UNC | SCHOOL OF MEDICINE

JOHN B. GRAHAM
Medical Student Research Society

UNC Medical Student Research Day

November 13
2023

About the research society

Established in 1987, the John B. Graham Medical Student Research Society recognizes and promotes the research efforts of the medical student body at the University of North Carolina School of Medicine in basic science, public health, and clinical sciences. Students who participate in the annual Student Research Day, an event dedicated to showcase the research projects of medical students, are inducted every year to the Society. Throughout the year, members exchange ideas and share their experiences about conducting research. In addition, the Society serves to encourage collaboration with faculty to promote productive research opportunities for students.

TABLE OF CONTENTS

RESEARCH DAY SCHEDULE

Monday, November 13th, 2023
Location: Roper Hall

3:30 – 4:30   **Poster Presentations**
Public Health................ 1st floor
Clinical Science........... 2nd 4th, 5th floor
Basic Science.............. 6th floor

4:30 – 5:30   **Oral Presentations**
Public Health................ Room 4310
Clinical Science........... Room 5310
Basic Science.............. Room 6310

5:30 – 6:00   **Reception**
1st floor lobby
     All guests are welcome

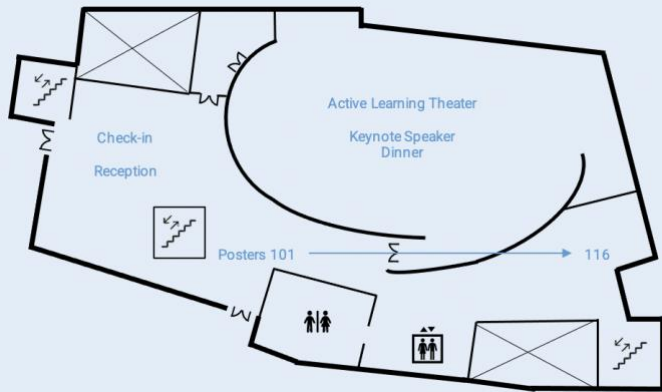**6:00 – 7:00**   **Keynote Speaker**
Brian James Miller, MD, MBA, MPH
Active Learning Theater

7:00 – 8:30   **Dinner, Society Induction, Awards**
Active Learning Theater
     Reserved for student presenters, judges, and faculty guest.

UNC | SCHOOL OF MEDICINE

ROPER HALL MAP

1st Floor
Active Learning Theater
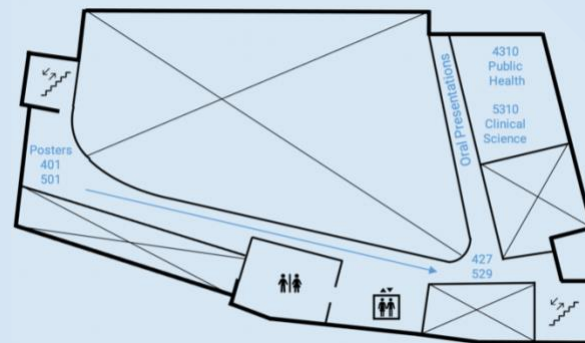Public Health Posters
101–116
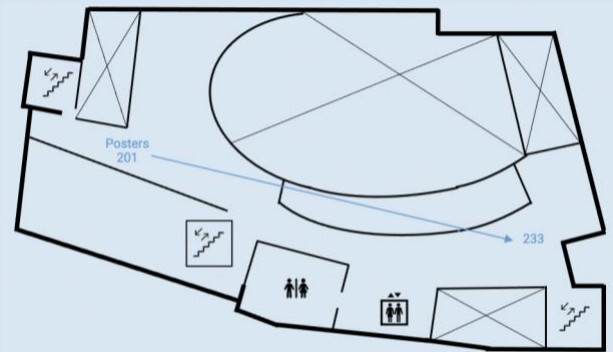
2nd, 4th, 5th Floors
Clinical Science Posters

2nd floor   # 201–233

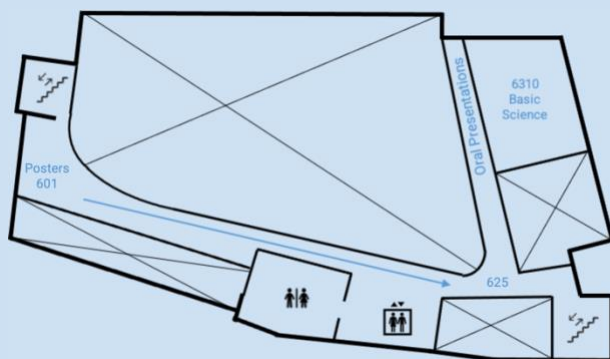**4th floor**   # 401–427
Room 4310: Public Health
Oral Presentations

