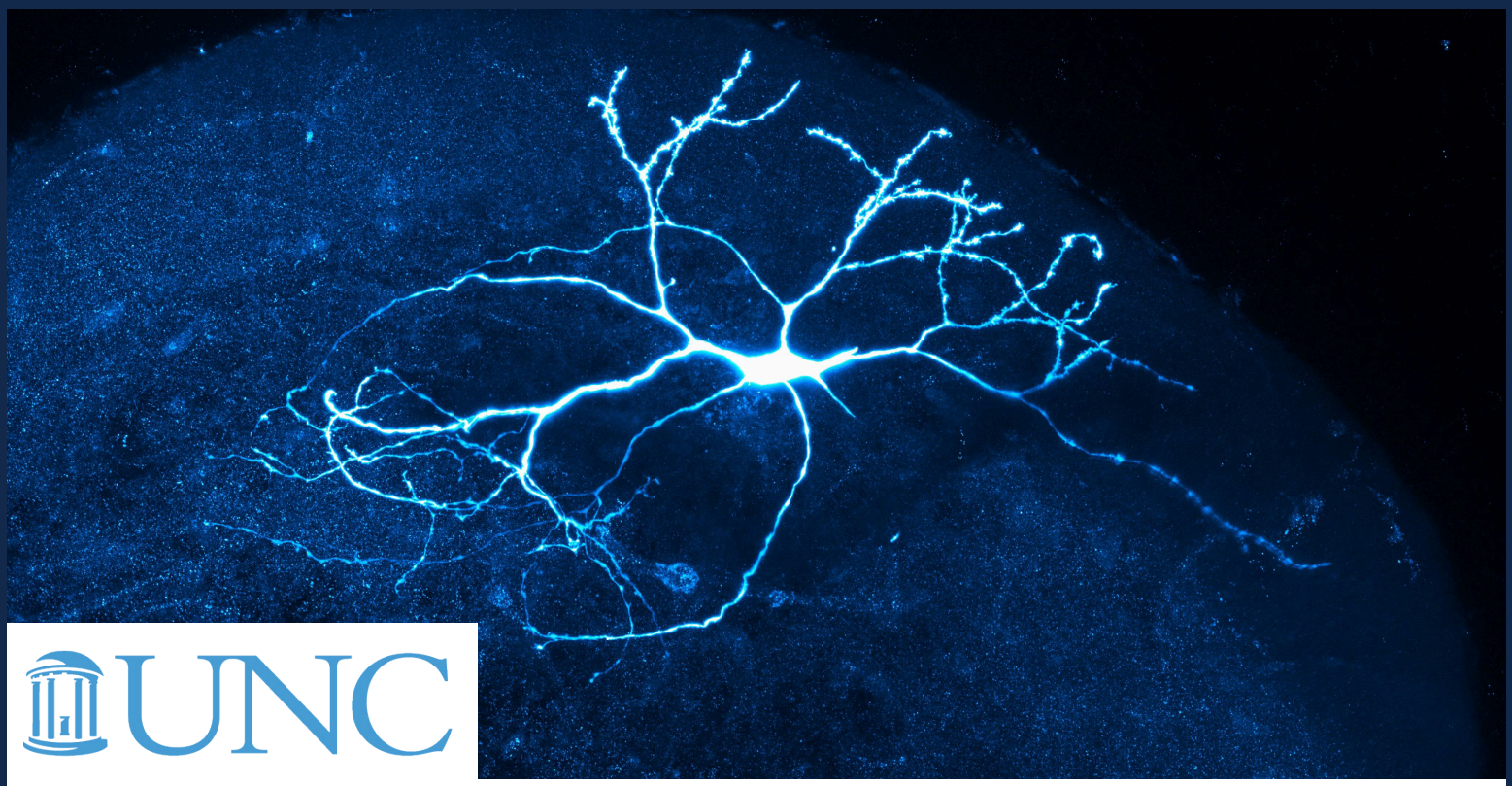


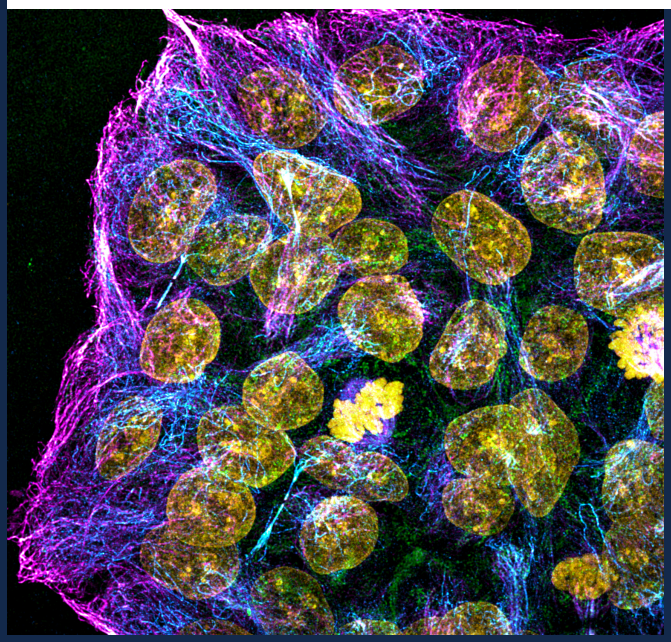
UNC

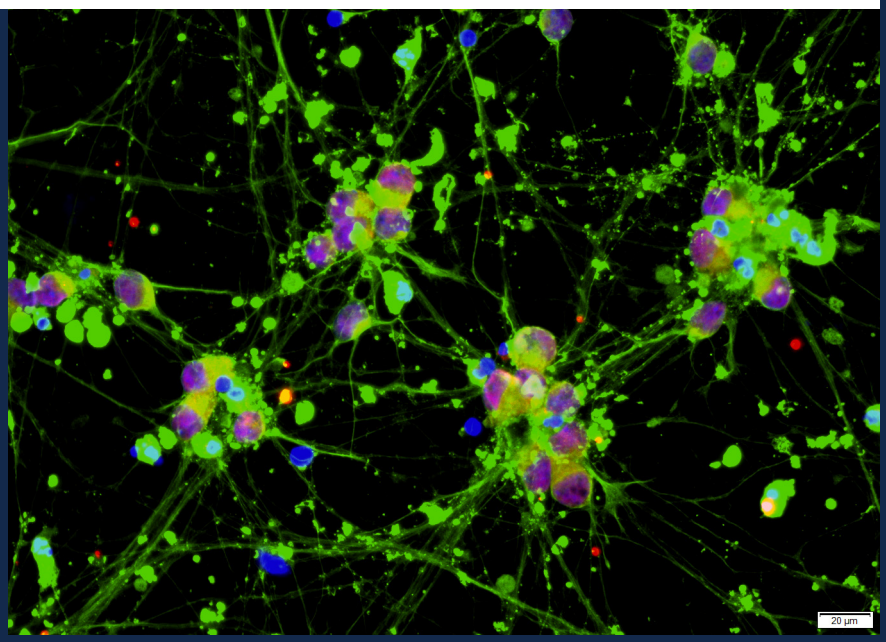
SCHOOL OF MEDICINE

RESEARCH ROUND UP

2025 Edition

A compilation of the most noteworthy research highlights from our departments.





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UNC
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Department of Anesthesiology


Matt Mauck

The Department of Anesthesiology research team is dedicated to developing innovative, non-addictive therapies to alleviate chronic pain affecting millions of Americans. **Dr. Matt Mauck, MD, PhD**, an Associate Professor within the Department, is collaborating with investigators from across the country as part of an NIH-funded team science initiative to pull together his expertise in vision neuroscience and chronic pain. The aim of this work is to identify neural mechanisms that underlie the phenomenon of light-driven analgesia and to develop novel approaches to reduce chronic pain using light delivered to the retina. To date, this work has examined retinal inputs to non-imaging forming regions of the brain that are also involved in pain perception using cutting-edge imaging techniques and light stimuli. The team has also demonstrated that colored light delivered to the retina in a novel, rat model of fibromyalgia ameliorates widespread pain.


Sarah Linnstaedt

Complementing these efforts, the Linnstaedt Lab, led by **Sarah Linnstaedt, PhD**, investigates how stress-immune mechanisms shape chronic pain outcomes after acute injury. Postdoctoral scholar **Lauren McKibben, PhD**, has published three manuscripts that demonstrate the roles of early-life adversity, adult stressors, and immune mediators in chronic pain vulnerability. Doctoral candidate **Erica Branham** received an NIH F31 award to study epigenetic mechanisms underlying the development of chronic pain following traumatic stress. Additionally, the lab's NIH HEAL-funded research has identified FKBP51, a stress-system protein, as a promising therapeutic target for preventing chronic pain. Together, these projects advance understanding of pain pathogenesis and pave the way for safer, more effective treatments.

