemistry core, the Solano County Research Clinic created a new and attractive facility for translational and Public Health investigators across the Bay Area.



6. Community Health: Diabetes and Related Complications

The Mobile Diabetes Education Center (MOBEC) at Touro University California exemplifies our commitment to community health and advancing health equity. In collaboration with local and state health departments, healthcare providers, and community organizations, MOBEC brings critical diabetes education and screening directly to underserved populations in Solano County, CA. Since its inception, MOBEC has conducted over 450 community visits, providing health screenings and educational resources to more than 12,000 individuals. By focusing on at-risk populations, MOBEC has identified numerous cases of undiagnosed diabetes and prediabetes, linking individuals to necessary care and prevention programs. This initiative raises awareness and bridges gaps in healthcare access, serving as a model for similar programs nationwide. Our efforts demonstrate the impact of community-based strategies in reducing health disparities and improving public health outcomes.

Outcomes

The success of this approach can be judged by the impact of our output:

- Together, in the past 13 years the main core laboratories at TUCOM, the Dean's Office and the MRC faculty have published over 200 peer reviewed papers in prestigious journals on our focused research (lipidology, metabolism, diabetes).
- Fueled by its currently established core laboratories and their synergy, and already extensively funded by NIH, our paradigm-shifting research has recently attracted widespread national and international press attention (Wall Street Journal, NY Times, CBS, BBC, Canadian TV documentaries, 60 Minutes, CNN, NBC, The Guardian, etc.).
- TUCOM extramural funding from 2010-2024 amounted to **\$20,421,484** and over 70% corresponded to the focus area of metabolism.
- We have active productive partnerships with national universities: UCSF, UC Davis, and UC Berkeley.
- Results from the FOODS surveys as the student cohort completes their curriculum show efficacy of our intervention.

7. Growing the COM research footprint

One of our successful strategies to grow the COM research footprint has been to recruit and retain high caliber research faculty. The new phase in our research development is also grounded on targeted hiring:

- Jay Shubrook, DO, joined COM as the Director of Clinical Research and Diabetes Services, in 2015 and brought his extensive expertise in teaching and clinical studies as well as his diabetes prevention and education programs and the Mobile Diabetes Education Center (MOBEC), which not only created a culture focusing on diabetes and wellness but also extended the efforts into the larger Solano County community filling in the care gap to advance health equity.

- A position was created in Basic Sciences for a faculty member that complemented our core research on Nutrition: Dr. Grace Jones has been appointed in January 2015. She bridges the teaching of the subject with our current research on human nutrition and has been successful at developing her own branched line of research. She has been awarded a TUS Seed Grant and was awarded an NIH R01 grant in 2022.
- Dr Shona Mookerjee joined the COM in late Dec 2021 and brings extensive expertise in mitochondrial and bioenergetic analysis. Her active research program bridges the stable isotope mass spectroscopy core at TUC and the resources available at the Buck Institute for Research on Aging, in Novato, CA. Recent work involving students centers on understanding the partitioning of energy production in models of cancer, muscle atrophy, and neurodegeneration, in collaboration with faculty at TUCOM, the Buck Institute, and New York Medical College.
- Dr. Shankar Chinta joined the COM faculty in September 2023, bringing with him a wealth of experience in both teaching and research, particularly in the field of neurodegenerative diseases. Dr. Chinta is dedicated to mentoring, training MS, and DO students in basic science research projects, fostering their development as future researchers and healthcare professionals. Alongside his publications in high-impact journals, Dr. Chinta has been awarded a TUS Seed Grant and is actively seeking NIH funding to advance his research.
- Dr. Amanda Smith joined the COM in July 2024. As a trained biological anthropologist and anatomist who specializes in feeding biomechanics, she brings extensive expertise that ideally complements the research activities of the COM Anatomy faculty. Her research combines advanced medical imaging and reconstruction, 3D modeling and structural analysis. She has a high potential for obtaining extra-mural funding in the near future, and has actively engaged graduate and medical students in her research program.
- Dr. Clipper Young, PharmD, MPH, joined the COM in July 2015 and became the Director of Clinical Research in July 2024. Dr. Young has led and participated in community-focused chronic disease prevention and management initiatives. His work emphasizes improving chronic diseases and pharmacotherapies management through innovative, community-based programs that address both clinical and social determinants of health. Key projects and programs include: (1) Mobile Diabetes Education Center (MOBEC); (2) Pharm2Home Initiative; (3) Prevention Forward Program. Dr. Young has authored over 30 peer-reviewed publications and presented his work at national conferences, emphasizing the integration of diabetes management, clinical pharmacy, and public health, as well as the impact of community-based interventions on health outcomes. His work exemplifies a commitment to leveraging academic research/scholarship and community engagement to enhance chronic disease management, specifically diabetes care, addressing both medical and social determinants of

