

2024 School of Medicine Research Round-up

To demonstrate the breadth of exceptional research done in the UNC School of Medicine, this publication is a compilation of the most noteworthy research highlights over the past year provided by Departments.

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Department of Anesthesiology

The Department of Anesthesiology researchers are committed to identifying mechanisms of chronic pain pathogenesis, characterizing the epidemiology of the transition from acute to chronic pain, and discovering novel non-addictive approaches to reducing chronic pain in the millions of Americans suffering each year. One example is translational research from the Linnstaedt lab. **Sarah Linnstaedt, PhD**, and her team have continued to explore how stress-immune mechanisms influence chronic pain outcomes after acute injury. Postdoctoral scholar **Lauren McKibben, PhD**, has recently published a series of three manuscripts describing how early life adversity, adult stressors, and immune mediators all play a role in chronic pain vulnerabilities. Doctoral candidate **Erica Branham** received an F31 award from the NIH to study epigenetic mechanisms of chronic pain development following traumatic stress exposure. Dr. Linnstaedt's lab has also significantly advanced their HEAL funded research focused on characterizing the stress system protein FKBP51 as a promising candidate for therapeutic prevention of chronic pain.

Researchers in the Department of Anesthesiology have made notable progress in the study of peripheral nerve stimulation (PNS) as a treatment for chronic knee pain post-surgery. While knee arthroplasty is often a successful procedure for chronic knee pain, an estimated 10-20% of patients experience persistent pain. Led by **Stuart Grant, MBChB, FRCA** (study site PI), UNC participated in a multi-center, randomized, double-blinded, placebo-controlled study of the FDA-approved SPRINT® PNS System to understand how treatment with the system, which delivers rapid electrical pulses to stimulate targeted peripheral nerve fibers, affects post-operative pain in knee arthroplasty patients. Long-term follow-up of study participants was completed in 2024 and the results, presented at the November ASRA Pain Medicine meeting, show promising potential. Most participants experienced improvements in both pain and function during the 60-day treatment, with sustained benefits up to 12 months following treatment. The study was sponsored by SPR Therapeutics and the DoD.

Department of Biochemistry and Biophysics

UNC is a leading center for RNA research, with laboratories exploring the form, function, and clinical applications of RNA across a wide range of pathobiology. The RNA Discovery Center (RDC), directed by **Chad Pecot, MD**, and co-directed by **Bill Marzluff, PhD, Qi Zhang, PhD, Silvia Ramos, PhD, Keriayn Smith, PhD**, and **Mauro Calabrese, PhD**, boasts numerous leaders in the field with over 40 faculty. The RDC is a hub for RNA research, supporting graduate and postdoctoral training, fostering academic and industrial collaborations, and driving large-scale funding initiatives. This year they created the RNA-targeted Innovation in Drug Exploration "RIDE" initiative, which will be led by **Qi Zhang, PhD**. To further foster collaboration, the [Inaugural RDC Retreat](#) was hosted early this year and included 25 posters, 80 attendees, talks from past internal grant awardees, and an external plenary talk by Frank Slack, PhD (Director of the Institute for RNA Medicine at Harvard).

[The UNC Program in Chromatin and Epigenetics](#) is dedicated to enhancing the epigenetics community and advancing our understanding of epigenetic regulation, a key driver of cellular growth, development, and diseases like cancer. The program aims to bring the epigenetics community together to inspire collaboration and to help faculty and trainees bridge critical knowledge gaps. With over 40 faculty and labs, including partnerships with NIEHS, the program drives innovation in fundamental mechanisms, drug discovery, and clinical research using cutting-edge technologies. It provides world-class training for students and postdoctoral researchers, recently launching a new Certificate Program for PhD-earning students, resulting in the creation of two new advanced

courses. The program is supported by a monthly seminar series (Carolina Chromatin Consortium (C3)) and a yearly symposium, funded by Lineberger, BCBP, pharmacy, genetics, Biology, and iBGS. With diverse funding sources and faculty, the program fosters collaboration and drives innovative research to advance the field.

Department of Biomedical Engineering

The Joint Department of Biomedical Engineering has achieved significant milestones in advancing healthcare innovation and research. **Rahima Benhabbour, PhD**, secured a \$3.15M National Cancer Institute R01 grant for cell therapy targeting glioblastoma, in collaboration with **Paul Dayton, PhD**, and **Shawn Hingtgen, PhD**. Similarly, **Matthew Fisher, PhD**, received a \$3.2M NIH R01 grant to investigate the effects of sex hormones on ACL injury risk and treatment, working with collaborators from multiple institutions. **Amol Yadav, PhD**, was awarded the NIH Director's New Innovator Award, with \$2.33M in funding, for his research on sensory augmentation to enhance neuroprosthetic device feedback, improving rehabilitation for neurological disorders.

Other faculty also gained prestigious recognition and funding for their groundbreaking work. **William Polacheck, PhD**, was honored with the BMES Cell and Molecular Bioengineering Young Innovator's Award for his research on mechanotransduction in blood vessel cells. **Jason Franz, PhD**, was awarded \$160K from NCBiotech and UNC Innovate Carolina to commercialize wearable sensing and machine learning technologies for precision rehabilitation in knee osteoarthritis. Additionally, the **Benhabbour Lab** received the CDC Charles C. Shepard Science Award for research on ultra-long-acting HIV prevention implants, and **Joseph Burclaff, PhD**, earned the AGA-Bristol Myers Squibb Research Scholar Award for studying transcription factors in inflammatory bowel disease. Three faculty members from the Department of Biomedical Engineering, **Paul Dayton, PhD**, **Koji Sode, PhD**, and **Matt Penny**, were recently inducted into the inaugural UNC-Chapel Hill National Academy of Inventors Chapter, recognizing their groundbreaking inventions and contributions to the innovation ecosystem. These achievements underscore the department's commitment to advancing biomedical research and translating discoveries into impactful healthcare solutions.



Paul Dayton

Koji Sode

Matt Penny

Department of Cell Biology and Physiology

Some cells are anything but stagnant. From wound healing to metastasis, diverse cells shuttle around the body to complete vastly different tasks. What few people tend to notice is that within each cell exists a bustling metropolis of organelles that also constantly moves to manipulate cell behavior and coordinate cell function. These seemingly small organelle movements can play big roles in human health and disease. Many mutations that cause neurodegenerative diseases are in proteins that interface between organelles and regulate organelle connections. **Sarah Cohen, PhD** and collaborators, **Assaf Zaritsky, PhD** (Ben Gurion University) and **Shalin Mehta, PhD** (Chan Zuckerberg Biohub), were awarded a [2024 Allen Distinguished Investigator Award](#), a \$1.5

million award that funds the development of paradigm-shifting tools for the research community. The trio will pioneer a new method to simultaneously visualize eight different organelle types and their interactions in living cells using label-free imaging, fluorescence microscopy, and machine learning.