Department of Biochemistry and Biophysics

We're excited to share that the Biochemistry and Biophysics team has received a Multi-PI R01 grant from the National Institute on Aging (NIA) for the project **"Epigenetic Regulation of Nuclear cGAS Activity in Aging-Related Inflammation."** Officially launched on August 15, 2025, this milestone underscores our commitment to advancing aging research through collaboration. The initiative is led by **Qi Zhang, PhD,** and **Pengda Liu, PhD**, with key contributions from **Brian Strahl, PhD,** and **Rob McGinty, PhD**. The research focuses on how epigenetic mechanisms regulate nuclear cGAS activity—a critical pathway in aging-related inflammation—with potential to reveal new therapeutic targets for age-associated diseases. This achievement reflects the strength of our interdisciplinary BCBP community and its dedication to impactful science. Congratulations to the entire team for driving innovation in aging research!

The UNC CryoEM Core is a hub for collaborative research, enabling team science across multiple disciplines in structural biology under the Directorship of **Joshua Strauss, PhD,** with faculty advisor **Saskia Neher, PhD**. Established in 2019, the Core supports investigators with advanced cryo-electron microscopy (cryoEM) technology and expert guidance, driving groundbreaking discoveries. In 2025, the Core's collaborative efforts led to the resolution of two significant molecular structures: **Gunn et al**. revealed the helical organization of lipoprotein lipase (LPL) in storage vesicles, using cryogenic electron tomography to visualize inactive filaments at 4.2 Å resolution. Meanwhile, **Skrajna et al**. introduced nickel-NTA lipid-monolayer affinity grids, achieving high-resolution cryoEM structures of the human nucleosome at 2.6 Å and a sub-100 kDa Sro7 complex at 3.1 Å. These achievements highlight the Core's vital role in advancing team-driven science and solving complex molecular structures that inform biological understanding and innovation. The Core was also the recipient of a $2M NIH high end shared instrumentation grant that will support the acquisition of a KriosG4 microscope and expand the research capabilities of the core to perform cutting-edge cryoET and microED experiments.

Department of Biomedical Engineering

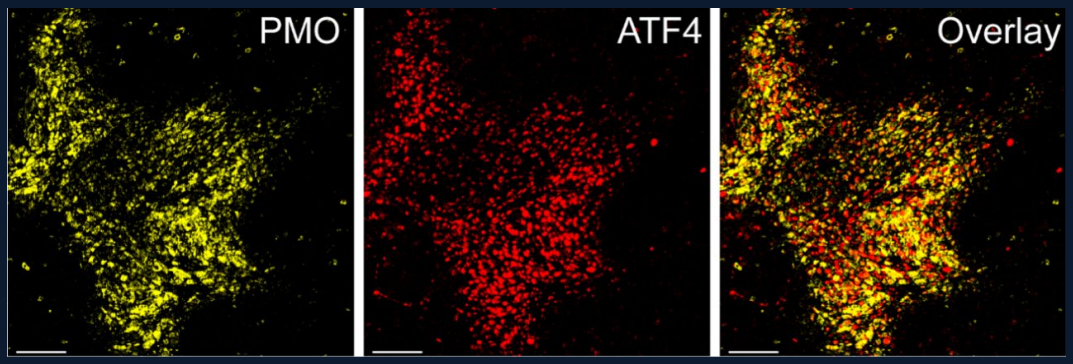
Ross W. Lampe Jr., an NC State alumnus and philanthropist, committed a historic $20 million investment to the department, leading to its renaming as the Lampe Joint Department of Biomedical Engineering. This gift, the second largest in NC State's College of Engineering history, will advance the department's mission to unite engineering and medicine to improve lives. The endowment provides long-term support to amplify research and commercialization in areas such as biomedical imaging, microdevices, rehabilitation engineering, regenerative medicine, and pharmacoengineering. With approximately 50 faculty and more than 600 students, Lampe BME is the second largest BME Department in the US, driving research and innovation, and preparing a workforce for one of the fastest growing employment sectors in North Carolina.

Researchers from Lampe BME and UNC Eshelman School of Pharmacy received up to $5.6 million through the CATALYST program, sponsored by ARPA-H. The project, led by **Yanguang "Carter" Cao, PhD**, (Pharmacy) and **William Polacheck, PhD,** (BME) aims to develop AI tools that predict how antibody-based therapies behave in the human body and improve modeling of antibody distribution, activity, and toxicity. Antibody drugs are powerful therapies but predicting how they move through the body and interact with tissues remains a major challenge. By combining computational modeling with biological data, the team seeks to more accurately simulate complex processes, support animal-free research applications, and guide the design of safer, more effective human-relevant treatments.

Through a collaboration between researchers at UNC School of Medicine, Lampe BME, and SonoVascular, Inc., a medical device called the SonoThrombectomy™ System reached a major clinical milestone of moving to First-In-Human clinical studies. The catheter-based ultrasound therapy system is designed to break down blood clots for patients with deep vein thrombosis. Early outcomes suggest the device can eliminate clots in a single session without blood loss and may preserve venous structures. Investigators are encouraged by these results and are now working toward initiating a pivotal U.S. trial pending FDA approval.

Department of Cell Biology and Physiology

When immune cells experience prolonged cell stress, immunotherapy fails. In a paper published in *Immunity*, **Jessica Thaxton, PhD, MsCR,** identified a conserved stress-sensing pathway in tumor-infiltrating T cells that, when chronically active, induces an exhausted cell state. Activating transcription factor 4 (ATF4) could be the lynchpin in controlling immune cell stress in hypoxic tumor microenvironments (Figure). Thaxton discovered that chronic ATF4 activity in CD8 T cells was driven by tumor hypoxia and the activation of the integrated stress response pathway, resulting in impaired antitumor immunity. Using mice and samples from cancer patients, they showed that chronic ATF4 activity may serve as a mechanism of PD-1 inhibitor therapy non-response in solid tumors and concluded that ATF4 inhibition could enhance therapeutic efficacy. Thaxton's team recently received a Translational Award from the V Foundation to expand their research and test drugs that reverse T cell exhaustion, improving clinical outcomes of immune therapies.



Thaxton's team injected mouse tumors with a hypoxia protein marker (yellow) and a marker for ATF4 (red). The two regions overlapped perfectly, implicating ATF4 in immune cell stress in tumors. Image Credit: Jessica Thaxton, PhD.

The brain's ability to support complex cognition depends on producing the right balance of neurons in the cerebral cortex during development. In a recent study published in *Nature*, **Eva Anton, PhD,** identified how the tuberous sclerosis complex (TSC), a collection of proteins that regulate cell metabolism, shapes the architecture of the developing human brain. During cortical development, radial progenitor cells give rise to intermediate progenitors that expand the brain's number of neurons through symmetric division. Anton's team found that deleting TSC proteins disrupts this balance, leading to an overproduction of upper-layer neurons and abnormal neuronal connectivity within cortical units. Even more interesting, they found that human-specific regulatory enhancer sequences modulate TSC expression to fine-tune progenitor cell ratios. These tweaks may have driven the expansion of upper-layer neurons in the cerebral cortex necessary for the evolution of higher-order brain functions in humans.

Eva Anton

Department of Dermatology

Christopher Sayed, MD, led genetic investigations within the Hidradenitis Suppurativa Program for Clinical and Research Excellence (HS ProCARE), in collaboration with **Karen Mohlke, PhD,** and **Yun Li, PhD**, supported by NIAMS grant 5R01AR083790. This work culminated in a *British Journal of Dermatology* publication identifying novel genetic risk loci for hidradenitis suppurativa (HS) and elucidating underlying mechanisms involving the **SOX9** and **KLF5** loci previously discovered by the team. These findings substantially advance understanding of HS pathogenesis by linking specific genetic variants to known pathways of keratinocyte differentiation and inflammation, thereby providing new insights into disease susceptibility and potential therapeutic targets.

Christopher Sayed

Nancy Thomas, MD, PhD, led the *Genes, Environment, and Melanoma Study* to elucidate genetic determinants of melanoma risk, supported by NCI grant R01 CA233524. Her team identified inherited genetic variants that predispose individuals to multiple primary melanomas, providing critical evidence for a heritable component in melanoma susceptibility. These findings, published in *Cancer Epidemiology, Biomarkers & Prevention* and *JNCI Cancer Spectrum*, advance understanding of genetic risk factors influencing melanoma multiplicity and inform strategies for patient counseling and surveillance. Collaborators from the University of North Carolina, including Drs. **Kathleen Conway, PhD, David Ollila, MD,** and team members **Sharon Edmiston**, **Eloise Parrish**, and **Honglin Hao**, contributed to this work.