health. These initiatives have not only provided much-needed healthcare services to the underserved populations in Solano County but also contributed data and insights into the broader field of diabetes research, aligning with the strengths of the college's research in the field of metabolism and cardiometabolic health.

8. TUCOM Faculty Securing Federal Funding

In addition to the successes of the metabolic core (Drs. Schwarz and Jones) who have a proven track record in securing **NIH funding** for their respective research programs, in Fall 2023 Dr. Tamira Elul, Professor in the Department of Foundational Biomedical Sciences, was awarded an R15 grant from the National Institutes of Health for her project titled "Cannabinoid Signaling Interactions During Axon Development in situ". The grant, which assesses how increased prenatal cannabis exposure impacts the developing brain, provides funding for summer research training for six medical and master's students over three years.

Aligned with our strategic initiative to grow **educational grants** from sources such as the Health Resources and Services Administration (HRSA), Dr. Nathalie Bergeron, TUCOM Associate Dean of Research and Dr. Catherine Cone, TUCOP Associate Dean of Assessment were awarded a 5-year HRSA grant for their project titled "Engaging students from underserved North Bay Counties for success in health professions careers - The TUC HCOP Academy". Touro University California's Health Careers Opportunity Program (HCOP) will help economically or educationally disadvantaged students overcome common barriers to consideration of healthcare as a career option. Through provision of summer health careers programs, post-bac programs and scaffolded mentoring programs, the TUC HCOP Academy will enhance undergraduate degree completion, enrollment into and graduation from health profession programs, and preparation to practice in underserved communities. Support mechanisms such as faculty and peer mentoring, career development, non-cognitive skills development, academic and social support, financial aid information, counseling, stipend awards, and student scholarships will encourage growth and retention of students in their career path, while promoting increased diversity of healthcare professionals better prepared to serve marginalized communities.

Future Goals

To increase our research footprint, we need to increase the funded faculty critical mass so as to put together a competitive NIH Program Project Grant. Such a project needs the core labs and at least 3 heavily funded (R01) laboratories (we currently have 2).

The opening of the H89 Research Clinic has rounded up our well-established, highly successful NIH funding and strengthened our partnerships with UCSF, UC Davis UC Berkeley and emerging partnerships with the VA Northern California Health Care System.

To that end, the Department of Foundational Biomedical Sciences has partnered with the Research Department to promote the hiring of 2 new bench researchers PIs, the hiring of whom has the following objectives:

- Increase the number of competitive NIH grant submissions and their revenue.
- Expand the research footprint in the area of metabolism to disorders that include cancer, muscle atrophy, and neurodegenerative diseases and beyond
- Additionally, due to the success of the stable isotope lab, more bench space has been allocated to the Schwarz and Jones teams to support this enhanced income flow.
- Increase the number of NIH R01 funded PIs to 5-6 to allow for the eventual opening of a PhD program funded, rounding up TUC as an academic research institute and fueling the research of the future of TUS. The Buck Institute for Aging Research, where two of our recently hired basic science faculty have adjunct appointments is very interested in this prospect and partnering with us to support the mentoring of PhD graduate students. TUC has a long history of working with Buck Institute faculty to support the training of student researchers.

We seek to put together a vibrant, extensive, diverse, well-funded and highly productive program that provides the foundation for high-quality, cutting-edge research in diabetes and related studies in obesity, metabolism, and endocrinology that is well positioned for rapid expansion.

Milestones and targets

We will monitor our strategic plan by:

- our productivity in number of papers;
- presentations, national and international recognition;
- student participation in research and scholarly work, supported by intramural funding;
- extramural funds obtained

Longer term goals

Our integrated research and pedagogic approach has the potential to produce a distinctive osteopathic physician better prepared to address the current obesity and diabetes epidemics.