Everyone has felt pain, but pain experience is affected by pain perception. For some, the promise of pain relief alone can alleviate symptoms, a phenomenon known as the placebo effect. Published in [Nature](#), **Grégory Sherrer, PharmD, PhD** and his team developed a behavioral assay that recreated a placebo-like pain relief in mice and used calcium imaging and transcriptomics to elucidate the neural circuitry underlying this phenomenon. These findings open the possibility of targeting neural pathways to treat pain. In another study, **Kathleen Caron, PhD, Mark Zylka, PhD, Bryan Roth, PhD, and Ben Philpot, PhD** are pursuing why women are 3-4x more likely to experience painful, debilitating migraines than men. The team was the first in the SOM to receive the [ARPA-H Sprint for Women's Health award](#), which provides \$3 million in funding to address critical unmet challenges in women's health. They will use forward genetic screens and innovative drug target discovery to define new avenues for migraine treatment.

Department of Dermatology

Following their initial discovery of genetic variants associated with hidradenitis suppurativa (HS) near SOX9 and KLF5, **Dr. Christopher Sayed, MD**, and co-PIs from the Department of Genetics, **Drs. Karen Mohlke, PhD**, and **Yun Li, PhD**, received R01 funding from the NIAMS to further [investigate the genetic basis of HS and recently presented data on new risk loci](#). **Dr. Nancy Thomas, MD, PhD, Sharon Edmiston, Lan Lin, Honglin Hao**, and HS research fellows **Drs. Franklin Blum, MD, Maria Melendez-Gonzalez, MD, Linnea Westerkam, MD, and Rayad Shams, MD**, and **Teja Mallela** supported this work. **Dr. Sayed** also led a team with **Drs. Paul Googe, MD, Jayson Miedema, MD, Ash Sampath, MD, Franklin Blum, MD, and Linnea Westerkam, MD**, that published guidelines for histologic assessment of HS tissue. Additionally, **Dr. Sayed**, with support of **Dr. Aida Lugo-Somolinos, MD, Suzy Caballero**, and **Erika Hanami**, was an investigator on multiple clinical trials of medications for HS, including for secukinumab, which was FDA-approved for HS last year.

Drs. Nancy Thomas, MD, PhD, and **Kathleen Conway, PhD**, led a study to explore tumor methylation profiling as a predictor of melanoma-related death in stage II-III cutaneous melanoma patients. Analyzing data from the international InterMEL study, which included cases from the US and Australia, they classified 422 melanomas into three methylation classes: CpG island methylator phenotype (CIMP), intermediate methylation (IM), and low methylation (LM). Patients in the CIMP and IM groups had two-fold higher odds of dying from melanoma within 5 years compared to the LM group, after adjusting for traditional prognostic factors. The study suggests methylation class may serve as an independent biomarker for predicting melanoma mortality, providing additional clinical value. University of North Carolina (UNC) investigators **Drs. David Ollila, MD, David Corcoran, PhD, Paul Googe, MD, Stergios Moschos, MD, and Lan Lin, Sharon Edmiston, Eloise Parrish**, and **Honglin Hao** contributed to the research. Funded by NCI P01CA206980, this work is in press at JCO Precision Oncology.

Department of Emergency Medicine

The Department of Emergency Medicine's **Mehul Patel, PhD**, is working to address disparities in acute stroke care for rural populations. Funded by an R01 grant from the National Institute on Minority Health and Health

Disparities (NIMHD), his project is modeling and comparing the effectiveness of emergency medical services' (EMS) current system design and triage strategies across rural settings to inform optimal stroke systems of care. This work includes building simulations of stroke patients to understand best practices on EMS routing. To understand perspectives of community members interacting with stroke care across North Carolina, Patel's team conducted interviews with stroke survivors and caregivers to discuss factors that impede and support early recognition of stroke symptoms and care-seeking across diverse groups. In a paper published in [The Journal of Rural Health](#), the team described EMS routing and transports of acute stroke patients to stroke centers by rurality.

Michelle Meyer, PhD, MPH, and team completed a CDC-funded study (UNC Injury Prevention Research Center) called the pain intervention via video optimization trial (PIVOT). PIVOT is a randomized controlled trial comparing an interactive educational video on pain management to usual care for preventing the transition from acute to chronic musculoskeletal pain among adults in emergency department and urgent care settings. Many patients seeking care for acute musculoskeletal pain transition to chronic pain, increasing their risk for long-term opioid use. Their goal is to test and implement a scalable intervention to improve pain outcomes and reduce the conversion to long-term opioid use. The primary outcome is pain through 3 months. They enrolled 224 patients at UNC emergency departments and orthopedic urgent care clinics and completed follow up calls in September 2024. Follow up call retention was 90% over the 3 months thanks to the excellent work of the study team!

Department of Family Medicine

Nadja Vielot, PhD, assistant professor of family medicine, received a four-year K01 grant of over \$620K from the U.S. Department of Health and Human Services Agency for Healthcare Research and Quality. Her project aims to reduce HPV vaccination disparities among rural adolescents in North Carolina. By recommending HPV vaccination at age 9 instead of the usual age 11, the initiative seeks to increase vaccination rates and completion before age 13, addressing urban-rural disparities in HPV cancer incidence and mortality. The grant's objectives include developing a clinic-based intervention to promote early HPV vaccination, incorporating caregiver insights to reduce hesitancy, and piloting the intervention in four rural clinics. This approach aims to capture patients during well-child visits and reduce the burden on parents, facilitating timely vaccination. The project supports broader systems-level interventions for significant impacts on HPV cancer rates nationwide.



UNC Family Medicine faculty **Leah Ranney, PhD**, and **Sarah Kowitt, PhD, MPH**, received a five-year, \$2.9 million grant from the NIH National Institute on Drug Abuse (NIDA) to study cannabis warnings. The research involves analyzing current cannabis warning regulations, interviewing regulators, developing evidence-based warnings, and conducting online experiments to improve warning effectiveness. Cannabis is widely used in the U.S., but many people are unaware of its risks, such as chronic bronchitis, cognitive impairment, and car crashes. Current warning labels are often inadequate. The study aims to create more effective warnings that better inform consumers about these risks. The team will work with state regulators to address challenges and implement new warnings. This



Leah Ranney, PhD, MA



Sarah Kowitt, PhD, MPH

research will help states develop better regulations and contribute to understanding the impact of cannabis policies. The project includes collaboration with experts from various institutions to ensure comprehensive and impactful results.

Department of Genetics

The Department of Genetics continues to focus on the recruitment of world-class faculty who bring diverse but complementary programs to expand the impact of genetics and genomics research. In April 2024, **Melissa Haendel, PhD**, joined the department, bringing a large team of faculty and staff from the University of Colorado. She leads the Translational and Integrative Sciences Laboratory (TISLab) and characterizes her work as “the art of data translation”, leading initiatives that aim to improve data integration and promote collaborative education. Haendel is serving as the Director of Precision Health & Translational Informatics and contributes her expertise as Deputy Director of Computational Science at NC TraCS, the hub of the UNC Clinical and Translational Science Award. Additionally, she will advise on Research Data Interoperability within the UNC Health System and participate in both the Computational Medicine Program and the Program in Precision Medicine and Healthcare. This combination of roles is expected to greatly extend the reach of her impactful work.