5th floor   # 501–529
Room 5310: Clinical Science
Oral Presentations

2nd floor

4th and 5th floor

6th Floor
Basic Science Posters
601-625

Room 6310:
Basic Science
Oral Presentation

UNC | SCHOOL OF MEDICINE

5

Keynote Speaker

Brian James Miller
MD, MBA, MPH

Dr. Miller is a practicing hospitalist, health policy researcher, and health policy analyst. He serves as an Assistant Professor of Medicine at the Johns Hopkins University School of Medicine and an Assistant Professor (courtesy) at the Johns Hopkins Carey Business School. His research focuses on payment policy, FDA regulatory pathways, and healthcare competition policy.

Dr. Miller previously served as a Medical Officer in the Office of New Drugs at the Center for Drug Evaluation and Research at the U.S. Food and Drug Administration, where he focused on pre- and post-market safety regulation, including the review and approval of valbenazine, a first-in-class breakthrough new molecular entity. He also served as a Senior Policy Fellow for Health IT at the Federal Communications Commission, in addition to serving as a Special Advisor in the Federal Trade Commission's Office of Policy Planning. At the FTC, he worked on competition policy and served as an in-house physician expert for the Bureau of Competition, assisting in merger review and enforcement in health systems, pharmaceuticals, and retail drug stores, including the FTC's successful action blocking the $7 billion Advocate - NorthShore merger. Prior to the FTC, Dr. Miller was a Fellow at the Centers for Medicare & Medicaid Innovation, where he co-managed the ACO Investment Model, a $114 million project focused on ACOs in rural areas.

Dr. Miller's research focuses on the intersection of healthcare and the state: healthcare competition policy, health insurance program design, and the FDA regulation of drugs, devices, and tobacco products. Applied in nature, his research is conducted in partnership with academics, federal regulators, corporations, and policymakers.

Dr. Miller's goal is to understand how competition can drive increased productivity, lower costs, and improve quality in insurance and care delivery markets. Secondly, he explores how merger control policy affects cost, quality, and consumer experience. Finally, he aims to understand how FDA regulatory pathways for drugs, devices, and tobacco products can be redesigned to promote the public health and support cost-effective clinical practice.

UNC | SCHOOL OF MEDICINE

Student Research Day Team
2023-2024

Heather Swain   **Zach Schrank**   **Daniel O'Connell**

Co-Presidents of John B. Graham Research Society

Chelsea Li   **Taylor Stack**   **Nishita Sheth**   **Maxwell Finkelstein**

Vice-Presidents of Student Research Day

Please let us know if you have any questions or issues.

Please direct all judging-related questions to Max Finkelstein, and all catering-related questions to Nishita Sheth. For all other questions about Student Research Day logistics, please contact other members of the Student Research Day team.

Heather Swain	heather_swain@med.unc.edu	(919) 998-8805
Zach Schrank	zachary_schrank@med.unc.edu	(815) 520-7308
Daniel O'Connell	daniel_oconnell@med.unc.edu	(919) 454-5313
Chelsea Li	chelsea_li@med.unc.edu	(801) 721-7697
Taylor Stack	taylor_stack@med.unc.edu	(828) 506-9424
Nishita Sheth	nishita_sheth@med.unc.edu	(336) 501-3269
Maxwell Finkelstein	maxwell_finkelstein@med.unc.edu	(610) 703-5333

UNC | SCHOOL OF MEDICINE

Oral presentations
4:30 – 5:30 pm

Public Health	*Room 4310*
Clinical Science	*Room 5310*
Basic Science	*Room 6310*

Public Health

Lindsay Klickstein — Prevalence of Drug-Drug Interactions That Elevate Bleeding Risk in Older Adults Presenting with Falls

Katarina Swaim — Duration of Untreated Psychosis in the United States: A Scoping Review Focused on Equity

Pierina Parraga — Correlation between anxiety and depression surveys by self- and parent-report among pediatric patients with chronic health conditions