The program will:

1. Expose both undergraduate and graduate students to obesity, metabolism and diabetes using a specialized focused curriculum
2. Integrate excellence in all phases of clinical training to further improve clinical

patient care

3. Advance the field of clinical education by developing and implementing models of inter-professional education and training
 4. Create a global, intellectual environment through collaboration with researchers both nationally and internationally
 5. Facilitate the translation of new research findings into novel therapies for patients with diabetes and metabolic diseases
 6. Train the next generation of scientists and clinicians in diabetes and metabolic diseases
 7. Provide continuing educational opportunities for health professionals
 8. Become the standard bearer for best practices in diabetes and metabolic diseases and its treatments
 9. Provide and deliver innovative health education curricula customized to meet patients' needs
 10. Provide multi-specialty care for the entire spectrum of diabetes and its complications and related metabolic diseases
 11. Offer free clinics and screening programs for diabetes and other metabolic diseases to the community
 12. Contribute to a healthy community that supports lifestyle changes to prevent or manage obesity, diabetes, its complications, and other metabolic and chronic diseases
 13. Develop strategies to overcome the unique socioeconomic and environmental barriers contributing to chronic disease in the region
-

Appendix A: Active Grants

2022-2023

COM Awards FY 22-23				
Title of Project	PI	Sponsor	Annual Awd	Total Awd
Pharm2Home Program - Pharmacist-Led Post-Hospitalization Surveillance Initiative	C. Young	Solano Sutter Hlth Hospital	\$150,000	\$150,000
Fructose: Substrate, Stimulus, or Both?	JM Schwarz	NIH (R01DK116033)	\$714,999	\$2,788,497
MOBEC Outreach 22-23	J. Shubrook	Kaiser (146252)	\$25,000	\$25,000
Building Capacity of the Public Health Workforce to Offer the NatBuilding Capacity of the Public Health Workforce to Offer the National DPP Lifestyle Change Program	J. Shubrook	ACPM Subcontract #1 (CDC NU3803000289)	\$6,000	\$6,000
Building Capacity of the Public Health Workforce to Offer the NatBuilding Capacity of the Public Health Workforce to Offer the National DPP Lifestyle Change Program	J. Shubrook	ACPM Subcontract #2 (CDC NU3803000289)	\$12,990	\$12,990
HHS: Improving the Health of Americans Through Prevention and Management of Diabetes and Heart Disease and Stroke-Financed in part by 2018 Prevention and Public Health Funds (PPHF)	J. Shubrook	CDPH (20-10293)	\$47,654	\$192,322
A Phase 2 Study of Once-Daily LY3502970 Compared with Placebo and OnceWeekly Dulaglutide in Participants with Type 2 Diabetes Mellitus	J. Shubrook	Lilly (Clinical Trial - J2A-MC-GZGE study)	\$0	\$68,183
TrialNet Pathway to Prevention	J. Shubrook	University of South Florida (TrialNet clinical trial)	\$0	\$310
Mobile Diabetes Education Center (MOBEC)	J. Shubrook	Solano Sutter Hlth Hospital	\$180,000	\$180,000
A Randomized, Double-Blind, Placebo-Controlled, Phase 3 Study with an Open-Label Extension Assessing the Efficacy, Safety, and Pharmacokinetics/ Pharmacodynamics of Tirzepatide in Pediatric and Adolescent Participants with Type 2 Diabetes Mellitus Inadequately Controlled with Metformin, or Basal Insulin, or Both (SURPASS-PEDS).	T. Hendriksz	Lilly (Clinical Trial - I8F-MC-GPGV study)	\$0	\$7,250
Portfolios of People: Advancing Anatomical Representation Together (POP AART)	T. Smith	American Association for Anatomy	\$17,500	\$17,500
Extra-hepatic postprandial metabolism of dietary fructose	G. Jones	NIH R01DK132064	\$320,540	\$1,282,160
The effects of orange juice compared with sugar-sweetened beverage	JM Schwarz	UC Davis	\$0	\$0
			\$1,474,683	