In the spirit of collaboration, the Department of Genetics has partnered with multiple departments to jointly recruit new faculty with a wide array of research interests. **Qingyun Liu, PhD**, Assistant Professor (Genetics and M&I) studies the evolutionary mechanisms and genetic basis underlying drug resistance and transmissibility in bacterial pathogens. **Robert Mealer, MD, PhD**, Assistant Professor (Psychiatry and Genetics) studies genes that increase the risk of developing schizophrenia and bipolar disorder. **Matthew Ulgherait, PhD**, Assistant Professor (Nutrition and Genetics) is focused on understanding how metabolism and nutrition can be altered to extend an organism’s lifespan. **David Zhang, PhD**, Assistant Professor (Biostatistics and Genetics) brings a research program focused on development of novel AI frameworks to analyze spatial ‘omics, computational pathology, and medical imaging data sets.



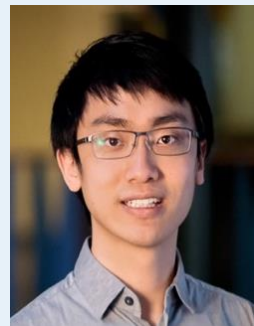
Qingyun Liu



Robert Mealer



Matthew Ulgherait



David Zhang

Department of Health Sciences



Karen Erickson, PhD, directs the Center for Literacy & Disability Studies. She is PI on multiple grants focused on communication and literacy for individuals with complex support needs. Three current projects are Stepping Up Technology Implementation projects (U.S. Department of Education, Office of Special Education Programs), which lead to open-source implementation models and tools for educational teams that allow them to more effectively address the learning needs of school-aged children with complex support needs. She is also PI for Project Open (ACL/NIDILRR), which has a research track focused on investigating in-person interactions between adults who use augmentative and alternative communication (AAC) and their familiar communication partners and a development track that resulted in the Open-Source Design and Programmer Interface created to accelerate research and development of AAC technologies. Her mission is to promote literacy and communication for individuals with disabilities of all ages.



Dara Chan, ScD, CRC, is leading research on multiple grants focused on improving community participation for adults with intellectual and developmental disabilities (IDD). As a NIDILRR Switzer Research Fellow, she used Global Positioning System (GPS) and Geographic Information Systems (GIS) mapping to understand meaningful participation and service use of autistic adults and is now building on these methods in a multi-PI NIMH R21 examining community participation, social connections, and suicide risk in older autistic and non-autistic adults. Chan is also co-leading the UNC Higher Education, Employment, and Living Success (HEELS) 2 Transition program, an interdisciplinary collaborative funded by the Oak Foundation which provides year-round, on-campus programming for individuals with IDD focused on developing critical skills for the transition to adulthood. In partnership with FPG, Chan is Co-PI on a related NIDILRR development project, “HEELS 2 Participation,” converting existing in-person HEELS programming into e-learning modules to increase accessibility and dissemination.

Department of Medicine

The Department of Medicine has continued to increase NIH, foundational, and industry funding during 2024. Our translational hematological malignancy team persists in making substantive advances in cancer treatments. Drs. **Natalie Grover, MD** and **Jonathan Serody, MD**, along with members of the Lineberger Comprehensive Cancer Center, recently published a dose-escalation study in [Lancet Haematology](#). The study investigated anti-CD30 CAR T cells in patients with CD30 lymphoma at high relapse risk after autologous stem cell transplant (HSCT). Results showed no dose-limiting toxicities or graft failures; thus the CAR T cell infusions were deemed safe with low rates of toxicity. The CAR T cells were detectable in over half of patients in remission at 6 months, and in 30% of patients still in remission at 1 year. Promising increases in survival were seen in patients with Hodgkin lymphoma at 32 months. The CAR T cells personalized for each patient were manufactured in a GMP-compliant facility at UNC, one of the largest facilities in the US; all these products demonstrated excellent potency against CD30 expressing cells.

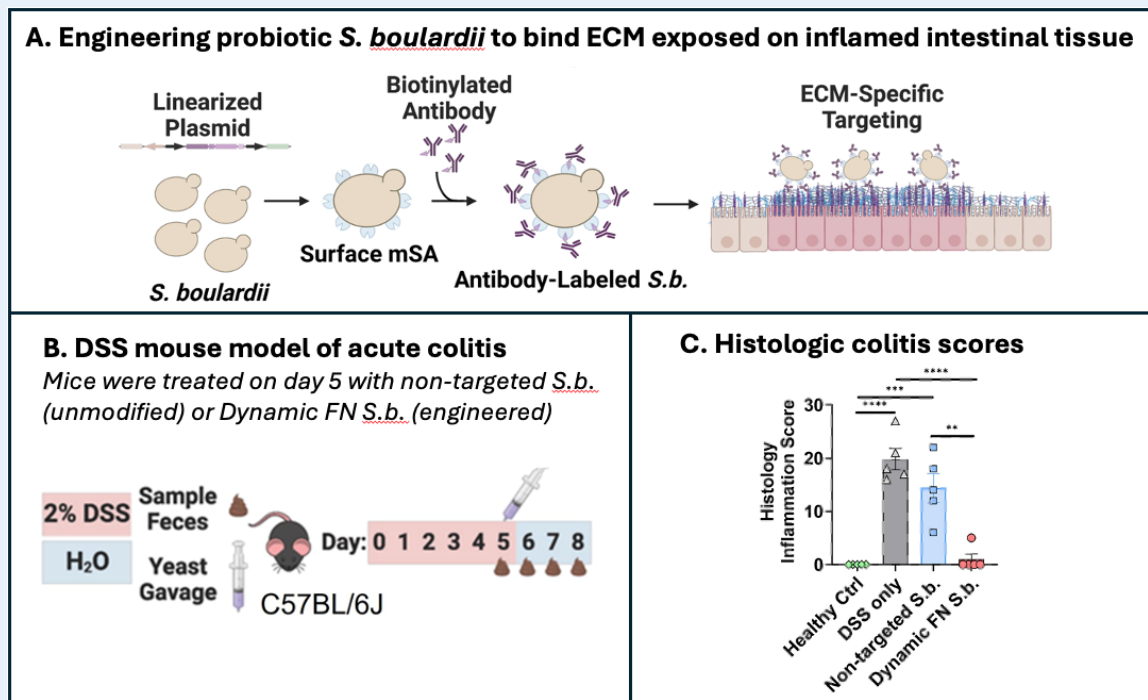
During stem cell differentiation, gene expression develops from nuclear chromatin positioned on a stable nucleoskeleton consisting of intermediate filament lamin proteins. The lab of **Janet Rubin, MD**, in conjunction with **Terry Furey, PhD** (Genetics), published that intranuclear actin provides a secondary structure which can

be dynamically remodeled. In their [Nature Communications](#) paper, they showed that rapid rearrangements of intranuclear actin structure reposition chromatin to cause changes in gene accessibility. Using confocal microscopy, along with biochemical and ChIP-Seq assays, the disassembly and assembly of nuclear actin polymers could be visualized. Accessibility of thousands of genes were specifically altered by the change in actin structure, for instance, increase in F-actin was associated with expression of bone phenotype. Not only does this work confirm that actin is a structural component of the nucleoskeleton but presents actin as a structural target within the nucleus – one that is susceptible to real time modification – upon which a cell’s epigenetic potential is written.