Nancy Thomas

Department of Emergency Medicine

The Global Emergency Medicine program's goal is to develop a sustainable, accessible model of emergency medicine education among frontline healthcare workers across Kenya. **Julianne Cyr, MPH, Justin Myers, DO, MPH, FACEP**, and **Carolyn Rapp, MD,** used Implementation Mapping to work with local clinicians, administrators, and regulators to assess the implementation needs and identify key players, outcomes, action steps, and strategies for adoption of the World Health Organization's Basic Emergency Care Course into clinical education.

Amy Ising, PhD, led a multidisciplinary team to improve emergency department surveillance for sexual violence (SV) in NC. The performance of several machine learning methods for SV classification was compared to rules-based definitions, using NC's statewide syndromic surveillance system. The UNCH SANE program provided subject matter expertise and the NC Coalition Against Sexual Assault provided feedback on data dissemination.

An evaluation of SV rules-based definition improvements is published in the Journal of Public Health Management and Practice.

Department of Family Medicine

Emily Hawes *Brianna Lombardi* *Erin Fraher*

A Health Affairs study led by **Emily Hawes, PharmD, Brianna Lombardi, PhD, and Erin Fraher, PhD**, finds physician training in rural and community health center settings more than doubled between 2008 and 2024. Released as Congress debates funding for Teaching Health Centers and other GME programs, the research demonstrates the return on investment of these initiatives and counters the myth that rural communities cannot develop GME programs. By measuring training at the actual site level, the study shows strong growth in family medicine rural training, while pediatric training lags, underscoring the need for targeted strategies to improve access.

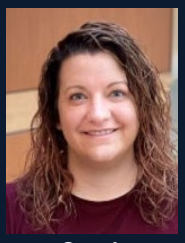
Adam Goldstein *Leah Rranney*

A study led by **Adam Goldstein, MD, MPH**, and **Leah Ranney, PhD**, published in *JAMA Network Open*, found graphic health warnings on little cigars and cigarillos significantly increase quit intentions and cessation behaviors compared to text-only or no warnings. In a randomized trial of 1,029 adult users, participants exposed to graphic warnings reported higher intentions to quit and were more likely to attempt quitting and reduce use. These findings provide critical evidence for the FDA to strengthen cigar warning regulations, addressing a long-standing gap in tobacco control and reducing health disparities among vulnerable populations.

Nadja Vielot

A study led by **Nadja Vielot, PhD**, and published in *Annals of Internal Medicine* confirms the real-world effectiveness of the recombinant zoster vaccine (RZV) in adults aged 65 and older. Using Medicare claims data from 2007–2019, researchers found two doses of RZV provide greater protection against shingles than one, even when the second dose is delayed. One dose was 56.1% effective, while two doses increased protection to 67.9%, reinforcing the importance of completing the two-dose series.

Department of Genetics



Sarah Schoenrock

The Department of Genetics was nationally ranked second overall for NIH funding last year. Faculty submitted 30% more grants and were awarded 14% more grants in FY25 compared to FY24, including 38 new awards. Genetics faculty and trainees published 297 papers, a 22% increase over FY24. The department utilized resources from the FY24 Academic Investment Fund to support the development and management of new interdisciplinary and collaborative team science grants. **Sarah Schoenrock, PhD**, serves as the faculty Director of Research Project Management, a role to support the development, administration, and project management of large team science grants. Over the past five years, the faculty's success has driven strategic investment in this initiative, resulting in the hiring of four scientific research project managers to work with Dr. Schoenrock. This department-supported resource for faculty reduces the administrative and project management burden of leading a project that involves a large interdisciplinary team applying to a complex funding mechanism, and enables the faculty to focus on the science, resulting in a more competitive application and once awarded, the successful completion of research aims and renewed funding.

Ten large team science grant proposals were submitted by the department in FY25, including competitive renewals and grant extensions. Four team science awards were received, totaling more than $10M in total costs. **Karen Mohlke, PhD**, was awarded a five-year RC2 from NIDDK to develop a *"Resource to interpret genetic signals and multi-tissue mechanisms for type II diabetes (T2D) and related traits"*. **Terry Magnuson, PhD,** renewed a long-standing U42 grant funded by the NIH Office of the Director, for *"A Carolina Center to Characterize and Maintain Mutant Mice"*. **Melissa Haendel, PhD,** was awarded an extension year of *"Iron-CLAD: securely advancing AoU participant characterization with proven platforms and collaborations"* by the NIH Office of the Director, and **Jason Stein, PhD,** received a new Other Transaction (OT) grant from the NIH Office of the Director for his project titled *"Modeling autism-associated gene-by-environment interactions in human brain organoids"*. The department plans to continue investing in collaborative team science grants.

Karen Mohlke *Terry Magnuson* *Melissa Haendel*

Department of Health Sciences

Vanessa Jewell, PhD, OTR/L, FAOTA, is an Associate Professor in the Division of Occupational Science & Occupational Therapy and is the Director of the Diabetes Research & Wellness Collaborative. She collaborates with multiple stakeholders nationally to develop and test novel healthcare assessments and interventions for rural families with a child living with type 1 diabetes (T1D) to promote family participation, quality of life, and child health outcomes. She was the PI on a foundation grant to develop and establish psychometric properties for the Diabetes Health Management and Distress Scale- Parents of Children, a novel health management routine measure. She is an investigator on a NIH/NIDDKD grant that will map neurocognitive risk and protective factors for children with T1D and is the PI on an AOTF Intervention Grant that is testing the feasibility of the REAL-Fam telehealth occupational therapy intervention. The REAL-Fam is a complex lifestyle management intervention, adapted with community partners to ensure its validity and usefulness to rural families.

Vanessa Jewell

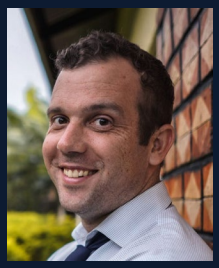
Julia Drouin, AuD, PhD, is an Assistant Professor in the Division of Speech & Hearing Sciences and Director of the Auditory Language Learning Laboratory. Her research examines how listeners with hearing loss adapt to acoustically degraded speech, drawing on behavioral, cognitive, and physiologic approaches. In partnership with the UNC Pediatric Audiology Clinic, her recent work was funded by a Clinical Research Grant from the American Speech-Language-Hearing Association and extends into sleep science to examine how hearing loss impacts learning, fatigue, and sleep architecture in children. Preliminary findings suggest that children with hearing loss show markers of disordered sleep and heightened fatigue, including shorter sleep durations and later bedtimes. Her ongoing goal is to advance interdisciplinary research in the audiology field while training the next generation of scientists and clinicians.

Julia Drouin

Department of Medicine

The Department of Medicine had a productive year in 2025, with publications in many areas of clinical science. For instance, our faculty from Rheumatology contributed to a *Nature Medicine* paper which predicts obesity across the lifespan, ID faculty research showed the worrisome spread of malaria with deletions that are missed by widely used rapid diagnostic tests, and Internal Medicine faculty showed that deployment of a direct-to-patient health program for lung cancer screening increased rates of lung cancer screening. We'd like to particularly highlight two publications receiving the highest degrees of attention.

Ross Boyce, MD, in the Division of Infectious Disease, publishing in the New England Journal of Medicine, conducted a novel trial to protect children from malaria in Uganda by using a long-acting insect repellent in wraps, which are routinely used to carry young children. Four hundred mother-child pairs were randomized to wearing permethrin or sham-treated cloth for 24 weeks. By the trial end there was a significant reduction in malaria cases in children in permethrin-treated wraps: 0.73 compared to 2.14 cases/100 person-weeks in sham-treated wraps. This study should lead to further new deployable anti-malarial strategies.