2023-2024

COM Awards FY 23-24				
Title of Project	PI	Sponsor	Annual Awd	Total Awd
Pharm2H0me Initiative	C. Young	Kaiser Permanente	\$25,000.00	\$25,000.00
Student Research Fellowship	J. Shubrook	New York	\$5,000.00	\$5,000.00
Student Research Fellowship	Elul	New York	\$5,000.00	\$5,000.00
Student Research Fellowship	Miller	New York	\$5,000.00	\$5,000.00
Student Research Fellowship	Mookerjee	New York	\$5,000.00	\$5,000.00
Bayer Clinical Trial	Shubrook	Bayer Industry	\$34,980.00	\$34,980.00
Cannabinoid Signaling Interactions During Axon Development in Situ	Elul	NIH	\$364,250.00	\$364,250.00
Nat'l DPP Group Coaching Certificate Pilot	Shubrook	ACPM	\$14,938.50	\$14,938.50
Bayer-Confidence Clinical Trial 2	Shubrook	Bayer Industry	\$32,112.00	\$32,112.00
hERG B-Catenin Dep Mod Neuro	T Elul	NYMC Seed Grant	\$50,000.00	\$50,000.00
Identifying the unmet psychosocial needs of individuals newly diagnosed with Type 2 Diabetes: Research Plan	C. Young	NYMC Seed Grant	\$31,800.00	\$31,800.00
Extra-hepatic postprandial metabolism of dietary fructose	G. Jones	NIH R01DK132064	\$288,486.00	\$1,153,944.00
Pharm2H0me Initiative	C. Young	Solano Sutter Hlth Hospital	\$166,267.00	\$166,267.00
MOBEC	Jay Shubrook	Sutter Health (Foundation)	\$171,062.00	\$171,062.00
The TUC HCOP Academy	Cone, C./N. Bergeron	HRSA	\$650,000.00	\$3,250,000.00
			\$ 1,848,895.50	

Appendix B: OMM/OPP Research

2024 OMM Department Research Update

- a) **RIOT- Reducing Inflammation with Osteopathic Treatment - Melissa Pearce, DO** is leading a team to implement and complete this study as conceived by Dr. Michael Clearfield looking at whether subclinical inflammation, as in the setting of diabetes, metabolic syndrome, and/obesity, can be reduced through the use of Osteopathic Manipulative Treatment (OMT). The American Osteopathic Association (AOA) provided grant funding of \$150,000 and milestone goals are imminent. Student involvement has been robust prior to the hiatus due to COVID. This study was completed at the end of 2021 with a final report submitted to AOA early 2022.

Hypothesis: OMT utilized in the setting of subclinical inflammation can reduce inflammation as measured by TNF-alpha, C-reactive protein (CRP), and other cytokines and biomarkers.

Key inclusion criteria: Diabetes, metabolic syndrome, and/or obesity (BMI 30+), elevated CRP as assessed at the screening visit, willing to forego NSAIDs/steroids for two weeks before and during the study. No physical medicine modalities such as Physical Therapy, OMT, acupuncture for six weeks before and during the study.

Key exclusion criteria: Cannot have actual inflammatory disease, such as rheumatoid arthritis, active Hashimoto's thyroiditis, ulcerative colitis, etc. Cannot have significant chronic pain, such as that rated as 7/10 or greater on a pain scale.

Summary Work Plan: 5-6 week study duration with four study visits. Screening visit, followed by two visits with an Osteopathic Structural Exam (OSE) for the control group and the inclusion of OMT for the treatment group. Visit 1 and Visit 2 are one week apart. Final visit one month after V2.

Implications: OMT has applications including and beyond the musculoskeletal system. Inflammation produces significant pathology and with the possibility of affirming the benefit of OMT for inflammation, there are implications for improvement in cardiovascular health and the effects of diabetes and many other conditions.

- b) **OMM & Autism Spectrum Disorder- Kimberly Wolf, DO**

Kimberly Wolf, DO partnered with Robert Hendren, DO (Child and Adolescent Psychiatry UCSF) and the Oak Hill School to investigate the benefits of OMT in patients with ASD. Dr. Wolf treated and observed over a dozen patients who were being regularly treated with OMT and witnessed positive improvements in mood, decreased aggression, increased eye contact, reduced stimming behaviors, etc. A case series based on the earliest encounters was published in the International Journal of Osteopathic Medicine in December 2023. There was a plan to move forward with a prospective study, but due to COVID-19 and Dr. Wolf's relocation, that project will not move forward at this time. Dr. Wolf continues to lecture on this work nationally, which has gained a lot of interest. She will be presenting it at the