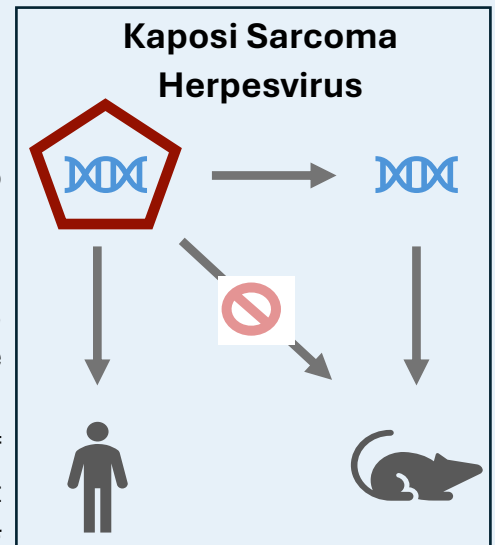
Department of Microbiology and Immunology

Inflammatory bowel disease (IBD) patients suffering from the pain of chronic inflammation often consume probiotics to ameliorate disease symptoms and encourage mucosal healing. However, probiotic microbes are poor gut colonizers, limiting their therapeutic utility. The labs of **Juliane Nguyen, PhD**, and **Janelle Arthur, PhD**, augmented the colonization capabilities of *Saccharomyces boulardii* (S.b.) by engineering this probiotic yeast to bind extracellular matrix exposed on inflamed intestinal tissue. Studies led by graduate student **Mairead Heavey** demonstrated ~100-fold increased colonic tissue concentrations of S.b. when engineered to bind fibronectin (FN). This prolonged gut retention amplified the probiotic effects of S.b. to reduce histologic colitis and inflammatory cytokine production in mouse models. The research team is now developing strains with enhanced therapeutic efficacy by engineering the targeted yeast to locally secrete drugs to resolve inflammation and reduce systemic side effects. These studies, published in [Nature Communications](#), highlight the potential for targeted microbe-based therapeutics to treat IBD.



(A) Genetic engineering of *S. boulardii* to express monomeric streptavidin (mSA) as a handle on the yeast cell surface for attachment of extracellular matrix (ECM) targeting ligands, here targeting fibronectin (FN). (B) In a DSS mouse model of acute colitis, probiotic yeast was delivered via oral gavage on day 5. (C) Mice treated with Dynamic FN *S.b.* (engineered) had significantly lower histologic colitis scores than those treated with Non-targeted *S.b.* (unmodified).

Approximately 20% of all human cancers are virus-associated or rely on viral infection as a crucial cofactor. Since its discovery in 1994, Kaposi sarcoma-associated herpesvirus (KSHV) has been linked to Kaposi sarcoma (KS). KS is predominantly found in immunosuppressed individuals, such as those living with HIV. The incidence of KS has started to rise again. Over the past 40 years, one persistent challenge has been the lack of a pre-clinical model, as KS tumor cells do not grow in culture. Now, this barrier has been overcome. **Dirk Dittmer, PhD, Blossom Damania, PhD**, and the Dittmer lab created the first immune-competent mouse model for KS as well as human angiosarcoma. This mouse model, published in [Cell Host & Microbe](#), advances our understanding of angiogenesis, the process of forming new blood vessels. This is crucial as it allows us to study drugs that inhibit angiogenesis, a potential key in treating KS and other tumors.



Department of Neurology

The Department hosted its inaugural "Neurology Day" event in May 2024, providing a platform to showcase significant achievements, foster collaboration, and celebrate advancements in neurological research.

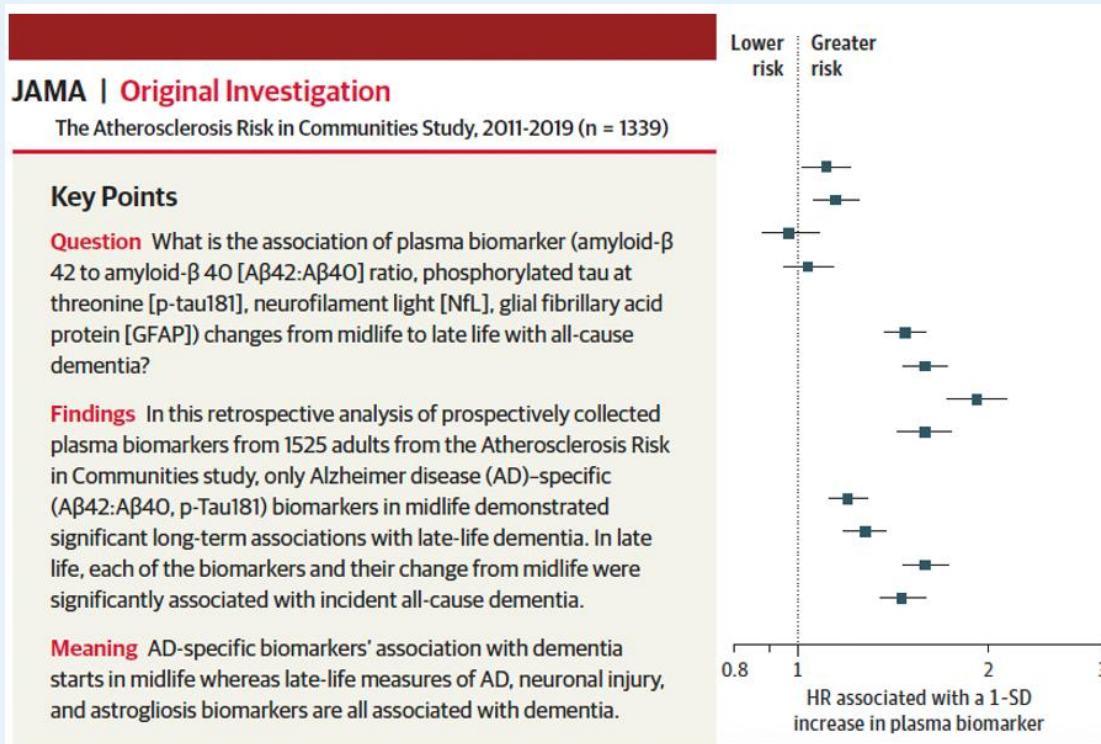
Clinical Research:

James F. Howard, Jr, MD, was awarded the Lifetime Achievement Award by the [AANEM](#) and the Distinguished Academic Achievement Award by the University of Vermont. **Senyene Hunter, MD, PhD**, received the Promoting Health Equity Research grant to expand access to long-read sequencing for genetic epilepsies. **Soma Sengupta, MD, PhD**, served as PI on Imvax's Phase 2B Trial, presented Phase 1 data in Glasgow, published 14 papers, and received the [ABTA](#) Discovery Grant. **Miriam Sklerov, MD**, published on [care partner burden in atypical parkinsonism](#). **Yasmeen Rauf, PhD**, received an NIH R21 grant with **Paul Dayton** to develop focused ultrasound approaches for CAR-T cell therapy in brain tumors. **Clio Rubinos, MD, MS**, was named a [UNC Simmons Scholar](#) and received the [SIREN MAGNETIC](#) Hub Subaward. **Yael Shiloh-Malawsky, MD**, led an n-of-2 ASO study for Batten disease CLN3. **Claudia Testa, MD, PhD** contributed to gene therapy trial design for [Huntington's diseases](#). **Fan Zheng, MD** published on [EEG patterns in Down syndrome](#) and [sleep apnea in muscular dystrophy](#).