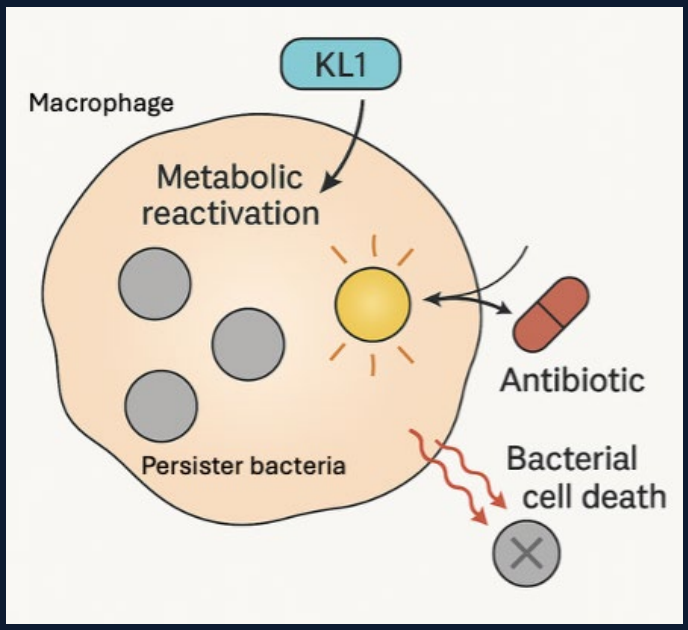
Ross Boyce

Using the most exciting drug for treating diabetes and obesity, **Klara Klein, MD, PhD**, working with **Dr. Christian Hendershot's** team in Psychiatry, showed that the glucagon-like peptide 1 receptor agonist semaglutide, known to reduce food craving, also reduces alcohol consumption and craving in adults with alcohol use disorder. Publishing in **JAMA Psychiatry**, the authors performed a double-blind trial for 9 weeks with participants receiving either semaglutide or placebo at weekly visits. Semaglutide treatment significantly reduced drinks per drinking day, as well as measures of alcohol craving. Ongoing preclinical studies suggest that these effects are mediated in the reward processing areas of the brain.

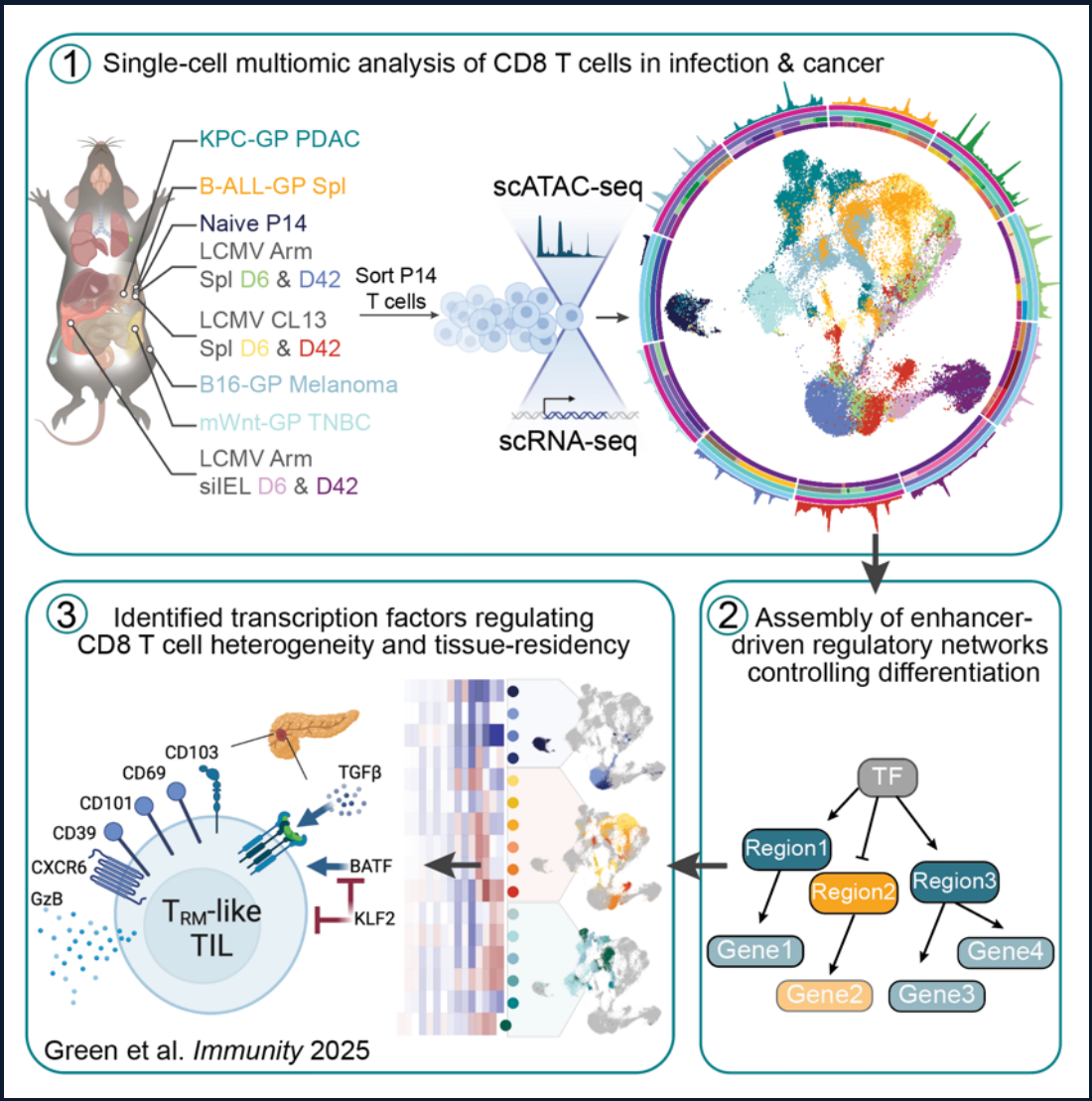
Klara Klein

Department of Microbiology and Immunology

In their recent work, **Brian Conlon, PhD,** and colleagues address the persistent challenge of intracellular bacterial persister cells - metabolically dormant bacteria that survive antibiotic treatment and contribute to relapse and treatment failure. They developed a high-throughput screen in macrophage infection models with *Staphylococcus aureus* (and extended to other pathogens) to identify host-directed small molecules that restore bacterial metabolic activity and thereby re-sensitize persisters to antibiotics. They identified the compound KL1, which boosts intracellular bacterial metabolism without promoting outgrowth or being cytotoxic, and when combined with conventional antibiotics markedly improves clearance of intracellular bacteria in cell culture and murine infection models. Mechanistically, KL1 modulates host macrophage signaling and reduces reactive oxygen/nitrogen species that drive bacterial metabolic collapse and tolerance. This work highlights a promising new adjuvant therapeutic strategy to overcome antibiotic tolerance at the host-pathogen interface and provides a framework for tackling recalcitrant intracellular infections.



Justin Milner, PhD's group recently published breakthrough findings in *Immunity* revealing new ways to boost the efficacy of cancer immunotherapies. While current immunotherapy approaches have transformed outcomes for some cancer patients, many still fail to respond. Using advanced single-cell multiomic approaches, the Milner lab mapped key signals suppressing cancer-killing T cell activity in the tumor microenvironment. Their work uncovered specific transcription factors that can be tuned to "super-charge" T cells, transforming them into more potent cancer-killing cells. The team is now aiming to extend these discoveries to improve adoptive cell therapy, an approach where a patient's immune cells are modified outside the body and reinfused to fight cancer more effectively. These efforts showcase the innovative research ongoing in the Department of Microbiology & Immunology.



Will Green in the Milner lab used multiomic approaches to identify new ways to boost immunotherapy in aggressive cancers in mice. This work was recently published in *Immunity*.

Department of Neurology

The Department hosted its second "Neurology Day" event in May 2025, featuring keynote speaker Dr. Michael D. Fox, from the Harvard Medical School, presenting the use of brain connectivity measures to guide neuromodulation treatments, and showcasing 52 research posters from the Department.

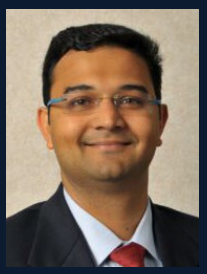
In clinical research, **Varina Boerwinkle, MD,** published a comprehensive meta-analysis comparing methods used to localize seizure onset zones. **Miriam Sklerov, MD,** identified brain correlates of autonomic failure in Parkinson's disease. **Monica Diaz, MD,** received an NIH R21 to study HIV persistence in the brain and its cognitive impact, and reported findings from studies in rural Uganda and in a marginalized community in Peru. **David Y. Hwang, MD,** completed a multicenter pilot trial evaluating a resilience intervention for caregivers of severe acute brain injury patients. **Lindsey Krawchuk, MD,** evaluated the necessity of ICU-level care after mechanical thrombectomy and identified predictors to guide utilization. **Lynn Liu, MD,** co-led a pilot study of unilateral focused ultrasound thalamotomy for focal epilepsy. **Yasmeen Rauf, MD, PhD,** presented survival outcomes from a Phase 1 CAR-T trial targeting B7H3 for recurrent glioblastoma. **Jeremy Rich, MD,** was named a Highly Cited Researcher. **Clio Rubinos, MD,** received an award to lead UNC system-wide implementation of the Status Epilepticus Order Set. **Deanna Saylor, MD,** helped established new diagnostic criteria for multiple

sclerosis. **Tamara Strohm, MD,** received an award to develop open-access interactive neurology online modules for medical students. **Claudia Testa, MD, PhD,** contributed to the AMT-130 gene therapy clinical trial demonstrating the first significant slowing of Huntington's disease progression. **JoJo Qian-Zhou Yang, MD,** conducted a study on social determinants of pediatric epilepsy and established expert consensus on counseling reproductive-aged youth with epilepsy. **John Younce, MD,** reported improved prediction of patient responses to deep brain stimulation using multimodal MRI.