American Academy of Pediatrics' National Conference in fall of 2024. Dr. Wolf is also working with a team of students from TUCOM and several other osteopathic medical schools to complete a scoping review of body-based complementary and alternative medicine, including OMT, for treating autism spectrum disorder. This will be submitted for publication starting in summer 2024.

c) Osteopathic Plagiocephaly Treatment of Infants and Neonates (OPT-IN)

Dr. Wolf is conducting a randomized crossover trial in conjunction with Osteopathy's Promise to Children (OPC) comparing the standard of care (repositioning) to OMT for treating infants with plagiocephaly (flat head syndrome). They aim to enroll 122 patients in the study that are under the age of five months at the time of enrollment. Measurements of the patients' Cranial Vault Asymmetry Index (CVAI) and Cranial Index (CI) are being objectively measured and quantified using a new technology known as SoftSpot. This allows for measurements of CVAI and CI not only over time and between visits, but also immediately pre- and post-OMT. In addition to these measurements, head circumference and weight are being monitored as well. Participants are also being asked to complete a survey when the children are 12-months old to assess their overall health and development. Through an anonymous donor, Dr. Wolf has ~\$2.5 million to fund stage one of this study with a plan to launch funded stage 2 which will bring in a helmet arm.

d) UPON (Utilization of Pediatric OMT Now)

Dr. Wolf composed a survey that was launched in March 2023 that evaluated the use of OMT on pediatric patients. It was designed to look at the "supply" and "demand" of pediatric OMT. The survey was distributed through a variety of specialty organizations (including the American Academy of Pediatrics' Section on Osteopathic Pediatricians [AAP SOOPe], the American College of Osteopathic Pediatricians [ACOP], the American Academy of Osteopathy [AAO], and the Osteopathic Cranial Academy [OCA]) and social media osteopathic groups. The survey ended with over 200 respondents, majority of which were attending DOs utilizing pediatric OMT in their practice. Initial poster was presented at the 2024 ACOP's spring conference in Denver, CO and a manuscript is currently being composed with anticipated submission for publication in summer/fall 2024. Dr. Wolf has partnered with students from TUCOM and several other osteopathic schools to present this poster and they are helping with the manuscript as well. The project was also generously supported by Osteopathy's Promise to Children and staff support from Western University of Health Sciences

e) Scoping Review on OMT for the Breastfeeding Dyad

Dr. Wolf has partnered with Drs. Eileen Conaway (Myrtle Beach, SC) and Alice Chen (UCSD) to design a scoping review on the use of OMT to treat the breastfeeding parent and the breastfeeding infant. Conditions covered in the search include latch difficulties, colic, and reflux for the infant along with carpal tunnel, neck pain, and recurrent mastitis for the breastfeeding parent. Initial search was run in June 2023 and the team has worked with several students and residents from various institutions to help with the review utilizing Covidence. The review is nearing completion and aiming for manuscript submission and publication in fall 2024.

Additionally, the team was able to publish their protocol on Open Science Framework.

f) Effect of Osteopathic Manipulative Treatment (suboccipital release) on Heart Rate Recovery - Dylan Loquist, OMS1, Ted Wong, PhD, Victor Nuno, DO

Specific Project Aims:

- Examine how (self-applied) suboccipital release OMT influences autonomic balance via parallel changes in heart rate variability (HRV).
- Determine the effectiveness of (self-applied) suboccipital release OMT to facilitate post-exercise heart rate recovery (HRR). To examine these aims, HRR and HRV were assessed in healthy subjects (n = 10-15) after performance of a bout of high-intensity interval training (HIIT) with or without OMT (suboccipital release) administered by a board-certified osteopathic physician. Subjects were recruited from the Touro University California student body. HRR and HRV were measured simultaneously using a mobile heart rate monitoring device (Polar H10®) with data collected and analyzed through pairing with heart rate (Polar Flow® and Polar Beat®) and HRV (Elite HRV®) phone applications linked to online data storage platforms. HRR analysis timeframes will be 1 minute after peak exercise (HRR-1) and 2 minutes after peak exercise (HRR-2). HRV will be monitored for a period of 5-minutes post-exercise. Both HRR and HRV recovery data were analyzed via a separate data collection bout to isolate recovery data and properly analyze the OMT's effect on HRR/HRV. Data collection is complete and analysis is ongoing and publication may be sought in the future.