Basic Research:

Todd Cohen, PhD, developed a new set of antibodies targeting the [tau protein associated with Alzheimer's disease](#). These antibodies are being tested in mice as potential immunotherapy drugs, with plans to advance to human clinical trials in the future. **Shazad Kahn, PhD**, demonstrated that LRRK2 mutations disrupt primary cilia in a cell-type-specific manner, impairing neuroprotective signaling in cholinergic neurons and contributing to [dopamine neuron vulnerability in Parkinson's disease](#). **Priya Palta, PhD**, and colleagues reported findings from the ARIC study showing that [midlife blood biomarkers can predict the risk of Alzheimer's disease](#) and related dementias in later life. **Ian Shih, PhD**, and his team revealed [that striatal fMRI signals are shaped by interactions between neuronal activity and neurotransmission](#), highlighting the role of opioidergic and

dopaminergic signaling; they also showed the [default mode network dynamically encodes spatial exploration](#) behaviors in naturalistic contexts.



Sampling from Priya Palta JAMA paper “Changes in Alzheimer Disease Blood Biomarkers and Associations With Incident All-Cause Dementia”. [Read the full story here.](#)

Department of Neurosurgery

The Department of Neurosurgery achieved significant milestones in focused ultrasound (FUS) research. As part of a multi-institutional team, **Vibhor Krishna, MD**, (PI: R01) published findings of a pivotal trial of bilateral focused ultrasound thalamotomy for essential tremor in [JAMA Neurology](#), which led to its approval by the FDA. Additionally, through a generous donation from Nancy and Tom Chewing, UNC launched a low-frequency FUS research program. Currently, a ['liquid biopsy' diagnostic procedure for glioblastoma patients](#) is underway at UNC. Our neurosurgical oncology program was also the [first site in the country to activate the Sonobird study](#) (PI: **Dominique Higgins, MD, PhD**), a multicenter phase 3 clinical trial investigating the use of implantable focused [ultrasound for recurrent glioblastoma treatment](#). The spine program, under **Michael Galgano, MD**, the neurosurgery residency program, under **Carlos David, MD**, direction, and the pediatric neurosurgery program, under the leadership of **Scott Elton, MD**, has seen a growth in the number of publications involving the [neurosurgery residents](#).

Department of Nutrition

Anna Kahkoska, MD, PhD, and colleagues analyzed [diabetes specialty care](#) among older adults using a sample of Medicare beneficiaries aged ≥ 65 years. From 2015–2019, they examined cohorts with type 1 diabetes (T1D), type 2 diabetes (T2D) with severe hypoglycemia, and all other T2D. Results showed an increase in endocrinology care for T1D patients (25.9% in 2015 to 32.7% in 2019), while T2D with severe hypoglycemia saw minimal changes. Factors such as age, race, residential setting, and income were linked to disparities in receiving care, underscoring the need for equitable diabetes management services. **Jessica Soldavini, PhD**,

MPH, RD, LDN worked with nutrition BSPH graduate **Albert Pan** to review [school meal charge policies in North Carolina](#). Findings revealed vague guidelines, with harmful actions such as referring unpaid charges to collection agencies (63%) and reporting suspected neglect (60%). Policy revisions, including offering school meals at no cost, could eliminate these negative impacts on families, students, and schools.

Stephanie Martin, PhD and UNC researchers implemented tailored [interventions for families with HIV-exposed but uninfected infants](#) (CHEU). By engaging family members—such as fathers and grandmothers—researchers improved exclusive breastfeeding (EBF), responsive caregiving, and ART adherence among women living with HIV (WLWH). Counseling strengthened confidence in breastfeeding and enhanced family support for infant care. An endocrinology review article by **Raz Shaikh, PhD** and **Nancie MacIver, MD, PhD** (Pediatric Endocrinology), explored molecular mechanisms through which [obesity weakens immune function](#), increasing susceptibility to complications. Mechanisms include hormonal changes, lipidome modifications, and altered extracellular vesicle cargo. The review highlights innovative methods to study obesity’s complexity and heterogeneity.

Department of Obstetrics and Gynecology

With support from the North Carolina state legislature and the North Carolina Collaboratory, department investigators were awarded \$1.5 million to improve diagnosis and management of endometriosis. The **NC Endometriosis Consortium** brings together researchers from several divisions and the UNC Collaborative for Maternal and Infant Health. The program is overseen by **Anne Steiner, MD, MPH**, and comprises two nested projects. The first measures the burden of endometriosis on individuals affected by this disease, characterizing phenotypes and their differential response to treatment. This clinical cohort, led by **Erin Carey, MD, MSCR**, includes rigorous longitudinal assessments and a biorepository for clinical specimens. The second project uses multimodal provider and community engagement to increase awareness, recognition, and earlier treatment of endometriosis. It is led by **Sarah Verbiest, DrPH, MSW, MPH, Erin McClain, MPH, MA, and Noor Dasouki Abu-Alnadi, MD**. Together, these complementary efforts will inform future treatment options for endometriosis, establishing a valuable resource to improve clinical care and drive future research.

The Division of Gynecologic Oncology has made significant strides in our understanding of obesity and endometrial cancer (EC) outcomes. A new line of research—led by **Victoria Bae-Jump, MD, PhD**, and colleagues—is evaluating tirzepatide (FDA approved for weight loss) as an innovative strategy for EC prevention and treatment, potentially in combination with chemotherapy and immunotherapy. This year, promising results from mouse models have been presented at the [Society of Gynecologic Oncology Annual Meeting](#) and published in the journal [Gynecologic Oncology](#). The team has secured funding from the Department of Defense to further assess the anti-obesity and anti-tumorigenic benefits of intermittent an energy restriction diet vs. dual GLP-1/GIP receptor agonist therapy in pre-clinical EC mouse models and assessment of tirzepatide in a pre-operative window study of EC.

Department of Ophthalmology

Tackling the Phototoxicity of Blue LED Light

Exposure to blue light can induce the overproduction of reactive oxygen species (ROS) in the retina and retinal pigment epithelium (RPE) cells, potentially leading to pathological damage of age-related macular degeneration

(AMD). While melanin in retinal pigment epithelium (RPE) cells absorbs blue light and prevents ROS buildup, age-related loss of melanin may increase vulnerability to phototoxicity. To address this, **Zongchao Han, MD, PhD** and colleagues at the Carolina Eye Research Institute evaluated PEGylated-polydopamine nanoparticles (PDA) as a melanin supplement to protect retinal cells from blue light damage. In a recent [Advanced Science publication](#), the team demonstrated that a single intravitreal PDA injection effectively preserved retinal structure and reduced ROS overproduction in a murine model exposed to blue light. This polydopamine-replenishing strategy offers a promising approach to mitigate phototoxicity and protect against high-energy blue light exposure.