In basic science research, **Todd Cohen, PhD,** established a zebrafish model to study environmental toxin effects in neurodegeneration and identified several candidate risk factors through large-scale screening. **Priya Palta, PhD,** reported that living in gentrified neighborhoods was associated with lower odds of hypertension and that higher late-life physical activity was protective against cognitive decline and dementia. **Ian Shih, PhD,** was inducted as a Fellow of the AIMBE, developed a silent and sensitive "SORDINO" fMRI approach highlighted by NIH ORIP, and disseminated a technique for simultaneous neurochemical recording during MRI.

Department of Neurosurgery

The Focused Ultrasound Program at UNC continues to advance incisionless neurosurgical therapies through innovative, patient-centered research. This year, the program successfully enrolled and treated a patient with treatment-resistant epilepsy using focused ultrasound ablation as part of a Phase I, investigator-initiated clinical trial funded by the Focused Ultrasound Foundation. UNC is currently the only center worldwide offering this first-in-human study, underscoring its leadership in translational focused ultrasound research. In addition, the program recruited patients with brain tumors to determine the feasibility of liquid biopsy using focused ultrasound blood–brain barrier disruption as part of an FDA-regulated, multicenter clinical trial.



Vibhor Krishna

Reflecting the growing national impact of this work, **Vibhor Krishna, MD,** was named a Neurosurgery & Spine Research All-Star by Avant-Garde Health in June 2025, an honor recognizing the top 1% of neurosurgeons in the United States based on research impact.

Department of Nutrition

Alice Ammerman, DrPH, worked with nutrition PhD graduate **Caitlin Hildebrand, MD, PhD,** on a scoping review of culinary medicine experiences for medical students and residents in the US and Canada (70 institutions). Despite implementation barriers, culinary medicine experiences can be offered in a variety of ways during graduate medical education and creatively designed to fulfill some accreditation standards. Findings are supporting ongoing work to implement more nutrition education experiences in the UNC School of Medicine.

Alice Ammerman

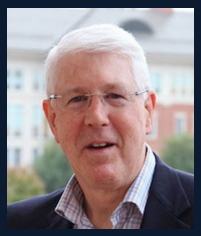
Blake Rushing, PhD, and colleagues were awarded a $3.9M grant from the National Cancer Institute to develop a groundbreaking Human Cancer Metabolome Atlas. This project aims to map the complex metabolic processes that drive cancer progression, treatment resistance, and more in human tumors. By cataloging how cancer cells alter their metabolism to survive and thrive, this project will help identify new targets for therapies and bring cancer metabolism to the forefront of precision oncology.

Blake Rushing

Carmina Valle, PhD, MPH, worked with nutrition PhD graduate **Erin Coffman, PhD**, and colleagues to conduct a systematic review and meta-analysis of 14 RCTs (n = 1169) of physical activity and dietary behavioral interventions designed for adolescent and young adult cancer survivors (AYAs). Findings demonstrated that interventions had moderate effects on increasing physical activity (g = 0.38, 95% CI, 0.183–0.573; *p* = 0.002) and were more effective compared with control groups when they used biofeedback and two behavioral theories. Interventions that focus on both dietary and physical activity behaviors among AYAs are needed.

Carmina Valle

Stephen Hursting, PhD, led a multidisciplinary team of Women's Health Initiative investigators that identified, for the first time, circulating insulin-like growth factor binding protein-7 (to date, a poorly characterized but biologically interesting component of the IGF system) as an age- and obesity-responsive biomarker that was found to be positively associated with all-cause mortality and obesity-related cancers.



Stephen Hursting

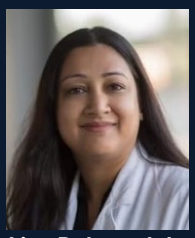
Department of Obstetrics and Gynecology

Departmental faculty continue to design, develop, and refine AI tools to increase obstetric ultrasound access in both domestic and global settings. **Jeffrey Stringer, MD**, and members of the Global Women's Health division have successfully competed for funding from NIH, NCInnovation, Butterfly Operations, and EQT Foundation. **Katelyn Rittenhouse, MD**, received an NIH K23 Career Development Award to expand this technology to diagnose early pregnancy. The department has partnered with faculty at New Hanover Regional Medical Center to expand study activities to the North Carolina Coast, funded by Novant Health. The team is actively exploring new applications of AI-assisted ultrasound, including in benign gynecology and infertility. Stringer received the 2025 Oliver Max Gardner Award—the UNC System's highest faculty honor—for his transformative work in maternal healthcare in low-resource settings around the world.

Jeffrey Stringer

Katelyn Rittenhouse

Faculty members from the Department of Obstetrics and Gynecology are leading two newly awarded NIH K12 Institutional Career Development Programs. Building Interdisciplinary Research Careers in Women's Health (BIRCWH) is a university-wide mentored career development program designed to connect junior faculty to senior faculty with shared interests in women's health and sex differences research. The leadership team is comprised of **Lisa Rahangdale, MD, MPH** (Ob-Gyn), **Michelle Meyer, PhD, MPH** (Emergency Medicine), and **Gaurav Dave, MBBS, DrPH, MPH** (Center for Thriving Communities). The Women's Reproductive Health Research (WRHR) Career Development Program provides Ob-Gyn junior faculty with state-of-the-art training in women's reproductive health research in an academic setting, increasing the research capacity of clinically trained Ob-Gyns. **Benjamin Chi, MD, MSc**, and **Genevieve Neal-Perry, MD, PhD**, serve as program PIs.



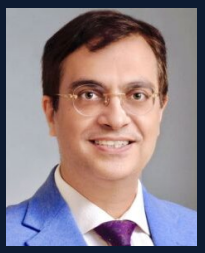
Lisa Rahangdale

Benjamin Chi

Genevieve Neal-Perry

The UNC Center for Women's Health Research has been incorporated into the Department of Obstetrics and Gynecology to serve as the research administration core supporting all Ob-Gyn research.

Department of Ophthalmology



Mohammad Soleimani

The UNC Department of Ophthalmology is proud to highlight the exceptional research achievements of **Mohammad Soleimani, MD,** whose scholarly output this year places him among the Top 1% of Ophthalmology Research Physicians in the United States (2025), as recognized by Avant-Garde Health's Healthcare Research All-Stars program. Over the past year, Dr. Soleimani has contributed more than 30 peer-reviewed publications spanning infectious keratitis, ocular surface disease, trauma, artificial intelligence applications, and surgical innovation - an extraordinary level of productivity for a busy surgeon-scientist. Dr. Soleimani also received a Cornea Society Research Grant from the Cornea Research Foundation of America for his pioneering Virtual Reality–based surgical education project, Reality Simulation for Training in Endothelial Keratoplasty (DMEK): A Pilot Study. He additionally serves as a consultant on a new NIH-funded ocular surface project. Together, these accomplishments underscore Dr. Soleimani's leadership in advancing ophthalmic science, education, and translational innovation.

Jacquelyn Bower

The Department of Ophthalmology is pleased to feature the outstanding work of **Jacquelyn Bower, PhD,** whose laboratory focuses on developing gene-based therapeutic strategies for uveal melanoma (UVM), the most common primary intraocular malignancy in adults. This year, Dr. Bower's team published a landmark study demonstrating allele-specific depletion of the oncogenic GNAQ Q209L mutation using both siRNA and rAAV-delivered shRNA, resulting in selective tumor-cell toxicity. She also co-authored high-impact publications advancing AAV vector biology and ex-vivo gene therapy for corneal transplantation. Dr. Bower secured two new competitive awards: a North Carolina Biotechnology Center grant supporting gene-editing approaches for UVM, and an Oxford–Harrington Rare Disease Scholar Award to advance a novel gene-therapy platform. Her lab is currently optimizing lead therapeutic candidates in pre-clinical models, with the goal of translating molecular insights into next-generation treatments for uveal melanoma.

Department of Orthopaedics

In 2025, UNC Orthopaedics advanced its mission of collaboration, discovery, and clinical excellence through these significant milestones.