g) The Effect of Osteopathic Manipulation on Diabetic Gastroparesis

Dr. Nicole Peña is conducting a study with Dr. Jay Shubrook and students assessing the effect of OMT on patients with diabetic gastroparesis. At this stage, the study is a series of cases exploring the effects of OMT on the symptoms and burden of illness of people with diabetic gastroparesis. This is intended to be exploratory to support the concept of a larger randomized trial. Patients report their gastroparesis symptoms before and after OMT using the GCSI, a reliable and valid instrument for measuring symptom severity in patients with gastroparesis. We also assess glycemic control via continuous glucose monitors, quality of life as assessed by SF-36v2 Health Survey, depression as assessed by the PHQ-9. Patients continue to receive the standard of care treatment for diabetic gastroparesis, and they have the benefit of up to 6 OMT appointments. So far, multiple poster presentations and student papers have been produced from this case series study. There is concern about enrollment feasibility if this study proceeds to a RCT with a grant, since the actual study enrollment is less than 10 participants from 2022-2024.

h) OMM & Autism Spectrum Disorder- Kimberly Wolf, DO

Kimberly Wolf, DO partnered with Robert Hendren, DO (Child and Adolescent Psychiatry UCSF) and the Oak Hill School to investigate the benefits of OMT in patients with ASD. Initially observed 6 patients who were being regularly treated with OMT and witnessed

positive improvements in these patients in mood, decreased aggression, increased eye contact, reduced stimming behaviors, etc. A case series based on these initial encounters has been submitted for publication. In fall 2019 UCSF IRB approved a formal prospective study treating new patients at Oak Hill with OMT. Due to Dr. Wolf's maternity leave and COVID the start of this project has been delayed but is scheduled to begin fall 2021. These students will receive regular OMT featuring a protocol + five minutes of individualized treatment and outcomes will be monitored by physicians, school administrators, teachers, therapists, and family.

i) The Effect of Osteopathic Manipulation on Diabetic Gastroparesis

Dr. Nicole Peña is conducting a study with Dr. Jay Shubrook and students assessing the effect of OMT on patients with diabetic gastroparesis. At this stage, the study is a series of cases exploring the effects of OMT on the symptoms and burden of illness of people with diabetic gastroparesis. This is intended to be exploratory to support the concept of a larger randomized trial. Patients report their gastroparesis symptoms before and after OMT using the GCSI, a reliable and valid instrument for measuring symptom severity in patients with gastroparesis. We also assess glycemic control via continuous glucose monitors, quality of life as assessed by SF-36v2 Health Survey, depression as assessed by the PHQ-9. Patients continue to receive the standard of care treatment for diabetic gastroparesis, and they have the benefit of up to 6 OMT appointments. So far, multiple poster presentations and student papers have been produced from this case series study. There is concern about enrollment feasibility if this study proceeds to a RCT with a grant, since the actual study enrollment is less than 10 participants from 2022-2024.

- The Effect of Osteopathic Manipulation on Diabetic Gastroparesis – Shalaya Asal Yazdi, MPH, MS, OMSII, Danielle Tucker, DO, Grace Hwang, MS, OMSII, Itzel Maldonado, MS, Amun Majeed, MS, Jay H. Shubrook, DO, Nicole Peña, DO
 - AAO 2024 Convocation LBORC-NUFA poster presented March 2024
 - ACOFP poster presented August 2023
 - Touro Research Day poster presented 2023
 - AAO 2023 Convocation LBORC-NUFA poster abstract submitted
- The Effect of Osteopathic Manipulation Treatment on Diabetic Gastroparesis- Itzel Maldonado MS and Amun Majeed MS
 - MSMHS Student Research Paper and Presentation- April/May 2023

Additional research projects:

- **Osteopathic Approach to Diabetes Complications** - Shalaya Asal Yazdi, MPH, MS, OMSII, Nicole Peña, DO, Jay H. Shubrook, DO
Status: Literature review paper written for submission to JOM 2024.
- **OMT and Wound Care-** Nicole Pena, DO, Sara Sievers, DO, Stephanie Fischer, OMS2, Sarah Perrin, DO, Kevin Miller, DPM, Jay Shubrook, DO

Goal and status: Assess the impact of OMT on wound healing. IRB written and currently working on developing team and location for conducting study. Once details finalized will update IRB and submit for approval.