Kayden Maddox — Updating a Natural Language Processing Algorithm to Identify Trends in Electronic Health Record Documentation of Transgender and Gender-Diverse Patients

Clinical Science

Joshua Hale — Minimally Invasive versus Open Radical Cholecystectomy for Gallbladder Cancer

Ricardo Crespo — Outcomes in obese adult veno-venous extracorporeal membrane oxygenation: a systematic review

Emily Summers — Toxic Epidermal Necrolysis (TEN)-Like Lupus or TEN in Lupus: A Case Series

Ambika Viswanathan — Deep learning to estimate gestational age from fly-to cineloop videos: a novel approach to ultrasound quality control

Basic Science

Noah Rice — Regulation of Cardiomyocyte Senescence by Alpha-1A Adrenergic Receptors

Alexander Warwick — Continuous hypoxia rescues retinal ganglion cell death in a mouse model of mitochondrial optic neuropathy

Alexander Pfeil — Functional characterization and therapeutic susceptibility of RRAS/RRAS2 mutations

Tiana Scott — In vitro reconstitution of HIV-1 reverse transcription, capsid destabilization, and innate immune sensing via cGAS

UNC | SCHOOL OF MEDICINE

Oral presentation
Public Health

Prevalence of Drug-Drug Interactions That Elevate Bleeding Risk in Older Adults Presenting with Falls

01

Lindsay C Klickstein BA, Joshua Niznik PharmD PhD, Victoria Fenton MD, Michelle L Meyer PhD MPH, Jan Busby-Whitehead MD, Kathleen Davenport MD-, Ellen Roberts PhD MPH, Parag Goyal MD MSc, Elizabeth Goldberg MD ScM, Martin F Casey MD MPH

Abstract:

Patients at high risk for falls are often advised to stop using antiplatelet or anticoagulation medications due to bleeding risk. This risk could also be mitigated by reducing drug-drug interactions (DDIs) that increase bleeding risk in fall patients. Our objectives were to determine the prevalence of such DDIs in a cohort of patients presenting with a fall and to identify common DDIs pairings. We performed a cross sectional analysis of data collected from a pharmacist-led fall-prevention program focused on older adults presenting with a fall to an ED in the southeastern United States between August 2020 – December 2021. ED pharmacists performed medication reconciliations on older adults (≥65 years old) presenting with a chief complaint of 'fall'. DDIs that are known to increase bleeding risk were identified in accordance with the 2021 Choosing Wisely & American Society of Consultant Pharmacists guidelines. Among 514 patients presenting with a fall to the ED, 171 were prescribed an anticoagulant or antiplatelet medication. Among patients on an anticoagulant or antiplatelet medication, 39.7% (68/171) had potentially harmful DDIs that increased the likelihood of harmful bleeding per 2021 Choosing Wisely guidelines. The most identified DDIs included: concomitant use of aspirin and SSRIs (44/171; 25.7%), SSRIs and DOACs (13/171; 7.7%), aspirin and P2Y12 inhibitors (11/171; 6.4%) and aspirin and DOACs (6/171; 3.5%). Patients on an anticoagulant or antiplatelet medication who present to the ED with a fall may benefit from interventions to screen for DDIs and potentially discontinue those that increase bleeding risk in this vulnerable subpopulation.

Oral presentation
Public Health

Duration of Untreated Psychosis in the United States: A Scoping Review Focused on Equity

02

Katarina Swaim

Abstract:

Background: Although many studies have assessed the relationship between duration of untreated psychosis (DUP) and schizophrenia outcomes, the relationship between sociodemographic variables and DUP remains unclear.
Methods: I conducted a scoping review of research based in the United States that reported any measure of DUP in addition to at least one sociodemographic variable with the aim of describing deficiencies in the documentation of the role of structural racism in the context of DUP. A systematic search of PubMed, PsycInfo, and Cochrane Library from 1975 to April 2023 was performed.

Results: Of 465 studies identified, 20 met inclusion criteria. Operationalization of DUP varied between studies in terms of both criteria for psychosis onset and DUP end point. Of 17 studies reporting racial/ethnic data, only 5 gathered the information using participant self-report. Sixteen studies included a measure of socioeconomic status. Ten studies analyzed for an association between any sociodemographic variable and DUP. Five studies subdivided DUP into "help-seeking" and "referral delay" components in order to ascertain effects of both individual behaviors and the systems-level service delivery on pathways to care.