The Orthopaedic Hand and Microsurgery Division achieved national recognition at the 25th Annual Meeting of the American Society for Surgery of the Hand (ASSH). The team delivered three poster presentations, two podium talks, and seven instructional courses, while faculty moderated three sessions. Notably, the study *"Impact of Perioperative GLP-1RAs on Outcomes Following Carpal Tunnel Release"* was named a Top 10 Paper for 2025, highlighting the division's leadership in addressing emerging clinical questions. Additional research included validation of an AI-based tool for assessing hand and wrist motion, showcasing UNC's role in integrating technology into surgical care.

In the orthopaedic basic sciences, **Dr. Geoffrey Handsfield, PhD,** director of the MOBIOS lab is Co-Investigator on the NIH R01 "Importance of muscle-subtendon units in Achilles tendinopathy" and published papers about characterizing fascia and muscle fiber architecture using MR Imaging. The lab presented new research findings at ORS, ASB, and ISB meetings. **Ming-Feng Hsueh, PhD,** published *a paper in Science Advances* where his lab group identified a system of small noncoding RNAs linked to cartilage regeneration, six conserved across species, with microRNA-21 promoting matrix synthesis, reducing degradation, and suppressing inflammation. The group also published a review in *Connective Tissue Research* highlighting biomarkers of aging in OA. Our work earned a Best Poster Award at UNC's Summer Research Program and was presented at UNC TARC Research Day and ABRCMS.

Joe Hart, PhD, secured a $500,000 award in partnership with Novant Health to establish the Carolina Musculoskeletal Research Consortium (CMRC). This two-year initiative will create a statewide network focused initially on shoulder injuries, co-led by William Hope, MD, of Novant and **Alex Creighton, MD**, of UNC. Working with UNC School of Medicine's Clinical Research Alliance, the consortium will develop a harmonized data registry across multiple sites in North Carolina, enabling large-scale clinical trials and best care pathways. This effort reflects UNC Orthopaedics' commitment to building infrastructure that elevates musculoskeletal research and improves outcomes for North Carolinians.

Department of Otolaryngology




Wendell Yarbrough ***Natalia Issaeva*** ***Travis Schrank***

The Head and Neck Oncology Lab has been exploring two recently identified subtypes of human papillomavirus positive (HPV+) oropharyngeal squamous cell carcinoma (OPSCC) that have marked molecular and biological differences: one with poor prognosis representing a classical HPV carcinogenesis and one with good prognosis driven by alternative HPV-associated carcinogenesis. The discovery of these intrinsic subtypes defines a critical prognostic biomarker in HPV+ OPSCC and identifies a novel molecular target with potential to improve outcomes for the treatment resistant tumors. To support NIH-funded pre-clinical studies, the Lab developed novel unique immunocompetent mouse model of the high-risk subtype of HPV+ OPSCC that is being used to test combinatorial treatment strategies. This research is led by **Wendell Yarbrough, MD**, **Natalia Issaeva, PhD**, and **Travis Schrank, MD, PhD**.

Age-related hearing loss is estimated to affect one-third of adults 65-75 years of age, while noise-induced hearing loss affects 6-24% of all adults. The functional consequences of hearing loss depend on changes in the brain, including alterations in cellular electrical excitability, synaptic function, and network connectivity. The Manis Lab (**Paul Manis, PhD, Michael Kasten, PhD, Ken Hutson, PhD,** and **Reginald Edwards, PhD**) has developed methods for high-resolution analysis of excitability and synaptic connections, and has used these methods to show that despite age-related hearing loss in mice, neurons in the cochlear nucleus show changes in excitability and remodeling of their dendritic trees with age. Other research in collaboration with **Hiroyuki Kato, PhD,** (Psychiatry) unveiled a novel pathway that delivers sound information to the auditory cortex faster than the main pathways, and tracked this pathway back to its origins in the cochlear nucleus.

Department of Pathology and Laboratory Medicine

Researchers in the UNC Department of Pathology and Laboratory Medicine continue to advance our understanding of hematological diseases and cancer biology through cutting-edge molecular and translational studies.


Matt Karafin

In the *Journal of Clinical Investigation*, **Matt Karafin, MD**, and colleagues published "Blood-storage duration affects hematological and metabolic profiles in patients with sickle cell disease receiving transfusions." This randomized trial of 26 adults with sickle cell disease compared transfusions using red blood cell units stored for less than 10 days versus more than 30 days. The study found that shorter storage improved oxygen delivery and reduced complications, while longer storage was associated with increased inflammation, oxidative stress, iron overload, and more pain crises. These results indicate that not all RBC units are of equal quality, and that longer-stored RBCs may not be optimal for this specific at-risk patient population.

In the journal *Blood*, **Alisa Wolberg, PhD**, and collaborators published "Plasminogen activation and plasmin activity are not necessary to prevent venous thrombosis/thromboembolism" which reported that plasminogen activation and plasmin activity are not required to prevent venous thrombosis or thromboembolism. This landmark study challenges long-held assumptions about fibrinolysis and thrombosis biology, suggesting that alternative pathways safeguard against clot formation in vivo.

Alisa Wolberg

Cyrus Vaziri, PhD, and **Jessica Bowser, PhD**, published "The RING finger E3 ligase RNF25 protects DNA replication forks independently of its canonical roles in ubiquitin signaling" in *Nature Communications*. This study is a comprehensive analysis of DNA damage response and replication stress in cancer cells. Their research demonstrated how defects in genome maintenance drive tumor evolution and therapy resistance, providing new insight into vulnerabilities that could be exploited for precision oncology strategies.

Cyrus Vaziri

Jessica Bowser

Department of Pediatrics

Samantha Schilling, MD, MSHP, and **Kori Flower, MD, MS, MPH,** and the Greenlight Study Team demonstrated their intervention reduces the risk of obesity in young children in a *JAMA*-published trial and were awarded a 5-year PCORI grant to follow the study cohort long-term health outcomes. **Bianca Allison, MD, MPH,** presented workshops and a Hot Topics plenary at the 2025 SAHM meeting and received the Jefferson-Pilot Fellowship for research excellence. **Neal deJong, MD, MPH,** completed the first year of a PCORI-funded hospital-to-home care coordination study for medically complex children with Duke. **Katie Jordan, MD,** and **Priyanka Rao, MD,** presented at the APPD Spring 2025 meeting on resident in-training exam scores and board certification during the pandemic. **Tisu Mvalo, MD,** published on infant morbidity and mortality in Tanzania, Malawi, and India. **Brittany Raffa, MD, MPH,** earned the highest-scoring poster honors for work on healthcare use among marijuana-exposed infants at the Pediatric Academic Societies. **Emily Vander Schaaf, MD, MPH,** co-authored a Carolinas Collaborative paper on food insecurity. **Jessica Young, MD, MPH,** received NIH LRP funding for HPV vaccine access research. **Xavier Williams, MD, MPH,** published on diversity in residency matching.

In Pediatric Gastroenterology, **Michael D. Kappelman, MD, MPH,** leads a PCORI-funded study on emerging IBD medications and a CDC-funded project to improve outcomes and reduce disparities. He published on the diagnostic delay in pediatric IBD, prevalence of pediatric IBD, and the association between HLA DQA1*05 and anti-TNF treatment failure in children with Crohn's disease. **Erica Brenner, MD, MSCR,** received an ACG Junior Faculty Development Award to investigate the safety and effectiveness of non-steroidal anti-inflammatory drugs, and defined risk factors for contraceptive failure and unintended pregnancy among women with IBD. **Ajay Gulati, MD,** continues as a Co-I on extended studies of salivary multiomics and cellular biomarkers for pediatric Crohn's disease. **Matthew Egberg, MD, MPH, MMSc,** serves as Site PI for **CAPTURE**, a nationwide biorepository study, and the pediatric CD **SETON** study, a multicenter cohort study investigating perianal complications, and for several industry-sponsored trials. He co-authored a major publication on the burden and cost of gastrointestinal diseases in the U.S.

Department of Pharmacology

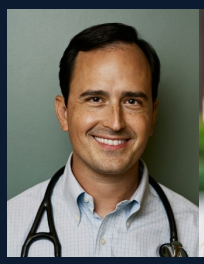

Juan Song

Metabolic disorders and unhealthy diets are rising at alarming rates, and we now know they significantly increase the risk of cognitive decline. But until recently, we did not understand how something as common as a high-fat diet could so quickly impair the brain. In research published in *Neuron*, the **Juan Song, PhD,** lab has shown that even brief exposure to a high-fat diet disrupts memory by overstimulating a specific group of neurons, called CCK interneurons, in the hippocampus. This occurs when glucose levels in the brain drop, a metabolic imbalance triggered by fatty foods, leading to abnormal activation of an enzyme called PKM2. Restoring glucose balance or inhibiting PKM2 not only normalized neuronal activity but also rescued memory in an animal model of obesity. Their discoveries are revealing how diet directly shapes brain health and are paving the way to new drugs that may help to preserve memory in human patients.