- **COVID-19 Immunization Study-** Melissa Pearce, DO, Nicole Pena, DO, Vanessa Newman, DO, Kimberly Wolf, DO

Goal and status: Study developed in collaboration with Western University of Health Sciences OMM Department and AOF. Western continued ahead with study on their campus and we were acknowledged for contribution to the protocol development in their recent publication.

TUCOM Faculty Innovation Grants

2023-2024

Faculty: Kimberly Wolf, DO, Sean Moloney, DO, and Victor Nuño, DO

Title: Library of Osteopathic Videos for Education and Didactics (LOVED)

Total Dollar Amount Funded: \$1995

Abstract: The OMM Department desires to create a comprehensive video library that would serve multiple purposes. This video technique's library would primarily serve as a supplement to the Osteopathic Principles & Practice Curriculum taught in the preclinical years. It would also be a resource for third- and fourth-year students while on clinical rotations. Finally, this would be a tool for our alumni and affiliated clinical faculty to encourage continued development and implementation of OMT into practice. This library could also serve as a marketable tool to help support Touro's GME collaborations who are seeking a designation of Osteopathic Recognition.

Status: funded and the LOVED project continues to evolve to meet changing student and faculty needs.

2022-2023

Faculty: Theodore C. Smith, PhD, Kimberly Wolf, DO, Shona A. Mookerjee, PhD, Nicole J. Peña, DO, Traci Stevenson, DO

Title: Diverse and Inclusive Osteopathic Patient Encounters Using Virtual Reality

Total Dollar Amount Funded: \$1975

Abstract: Authentic and effective curricular content dedicated to addressing healthcare needs of marginalized communities is a major step towards reducing health inequalities 1–3. Virtual Reality technology has recently been identified as a possible tool to provide effective clinical education 4–8. Using 360° cameras and Wonda software, this project aims to create unique osteopathic standardized patient encounters (SPEs) for use at TUC to show pre-clinical and clinical students the best practices for treating patients from the LGBTQIA+ community. This project will be evaluated using pre-/post-activity assessments that will aim to determine osteopathic clinical skill growth and student experience satisfaction.

Status: Grant awarded, and development of resources is an ongoing project.

2021-2022

Faculty: Michael Warner, DO, Jordan Keys, DO, Kimberly Wolf, DO, Melissa Pearce, DO, Sean Moloney, DO

Title: OPP Video Technique Library (OPP-VTL)

Total Dollar Amount Funded: \$1999

Abstract: This project involves a collaborative effort of TUC OPP faculty to create a series of short videos that explain how to perform Osteopathic Manipulative Treatment (OMT) procedures and conduct Osteopathic Manipulative Medicine (OMM) hands-on diagnosis/assessment. In anticipation of the 2019-2020 academic year, the OPP department – spearheaded by work by Kimberly Wolf, D.O., assembled a 467-page Manual. The Manual describes all palpatory and treatment exercises as a reference for all OPP courses. Descriptions include written instructions and pictures (faculty plus model).

In anticipation of the 2020-2021 academic year, accommodation for COVID-19 placed more emphasis on remote learning, while minimizing time on campus. Students were intended to review the Manual, watch selected techniques in the VTL, and then experience short duration hands-on instruction in the OPP laboratory. If TUC experiences any “all remote” periods of instruction in the future, these videos will be an irreplaceable reference for OPP learning.

Status: Funded and VTL were developed and are an enduring resource that is continually utilized in the OPP curriculum and evolving/updating as needed with time.