Employing Fetal-Maternal Tolerance to Prevent Corneal Transplant Rejection

Corneal blindness affects over 5 million individuals globally, with 180,000+ corneal transplants (CTs) performed annually. In high-risk CTs, most grafts are rejected within 10 years. **Matthew Hirsch, PhD** and the Hirsch Lab at the Carolina Eye Research Institute explored [adeno-associated virus \(AAV\) ex vivo gene therapy](#) to prevent high-risk CT rejection by establishing immune tolerance in the corneal allograft. The team engineered a novel molecule, sclIM, based on HLA-G, which naturally maintains ocular immune privilege. In a murine corneal burn model, AAV-sclIM significantly reduced corneal vascularization and fibrosis—key risk factors for CT rejection. In a high-risk rabbit CT model, treating donor tissue with AAV-sclIM completely prevented rejection, compared to 83% rejection in controls. This study, published in *Molecular Therapy*, highlights sclIM's potential to prevent CT rejection and its broader applications for other organ transplants.

Department of Orthopaedics

The Department of Orthopaedics at UNC has experienced remarkable growth in its research initiatives over the past year. The clinical trials team, supported by skilled coordinators, has aligned research efforts with orthopaedic practices, bringing innovative clinical trial opportunities to patients. The department's research enterprise has expanded under the guidance of Research Program Manager **Manal Khan**, alongside the recruitment of [two new basic science faculty members](#) in 2024: **Geoff Handsfield, PhD** and **Ming-Feng Hsueh, PhD**. **Dr. Handsfield**, jointly appointed in Biomedical Engineering, specializes in imaging and computational modeling of musculoskeletal tissues. His work has led to an NIH-funded supplement to develop fascia imaging techniques in collaboration with Mass General Hospital. **Dr. Hsueh**, a member of the Thurston Arthritis Research Center, focuses on translational musculoskeletal and aging biology, employing advanced multi-omic approaches to develop therapies for joint tissue regeneration. His NIH K01 award investigates synovial cell involvement in joint anabolism.

In August, the department [opened the 25,000-square-foot Sports Medicine Center \(SMC\)](#) in Chapel Hill, integrating patient care, radiology, physical therapy, and research. The SMC fosters collaboration through the Sports Medicine Institute and shared research facilities. The center hosted its [third annual Sports Medicine Institute conference](#) in September, featuring prominent speakers and interdisciplinary discussions on injury prevention and rehabilitation.

The Department has developed the Dahnners Grant program, named after retired faculty member Laury Dahnners, to support innovative clinical faculty-led research projects. Recent awardees include **Ried Drager, MD**, for developing and testing innovative hand fracture fixation techniques, and **Jeff Spang, MD**, for characterizing

cartilage healing in patients treated with allograft tissue. **Trapper Lalli, MD**, in collaboration with **Kyle McNamara, MD, PhD** (PGY3 resident), received an investigator-initiated grant from Arthrex to study the influence of postoperative weight-bearing on outcomes in ankle fracture patients. Additionally, **Joe Hart, PhD**, secured the department's [first NIH R01 grant](#), a \$1.5M study using 3D markerless videography to predict second injuries after ACL reconstruction.

Department of Otolaryngology-Head & Neck Surgery

The Division of Facial Plastics and Reconstructive Surgery has been growing their research portfolio in the past several years in two main areas. **Matthew Miller, MD**, leads The Facial Reanimation Lab, a first of its kind center dedicated to investigating how emotions conveyed by patients with chronic Bell's palsy, chronic Ramsay Hunt Syndrome, and other causes of nonflaccid facial paralysis change after depressor anguli oris muscle excision and selective denervation surgery. This group recently reported that patients convey more happiness when smiling after surgery compared to before their procedures ([O'Rourke et al. 2024](#); [Varman et al., 2023](#)). In related research, **Madison Clark, MD**, and **Virginia Drake, MD**, reported that the nasal dorsal septal cartilage has low glycosaminoglycans and high collagen levels in patients with nasal valve collapse, which could explain why some patients are resistant to nasal changes with aging and minor trauma ([Kim et al., 2024](#)).

An accurate understanding of the cues necessary for speech recognition is fundamental for hearing aid fitting and outcome counselling for hearing impaired patients. Traditional methods for estimating the importance of speech cues across frequency use filtering and steady noise, but many natural listening environments include complex dynamic backgrounds, such as competing speech. The Hearing Research Lab developed a method for estimating frequency band importance based on inherent fluctuations in the signal-to-noise ratio for full-bandwidth sounds, preserving the natural perceptual characteristics of speech in a multi-talker environment. They found that the spectral distribution of cues necessary for speech recognition differ for speech and for noise backgrounds and depend on the relative positions of sound sources in space ([Buss & Bosen, 2021](#); [Bosen et al., 2024](#)). These results warrant a second look at the traditional methods for estimating and optimizing speech recognition for patients with hearing loss.

Department of Pathology and Laboratory Medicine

Researchers with the UNC Global Cancer Pathology Program in the Department of Pathology and Laboratory Medicine explored the molecular differences between lymphomas from HIV positive patients and those from HIV negative patients. Diffuse large B-cell lymphoma (DLBCL) is the most common subtype of lymphoma worldwide and accounts for up to 40% of new non-Hodgkin Lymphoma (NHL) globally. People with HIV are up to 17 times more likely to develop NHL, and as such, DLBCL is the leading cause of cancer death in this population. Two papers were published on the subject by Lab Corp Distinguished Professor **Yuri Fedoriw, MD**, with the research for these papers led by Pathobiology and Translational Sciences graduate students, **Sophie Rush** (MD/PhD) and **Jenny Coelho** (PhD).

[“HIV and prior exposure to antiretroviral therapy alter tumour composition and tumour: T-cell associations in diffuse large B-cell lymphoma”](#) investigates the impact of HIV infection and anti-retroviral therapy on the clinical features of DLBCL and T-cell immune response and demonstrates a previously undescribed HIV and therapy-related difference in the DLBCL tumor microenvironment.

“[HIV infection and ART exposure affect tumor TCR repertoire of diffuse large B cell lymphoma](#)” explores the T-cell response to DLBCL by sequencing the T-cell receptor in a cohort of HIV-negative, HIV+/therapy-experienced, and HIV+/therapy-naive patients with DLBCL. This study represented the first description of the HIV+ DLBCL blood and tumor TCR repertoires. Stratifying the HIV+ patients by duration of therapy identifies differences in the TCR repertoire.

Department of Pediatrics

In Pediatric ID, **Sahal Thahir, MD**, received an ASTMH award to investigate malaria’s impact on vaccine responses in children. **Peyton Thompson, MD**, received funding to connect pregnant and postpartum individuals in NC to hepatitis care and published work on the impact of an [HBV vaccine birth dose in the DRC](#). **Zachary Willis, MD**, authored the [Pediatric ID Society’s COVID-19 prevention statement for children](#) and adolescents. **You Li, PhD**, published host factors affecting [HAV replication](#) and developed inhibitors for [HAV and HBV](#). **Matthew Vogt, MD PhD**, has NIH funding to develop picornavirus antibodies and directs the NC Pandemic Response Repository. **Indriati Hood-Pishchany, MD PhD**, is funded by the Gates Foundation to create bacterial vaginosis therapeutics, while NIH supports **Catherine O’Connell, PhD**, and **Xiaojing Zheng, PhD** in exploring microbiome-pathogen interactions affecting Chlamydia. **Taylor Poston, PhD**, and **Toni Darville, MD**, published preclinical [Chlamydia vaccine studies](#), and received new funding to advance a vaccine to clinical trials.