Yinglong Miao

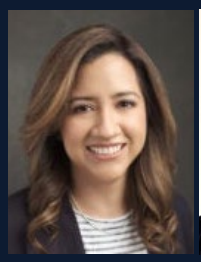
G protein-coupled receptors (GPCRs) are targets for two thirds of all hormones and neurotransmitters, as well as a third of all marketed drugs. A key step in GPCR action is the physical separation from its cellular target, the G protein. In their article published in the *Proceedings of the National Academy of Sciences*, **Yinglong Miao, PhD,** and colleagues documented, for the first time, how GPCRs detach from G proteins in response to a novel class of experimental drugs. Key to their analysis was the use of an advanced computational method, accelerated molecular dynamics simulations. These computational methods, in conjunction with experiments done in a collaborating laboratory, showed how a unique and emerging class of drug leads, known as allosteric modulators, can exhibit high receptor selectivity. Their findings provided important mechanistic details about GPCR–G protein biochemistry and are advancing the goal of designing drugs with improved efficacy and reduced side effects.

Department of Physical Medicine and Rehabilitation


John Baratta


Janet Prvu Bettger

Stroke is a leading cause of disability in North Carolina and newly funded projects aim to address the needs of stroke survivors returning home to the community. **John M. Baratta, MD, MBA,** Associate Professor, is collaborating with the UNC Comprehensive Stroke Center to lead CREST—Coordinating Resources to Enhance Stroke Transitions—and **Janet Prvu Bettger, ScD, FAHA**, Professor and Vice Chair for Research is collaborating with UNC Rex Hospital's Comprehensive Stroke Center as they implement a hybrid outpatient stroke follow-up clinic. Both projects are innovating with new care models to enhance comprehensive care during the post-acute period and improve the coordination of clinical, social, and support services for individuals who have experienced a stroke. The teams are working together with the UNC Stroke Patient and Community Advisory Council to identify and increase access to community-based services and address unmet social needs.


Daisy Zamora


Keturah Faurot

Chronic pain afflicts thousands of North Carolinians and **Daisy Zamora, PhD,** and **Keturah (Kim) Faurot, PhD, MPH, PA,** Associate Professors, have tested diet-based approaches to regulate pain signaling mechanisms and decrease pain. Funded to build on the success of their previous research using dietary approaches to address chronic pain, they're funded by NIAMS to work with their advisory board to plan a larger clinical trial to test the efficacy and biochemical mechanisms of their intervention with individuals experiencing chronic low back pain.

Department of Psychiatry

Adam Bryant Miller, PhD, Associate Professor and Associate Director of the Child and Adolescent Mood and Anxiety Disorders Program (CHAAMP), led a groundbreaking study published in the *Journal of the American Academy of Child & Adolescent Psychiatry*. The research demonstrated that children as young as five can safely and effectively be assessed for suicidal thoughts and behaviors. Among 98 children ages 5–10, 34% reported passive suicidal ideation and 33% reported active ideation, with 5% reporting a suicide plan. Importantly, assessments were feasible and did not cause harm, highlighting the urgent need for early screening and intervention. Miller's team is now conducting two NIMH-funded studies to further explore these behaviors and develop strategies to support families.

UNC researchers published the largest study of its kind in *JAMA Psychiatry*, revealing that a brief, scalable psychosocial treatment can reduce suicidal thoughts among pregnant and postpartum women by 80% within three months. Led by **Crystal Schiller, PhD**, Associate Professor and director of the UNC Center for Women's Mood Disorders, and co-authored by **Samantha Meltzer-Brody, MD, MPH**, and **Parisa Kaliush, PhD**, the study evaluated behavioral activation therapy delivered in person or via telemedicine. The approach proved effective across diverse settings and clinicians, offering a low-cost, accessible solution to one of the leading causes of maternal mortality.

Department of Radiation Oncology

Dry mouth (xerostomia) is a common but underappreciated side effect of whole brain radiation therapy (WBRT) for patients with brain metastases. A recent study published in the *International Journal of Radiation Oncology, Biology, Physics* asked whether adjusting radiation fields to spare the salivary glands (parotids) could help reduce risk of xerostomia. The trial was developed and led by Kyle Wang, MD, at the time a resident at UNC and now a faculty member at the University of Cincinnati, and enrolled patients at UNC, the University of Michigan, and Wake Forest University. UNC co-authors included **Lawrence Marks, MD, Bhisham Chera, MD, Colette Shen, MD, PhD, Ashley Weiner, MD, PhD, Kevin Pearlstein, MD, Allison Deal, MS,** and **Victoria Xu, BS**. The results showed that parotid-sparing WBRT can potentially reduce short-term dry mouth without compromising cancer control and suggest that a simple change in radiation treatment planning could improve quality of life for patients receiving WBRT. Importantly, this study highlights the very impactful role trainees can have on patients and their field.

Children and adolescents with metastatic Ewing sarcoma or rhabdomyosarcoma face challenging treatment decisions, especially regarding whether and how to use radiation therapy for metastatic sites. To address this, a panel of experts from institutions affiliated with the National Pediatric Cancer Foundation recently published consensus guidelines in *Practical Radiation Oncology* to help clinicians navigate these complex choices. Led by **Dana Casey, MD**, with contributions from **Colette Shen, MD, PhD**—both Associate Professors of Radiation Oncology—the group reviewed existing evidence and ongoing trials to provide practical recommendations. The guidelines outline when to treat metastatic sites, preferred techniques such as stereotactic body radiation therapy, and timing relative to chemotherapy. These recommendations aim to improve disease control while minimizing side effects for pediatric patients. They represent an important step toward standardizing care and will guide future research to refine treatment strategies for children with these aggressive cancers.

Department of Radiology

UNC researchers introduced Anatomy-to-Tract Mapping (ATM), a deep learning framework published in *Nature Communications* that reconstructs white matter pathways using only standard T1-weighted MRI, eliminating the need for diffusion MRI. ATM accurately generated 30 major white matter bundles, even on low-field clinical

scans—dramatically expanding access to brain connectivity mapping in research and clinical settings. This innovation represents a conceptual shift in neuroimaging and opens new possibilities for individualized brain mapping worldwide.

UNC Biomedical Research Imaging Center (BRIC) and Radiology faculty published "Charting brain functional development from birth to 6 years of age" in *Nature Human Behaviour*. Led by **Weili Lin, PhD, Dinggang Shen, PhD, Hongtu Zhu, PhD, Keith Smith, MD, Pew-Thian Yap, PhD,** and **Han Zhang, PhD**, the study analyzed over 1,000 resting-state fMRI scans to create developmental charts of brain connectivity, revealing milestones linked to cognitive abilities and offering tools to track healthy brain development.

UNC Interventional Radiology made a powerful impact at the 2025 Society of Interventional Radiology Annual Meeting. **Gloria Salazar, MD**, served as Program Director; **Maureen Kohi, MD**, was recognized for her leadership as Chair of the SIR Foundation; **David Mauro, MD**, earned Fellowship in SIR; and **Matt Mauro, MD**, received the Leaders in Innovation Award. These honors underscore UNC's national prominence in advancing interventional radiology.

Department of Social Medicine

Jill Fisher

Jill Fisher, PhD, was the PI of a 3-year project funded by the National Science Foundation that focused on university hiring practices for and job market experiences of dual-career academics. With long-time research collaborator Professor Torin Monahan (UNC Dept. of Communication), this project empirically investigated researchers' perceptions of dual-career academic job searches and the effects of university partner-hire policies upon their research productivity and career advancement, while also documenting the formal policies and mechanisms used by universities to support dual-career hires. Leveraging the empirical findings, the project culminated in the 2024 publication of an online "scorecard" of the dual-career-friendly status of all research-intensive universities in the US, along with an accompanying report for university officials and academic associations. The scorecard is intended to serve as an intervention to nudge universities into adopting more partner- and family-friendly policies to correct gender, race, and other inequities in faculty hiring and retention.

Anne Drapkin Lyerly

Anne Drapkin Lyerly, MD, MA, is PI of the NIH funded **PHASES** (Pregnancy and HIV: Seeking Equitable Study) and **PREPARE** (Promoting Equity for Pregnant Adolescents in Research) Projects which seek to identify ethical pathways toward responsible inclusion of pregnant women and adolescents in biomedical HIV and coinfection research. Supported by more than **$7 million** in **R56 and R01** funding from the **NIAID** since 2013, Lyerly's team has conducted empirical and conceptual analytic research in the US, Malawi and Botswana, convened international interdisciplinary expert Working Groups, and developed widely cited Ethics Guidance. PHASES outputs have contributed to inclusion of pregnant persons in groundbreaking prevention research, and informed World Health Organization reports and a research toolkit for conducting research in pregnancy. Building on PHASES, Lyerly and co-PI **Suzanne Day, PhD,** (Department of Medicine) are conducting research to address the additional ethical complexities of including pregnant adolescents in the biomedical research agenda.