Additional TUCOM Student OMM/OPP Research Projects

OMM/OPP Clinical Distinction Projects

Last Name	Frist Name	Project Title	Course	Sponsor
Cline	Peyton	An Introspective Journal on the Clinical Integration and Application of Neurology and OMM	Clinical Distinction 1	Dr. Joshua Alexander
Nguyen	Luan	Introduction to Osteopathic Medicine	Clinical Distinction 2	Dr. Timothy Dowling
Scott	Dominique	Comparing the Tenets of Osteopathic Medicine to the Principles of Chiropractic	Clinical Distinction 1	Dr. Sean Moloney
Senger	Kayla	OMM Mini Fellowship	Clinical Distinction 1	Dr. Melissa Pearce
Yazdi	Shalaya	Research of the impact of Osteopathic Manipulative Treatment on Diabetes	Clinical Distinction 2	Dr. Jay Shubrook

Other OMM/OPP Student Research Projects

1. *Dylan Loquist 2021 MSMHS, now OMS1 – Heart Rate Recovery Following Suboccipital Tension Release.*

Heart rate recovery was monitored after volunteers physically exerted themselves comparing application of self-administered suboccipital l tension release versus control. Lower HRR recovery times are associated with better cardiovascular health. Self-OMT administration revealed lower HRR times. For the 2021-2022 academic year, Victor Nuno, DO is elevating this IRB approved project to better apply OMT and monitor outcomes.

Purpose of the following community outreach messages and relevance to osteopathic medicine and osteopathic manipulative treatment (OMT):

Patient testimony of OMT outcomes has been considered anecdotal. As of 2021, documentation

of the History in an outpatient/office encounter in the health record is no longer part of the physician payment formula. Instead, patients themselves are encouraged to answer the standardized History questions to providers so the information can be used as the subjective History in the health record. This process reduces provider clerical burden and also empowers patients to report their experiences with disease and previous treatment efforts. This policy change changes the patient's words from anecdotal to an official entry into the health record. This opens the door for patients of osteopathic physicians to capture OMT outcomes data. This discoverable data can be used to justify medical necessity for OMT administration and also serve as a resource for OMT research.

2. *Shalaya Yazdi, MPH, 2021 MSMHS, now OMS1– Community outreach message encouraging patients to read their health records.*

IRB M2120 - A YouTube video was created delivering a message with over a dozen Master of Science and Osteopathic medical students and a faculty member to raise awareness and importance of reading your health record after a medical encounter. Reading one's record helps check for accuracy as well as engaging patients to take an active role in patient-provider communication. An associated Qualtrics survey assesses viewer concerns, beliefs, and inclinations to read their health records.

3. *'Jori' Charles Enfield 2021 MSMHS, now OMS1 – Community outreach message reviewing new verbiage in the 2021 CPT manual.*

IRB M0821 - A YouTube video was created delivering a message with over a dozen Master of Science and Osteopathic medical students to analyze a new paragraph in the 2021 CPT manual regarding health record documentation for outpatient/office medical encounters. This paragraph replaces nearly 2 pages of text from 1995-2020 and changes the rules as to what the provider must document in regard to the History and Examination. The paragraph updates policy removing documentation of the History and Exam from the physician payment formula. The paragraph promotes a patient authored History questionnaire. An associated Qualtrics survey assesses viewer concerns, beliefs, and inclinations toward this new policy.

4. *Jaspreet Dhanoya, 2021 MSMHS - Community outreach message encouraging patients to answer all history questions in preparation for every medical encounter.*

IRB M0621 - A YouTube video was created delivering a message with over a dozen Master of Science and Osteopathic medical students to promote and discuss active engagement of patients to prepare for a medical encounter by answering a series of standardized questions. An associated Qualtrics survey assesses viewer concerns, beliefs, and inclinations toward this type of active engagement.

5. *Charndee Sahota, 2021 MSMHS - Community outreach message encouraging medical students to view health record documentation through the lens of all 7 osteopathic core competencies.*

IRB M0721 - A YouTube video was created delivering a message with over a dozen Master of Science and Osteopathic medical students and a faculty member to frame health record documentation through each of the core competencies. An associated Qualtrics survey assesses viewer concerns, beliefs, and inclinations toward this consideration of health record documentation through the lens of core competencies.

6. *Kyle Chung, 2021 MSMHS - Community outreach message addressing how a patient can represent*

their experience with a chronic condition in their health record.

IRB M1421 – A YouTube video was created delivering a message with over a dozen Master of Science and Osteopathic medical students, a faculty member, and a chronic disease advocate to consider how a person can represent their experience with a chronic disease in their health record. An associated Qualtrics survey assesses viewer concerns, beliefs, and inclinations toward this consideration of health record documentation through the lens of core competencies.