Lawrence Ostroski, PhD, **Maimoona Zariwala, PhD**, and other investigators from the Division of Pediatric Pulmonology partnered with several European collaborators showing that genetic defects in a putative antiprotease secreted by airway epithelial cells leads to suppurative airway disease, further expanding genetic bases of [bronchiectasis](#) in children. **Camille Ehre, PhD**, **Gang Chen, PhD**, and **Martina Gentsch, PhD** worked closely with colleagues from the Marsico Lung Institute to demonstrate that chronic airway hypoxia is central to the current paradigm of a “vicious-vortex” of feedback mechanisms in various muco-obstructive [lung diseases](#). **Thomas Ferkol, MD**, **Margaret Leigh, MD**, **Stephanie Davis, MD**, and **Kelli Sullivan, MPH** were integral investigators in the first transatlantic, multicenter clinical trial in primary ciliary dyskinesia, which found that an inhaled [epithelial sodium channel inhibitor](#) (idrevloride) with hypertonic saline was safe and improved lung function as compared to inhaled hypertonic saline alone.

Department of Pharmacology

Diffuse Large B-Cell Lymphoma is the most common blood cancer and consists of two subtypes named ABC and GCB, but they have been treated uniformly. In [The New England Journal of Medicine](#), **Adam Palmer, PhD** and colleagues showed the value of subtype-specific treatment. Whereas a new first-line regimen for these lymphomas with the antibody-drug conjugate Polatuzumab-vedotin showed modest benefits, and no change in survival versus the standard regimen, Palmer’s group showed that across many trials, polatuzumab-vedotin was consistently more effective against ABC lymphomas than GCB lymphomas. Thus, the seemingly modest overall effect of adding polatuzumab-vedotin to the first-line regimen arose from large survival improvements in ABC lymphomas, counterbalanced by no benefit at all in GCB lymphomas. This discovery justifies precision medicine at the first-line of treatment for this common blood cancer, targeting costly treatments to the patients who will most benefit from them.

Many patients whose cancers initially respond to treatments will suffer a relapse. In two back-to-back papers published in *Science*, pharmacology researchers **Channing Der, PhD, Adrienne Cox, PhD, Jeffrey Klomp, PhD, Clint Stalnecker, PhD, and Jennifer Klomp, PhD**, provided a [comprehensive molecular portrait of the workings of KRAS](#), one of the most frequently altered genes in cancers. By analyzing multiple mutant cancer cell lines and tumors they showed that KRAS drives cancer growth mainly through ERK and identified 2,100 proteins phosphorylated by this protein kinase, including many that were previous unidentified substrates of ERK. They further identified genes that are actively transcribed in response to ERK activation. Because this pathway is so important for the response to cancer drugs that inhibit KRAS, the findings reveal mechanisms involved in treatment responses and drug resistance and provide better ways to monitor treatment outcomes.

Department of Physical Medicine and Rehabilitation

With support from the UNC SOM Academic Investment Fund, UNC Department of Physical Medicine and Rehabilitation (PM&R) successfully recruited our inaugural Vice Chair for Research. Dr. **Janet Bettger, ScD, FAHA** is a clinical and translational researcher scientist trained in rehabilitation and implementation science. Her research is dedicated to establishing real world evidence aimed to improve health care quality and policies that reduce the burden of disease and disability. Her research extends from observational studies to randomized and pragmatic trials, and she has significant expertise studying implementation and spread of evidence-based interventions in both the U.S. and around the globe. From 2003-2023, she was federally funded continuously for research with grants and contracts from nine centers and institutes at the NIH. She has over 200 peer reviewed publications, research mentees at all levels of training and career development, multiple national leadership roles, and editorial positions at two journals (*Stroke* and *Archives of Physical Medicine and Rehabilitation*). Her official start date is December 30, 2024.

UNC PM&R has continued to pursue numerous research projects this year. In addition to the twelve submitted projects pending funding, and the twelve ongoing departmental projects, PM&R faculty collaborate with many other departments. One example is **JM Baratta, MD** Founder of the UNC Covid Recovery Clinic, who collaborates with Michele Flores-Moore, MD (Infectious Disease) on projects to treat Long Covid, including cardiopulmonary rehabilitation and pacing coaching as treatment approaches. Other research in the department focuses on 1) reducing health disparities for medically underserved populations (Faculty lead); 2) managing chronic pain through nutrition and mindfulness (Faculty lead); 3) addressing stress and anxiety through mind-body approaches (Faculty lead); 4) developing novel diagnostics for people who have had a stroke or limb amputation (Faculty lead); and 5) improving rehabilitation after cancer treatment (Faculty lead). Finally, the NIH T32 Research Fellowship in Complementary and Integrative Healthcare (**Susan Gaylord, PhD, Lead PD**) was awarded an additional two trainee positions, bringing our total to seven.

Department of Psychiatry

This year's Psychiatry research highlights feature groundbreaking studies from UNC researchers exploring mood disorders and autism. The Frohlich Lab, led by **Flavio Frohlich, PhD**, focuses on understanding neural network dynamics to develop innovative treatments for psychiatric disorders. In a [recent pilot study](#), UNC researchers led by Dr. Frohlich tested a closed-loop brain stimulation system tailored to individual brain wave patterns. By delivering a weak electrical current, this approach significantly reduced symptoms of major depressive disorder, offering a potential breakthrough in personalized psychiatric care. Complementing this clinical advance, the

Frohlich Lab published a study in the [Journal of Neuroscience](#) investigating neural oscillations that govern cognitive processes. Using transcranial magnetic stimulation and EEG, the researchers demonstrated how frontoparietal theta connectivity and alpha oscillations influence working memory by prioritizing relevant information and suppressing irrelevant details. This research provides foundational insights into how targeted neural activity can enhance cognitive function.

Research led by Drs. **Jessica Girault, PhD**, **Mark Shen, PhD**, and **Joe Piven, MD**, highlights critical advancements in understanding autism spectrum disorder (ASD). Their study, published in [Molecular Psychiatry](#), links white matter development in the arcuate fasciculus to language abilities in infants at high likelihood for ASD. Findings revealed distinct developmental patterns in white matter associated with expressive language in toddlers diagnosed with ASD. These insights offer potential early markers for ASD intervention strategies. Additionally, **Mark Shen's** research on cerebrospinal fluid biomarkers earned him the prestigious [Hettleman Prize](#). His pioneering work revealed that excessive cerebrospinal fluid volume, detectable as early as six months, predicts autism development. This discovery has reshaped understanding of early neuroinflammatory processes in ASD. These studies underscore UNC's commitment to advancing psychiatric and neurodevelopmental research for improved patient outcomes.