Department of Surgery

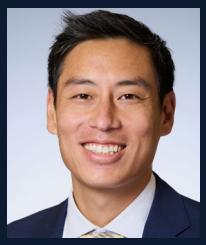
Jen Jen Yeh, MD's groundbreaking research, recently featured in *Cancer Discovery*, maps the tumor-intrinsic kinome of pancreatic ductal adenocarcinoma, providing a critical roadmap for developing more effective, subtype-specific kinase-targeted therapies. This work has been further recognized through two additional

awards: **Jaewon Lee, MD,** UNC's first-ever Surgical Oncology Fellow, received the highly competitive ASCO/Conquer Cancer Young Investigator Award for a project aimed at identifying blood-based signatures that define molecular subtypes of pancreatic cancer and developing a liquid biopsy assay to classify tumors without tissue samples. **Michelle LaBella, MD,** was awarded the 2025–2027 American College of Surgeons Resident Research Scholarship to study the role of the kinase TNIK in pancreatic cancer, focusing on how its differential expression drives remodeling of the tumor microenvironment.

Members of the DOS and Novant surgical research community received funding to support innovative studies that reflect the department's impact on patient care and research. **Jessica Schumacher, PhD,** along **with Jared Gallaher, MD, Clara Lee, MD**, and William Hope, MD, received a UNC-Novant Research Capacity Building Grant to establish an implementation science network in Southeast NC, beginning with a project to reduce post-operative opioid prescribing. **Katharine McGinigle, MD,** received a four-year NHLBI R01 to develop treatment algorithms that optimize limb preservation and survival for chronic limb-threatening ischemia. **Thomas Egan, MD,** in collaboration with **Juliane Nguyen, PhD**, received **NHLBI R21** funding to test a novel long-term solution for air leaks after lung surgery, and he and collaborators from NCSU earned a patent for technology that quantifies pulmonary fibrosis with USMS. **Adam Akerman, PhD,** received an equipment grant to bring a *Qiagen automated nucleic acid extraction and digital PCR system*, expanding the department's molecular research capabilities.

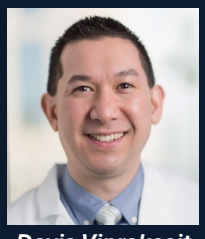
These achievements showcase the department's innovation and leadership, advancing cutting-edge research, fostering novel therapies, and strengthening its impact on patient care and scientific discovery.

Department of Urology



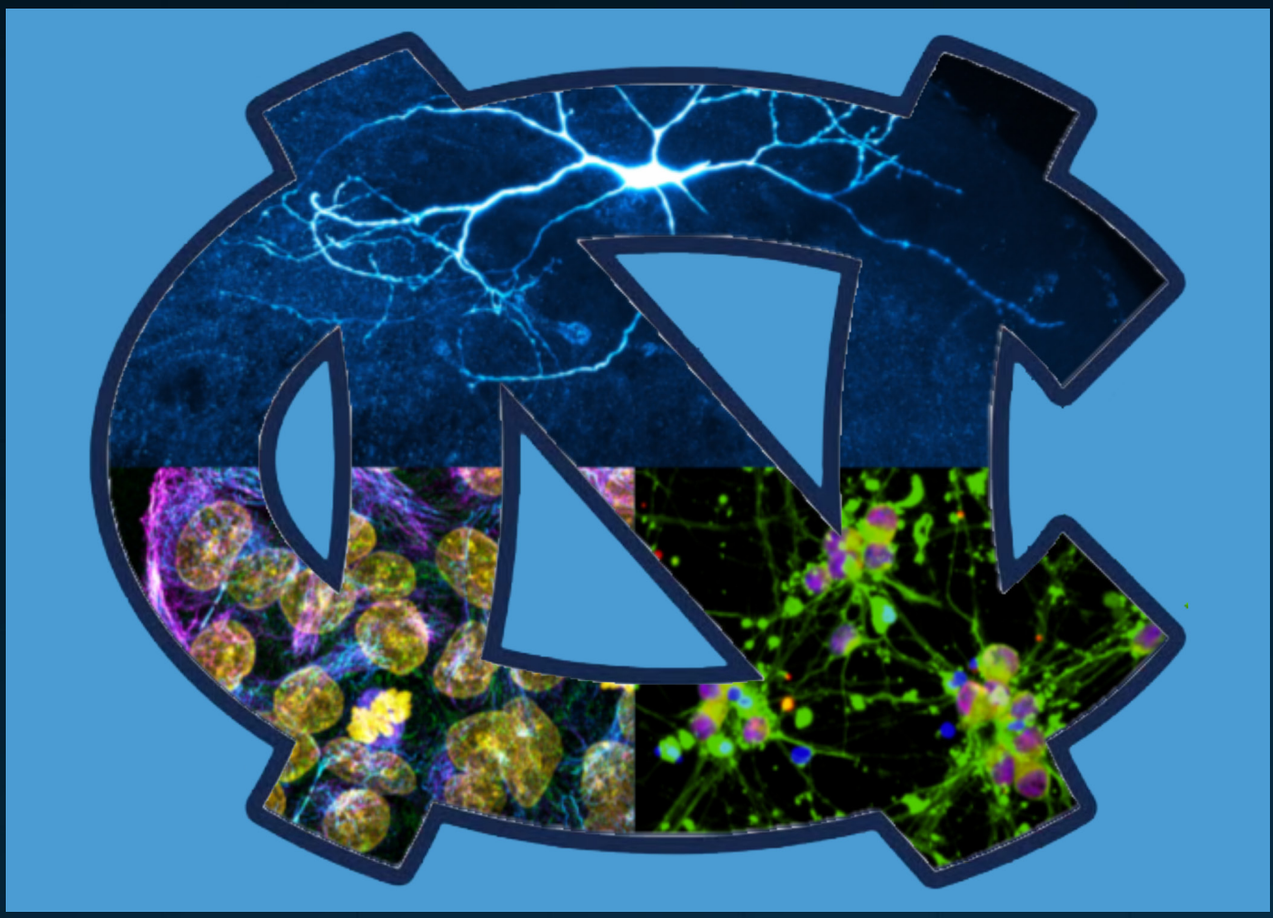
Hung-Jui (Ray) Tan

In 2025, UNC Urology advanced national leadership in cancer survivorship research through **Dr. Hung-Jui Tan's** Department of Defense R01-level award for the Virtual Testicular Cancer Lay Support and Survivorship (VITALSS) Study. Following regulatory approvals this year, Dr. Tan's team launched the project to build, test, and implement virtual peer-support models aimed at improving long-term well-being for testicular cancer survivors—an understudied young-adult population. Dr. Tan also continued to shape national dialogue on patient-centered communication and decision-making. As Visiting Professor at the University of Michigan, he presented his team's research on "*Surgeon Decision-Making and Implications for Clinical Decision Support*" and "*Personalizing Communication and Support for Patients with Small Renal Masses*" at both the Dow Division Research Meeting and Urology Grand Rounds. His work was also showcased at the 26th Society of Urologic Oncology Annual Meeting in early December, where he delivered a plenary presentation within a program curated by 2025 SUO Program Chair, **Mary Beth Westerman, MD**, and complemented by faculty presentations from **Angela Smith, MD, MS,** and **Hans Arora, MD, PhD**.



Davis Viprakasit

UNC Urology strengthened its national research footprint in urinary stone disease as **Davis Viprakasit, MD**, became the UNC site PI for a major NIH-funded initiative creating the Urinary Stone Disease Hub (USDHub)—a coordinated, multi-institutional research resource for both adult and pediatric stone disease. The USDHub will centralize data, biospecimens, and analytic tools to accelerate discoveries in pathophysiology, prevention, and treatment of nephrolithiasis. This infrastructure is designed to support high-impact translational science and foster collaboration across leading stone disease centers. As part of this national consortium, UNC will contribute clinical expertise, patient enrollment, and data integration efforts, ensuring that diverse North Carolina populations are represented in future innovations in kidney stone care.



This year brought challenges and remarkable achievements. Our research community continued to innovate, collaborate, and make a lasting impact. Thank you for your dedication. Here's to a new year of discovery and progress.

UNC

SCHOOL OF MEDICINE