Department of Radiation Oncology

The interplay between radiation-induced DNA damage and the immune system remains poorly understood yet represents an exciting frontier for advances in radiotherapy. Earlier this year, the laboratory led by **Gaorav Gupta, MD, PhD**, Associate Chair for Research, published a groundbreaking discovery in [Nature \[press release\]](#), revealing a novel mechanism of innate immune sensing of DNA damage. They identified the DNA damage sensor MRE11 as a key player in activating cGAS, an immune enzyme that is typically suppressed by its attachment to nucleosomes. By freeing cGAS, MRE11 enables the immune system to detect damaged DNA and trigger necroptosis—a programmed cell death process that helps prevent tumor growth. This finding not only enhances our understanding of cancer suppression but also opens new avenues for therapeutic innovation.

While advances in treatments for children with cancer have improved survival outcomes, unfortunately many childhood cancer survivors experience long-term treatment-related health issues. This spring, through the **Pediatric Normal Tissue Effects in the Clinic (PENTEC)** initiative, an international research consortium published a series of evidence-based reviews in the [International Journal of Radiation Oncology, Biology, Physics \[Lineberger feature\]](#) that may help physicians to develop equally effective but less toxic treatment plans for their patients. The initiative was co-led by **Lawrence Marks, MD**, Sidney K. Simon Distinguished Professor of Oncology Research and former Department Chair, **Dana Casey, MD**, and **Colette Shen, MD, PhD**, Assistant Professors, each led one of the initiatives (assessing risks of therapy-related secondary malignancies and ocular complications, respectively), and **Shiva Das, PhD**, Professor and Head of the Medical Physics Division, was co-author of a paper investigating the risk of pulmonary complications associated with total body irradiation.

Department of Radiology

Matthew A. Mauro, MD, FSIR, was honored with the 2025 Leaders in Innovation Award for his pivotal work in transitioning interventional radiology (IR) from fellowship to residency status. This achievement reshaped IR as

a primary specialty, securing its competitive standing and advancing patient care. Additionally, **Maureen P. Kohi, MD, FSIR**, was named the 2025 Women in IR (WIR) Champion Award recipient for her dedication to promoting gender equity in interventional radiology. **Lauren Burke, MD, FSAR**, became the first female recipient of the Matthew A. Mauro Distinguished Professorship of Radiology. This endowed professorship, approved by the Board of Trustees, recognizes her exceptional contributions to patient care, education, and research at UNC Radiology.

Pew-Thian Yap, PhD, achieved extraordinary success with over \$8 million in R01 grant funding, including:

- Optimized High-Resolution Fast Magnetic Resonance Fingerprinting with Cloud-Based Reconstruction (\$3.1M, NIH NINDS).
- Multifaceted Characterization of Early Human Brain Development (\$3.1M, NIH NIMH).
- AI-Powered MRI Quality Control and Artifact Correction for Multi-Site Studies (\$1.8M, NIH NIBIB).

Louise Henderson, PhD, received two significant awards, including a \$3.2 million grant from the National Cancer Institute and a \$1 million R01 for lung cancer research.

Other notable funding achievements include:

- **Zhanhong Wu, PhD**: \$400,000 for PSMA radiolabeled agent development.
- **Zibo Li, PhD**: \$2.5 million for innovative 18F labeling technology.
- **Li Wang, PhD**: \$2.6 million for autism-related neuroimaging research.

These achievements reflect the department's leadership in advancing radiology through innovative research and groundbreaking discoveries.

Department of Social Medicine

Tasseli McKay, PhD, assistant professor of Social Medicine, is the PI of a five-year, \$1 million project funded by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) to examine how contact with public institutions shapes family violence incidence, help-seeking, and disclosure to researchers. The project includes latent variable modeling of secondary data as well as new longitudinal surveys, administrative data collection, and a two-site qualitative study with youth and parents. It will produce a validated measure of institutional responsiveness and a richer understanding of the complex decisions survivors face in the context of mass surveillance and criminalization.



Department of Surgery

The **UNC Surgical Health Research Center (USHER)**, led by **Clara Lee MD, MPP**, was created to improve the delivery of surgical care. Recognizing that surgery is common, costly, and associated with high morbidity, USHER aims to bridge the gap between health services research and clinical practice. Through collaboration, USHER provides surgeon-scientists and faculty with the infrastructure necessary to reduce the friction of conducting meaningful research. It brings together a diverse, multidisciplinary team to discuss cutting-edge research, offering mentorship, assisting with protocol development, study design and execution, and providing staff support, such as project managers and study coordinators. We also established the **NC Surgical Collaborative**, aiming to partner with other healthcare systems across North Carolina, to advance surgical quality improvement initiatives statewide. The collaborative supports research focused on promoting healthcare access in rural

communities, reducing postoperative opioid prescribing, and continuing medical education efforts for surgeons across the state.

Katharine L. McGinagle MD, MPH received a **NHLBI R21** to establish a precision medicine framework to build “the right patient, right treatment, right time” treatment paradigms using machine learning for patients with chronic limb threatening ischemia. **Philip Spanheimer, MD** and collaborators (Jeremy Purvis, PhD and Sam Wolff, PhD, Genetics) developed a novel image based single cell proteomic platform to improve treatment efficacy in breast cancer (Zikry et al. Proceedings of the National Academy of Sciences). Dr Spanheimer was also awarded an **R37 MERIT award** for “Predicting Endocrine Therapy Response in Male Breast Tumors”. **Jen Jen Yeh, MD** and Gary Johnson, PhD (Pharmacology) received an **NCI R01** to study the role of anti-EGFR approaches for a specific molecular subtype of pancreatic cancer. The first trial to use molecular subtyping to select treatment for patients with metastatic pancreatic cancer will be led by Dr. Ashwin Somasundaram (Medicine) and open in January 2025.

Department of Urology

In 2024, the UNC Department of Urology reached significant milestones in urologic research, reflecting its commitment to improving patient outcomes and expanding treatment options. Among the highlights, **Dr. David Friedlander, MD MPH**, received the [AHRQ K08 Career Development Award](#) for his project, “*Using Mixed Methods to Reduce Disparities in Renal Colic Care: A Model for Surgical Value Transformation.*” By analyzing claims data and interviewing patients and providers, Dr. Friedlander aims to develop a clinical decision support tool to standardize renal colic care, reduce variations, and improve follow-up access. Complementing this work, his role as an [Improvement Scholar with the UNC Institute for Healthcare Quality Improvement \(IHQI\)](#) has led to improved care pathways for renal colic patients discharged from the ED, with initiatives reducing follow-up times and emergency revisits. This pathway will soon be integrated into UNC Health’s EHR.

Meanwhile, UNC Urology has also advanced clinical research for bladder cancer. **Dr. Marc Bjurlin, DO, MSc, FACOS**, has been a key participant in the [multi-center QUILT trial](#), which explores a promising combination therapy for BCG-unresponsive, non-muscle invasive bladder cancer. This study evaluates the use of BCG in conjunction with the experimental drug N-803 to potentially offer a new treatment alternative to patients who might otherwise face bladder removal. Dr. Bjurlin’s extensive research background, [particularly in smoking cessation](#), adds a unique perspective to the trial, as he has conducted quality improvement initiatives on tobacco treatment for these patients and has [spoken internationally on the rise of e-cigarette use](#). His expertise informs of a holistic approach to managing bladder cancer, with the goal of reducing recurrence and enhancing patient outcomes. These highlights are just two examples of UNC Urology’s commitment to advancing research and patient care, with numerous other projects contributing to progress in urologic health.