Conclusions: Current practices in early psychosis research are missing significant opportunities to examine and understand known disparities in mental health care access in the US. Recommendations for future research include: a focus on recruitment of ethnically and socioeconomically diverse study participants; collection of race/ethnicity data by participant self-report; clearly defining operationalization of DUP; and adoption of "help-seeking" and "referral delay" DUP classifications.

Oral presentation
Public Health

Correlation between anxiety and depression surveys by self- and parent-report among pediatric patients with chronic health conditions

03

Pierina Parraga, Dr. Maria Ferris

Abstract:

Internalizing conditions like anxiety and depression should be assessed throughout the treatment of comorbid chronic pediatric conditions, such as diabetes, digestive diseases, and kidney or neurological diseases. One helpful tool is the Revised Children's Anxiety and Depression Scale (RCADS). In clinical and academic settings, RCADS has demonstrated efficacy in determining symptom presentation for adolescents. Our Quality Improvement project was conducted at the University of North Carolina Pediatric Diagnostic and Complex Care Clinic from March 2017 to July 2023. Consecutive patient and caregiver responses to the sub-scales of the RCADS surveys were compared among 808 patients and their caregivers. We found no difference between the RCADS scores for patients of different races/ethnicities or grade levels, indicating that social determinants of health did not play as big of a role as expected in the development of internalizing conditions. There was a significant difference by sex in the obsession and compulsive subdomains. Furthermore, our study noted a key relationship in patients taking anti-anxiety or depression medication while being treated. For these patients, higher RCADS scores were reported in the subscales of separation anxiety, general anxiety, panic, obsession/compulsion, depression, total anxiety, and total anxiety and depression. More research is needed to fully understand this trend, to monitor symptom development while and targets of intervention for optimal management of chronic or long-term health conditions.

Oral presentation
Public Health

Updating a Natural Language Processing Algorithm to Identify Trends in Electronic Health Record Documentation of Transgender and Gender-Diverse Patients

04

Kayden Maddox, Brad Wright, Modjulie Moore, Rita Lahlou

Abstract:

Objective: To update an existing Natural Language Processing (NLP) algorithm to identify trends in EHR documentation of transgender and gender-diverse (TGD) patients, while attempting to account for current sociopolitical barriers the TGD community faces. Methods: Secondary data was collected from UNC's Gender-Affirming Primary Care Clinic patient panel. Patient charts were manually reviewed and categorized by billing code and EPIC SOGI (sexual orientation and gender identity) data. The algorithm was then adjusted and ran using EMERSE software to tailor a more accurate catchment of the entire patient panel. With each iteration of adjusted algorithm, the data set was analyzed for trends.

Results: Using an updated and expanded list of ICD-10 billing codes and keywords, we captured 99% (189/191) of the given patient list. 72% (128/190) of patients' gender identity was correctly documented in the SOGI section of EPIC. Of the 191 TGD patients identified, 15 (8%) were uninsured, 25 (13%) were insured through UNC's Financial Assistance Program. Patients with State Health Plan were more likely to secure healthcare using the E34.9 billing code. Patients utilized the Family Medicine Clinic most (99%), but also sought care from Plastic Surgery, Psychiatry, Urology, Gynecology, Pediatric Endocrinology, Endocrinology, Oral & Maxillofacial Surgery, and Emergency Medicine.

Conclusions: When capturing a strategically hidden population in a rough sociopolitical climate, the healthcare workers providing gender-affirming care have the best insight. By expanding and updating this algorithm, the care needed by this marginalized population continues to grow clearer.

Oral presentation
Clinical Science

Minimally Invasive versus Open Radical Cholecystectomy for Gallbladder Cancer

01

Joshua Hale, Kelsey R Landrum, Chris Agala PhD, Michael LeCompte MD

Abstract:

Background: Radical cholecystectomy (RC) is the standard procedure for gallbladder cancer (GBC) tumors stage TIb or higher and is associated with significant morbidity and mortality. Minimally invasive surgical (MIS) techniques utilizing laparoscopic and robotic surgery have the potential to improve patient morbidity and outcomes however there is a paucity of data evaluating these techniques.

Aims: This retrospective cohort study aims to compare 30-day mortality, major morbidity, and secondary surgical outcomes between patients that underwent MIS and open RC for GBC.

Methods: A retrospective cohort evaluation used the National Surgeon Quality Improvement Database (2014-2019) to assess 30-day mortality, morbidity, and secondary surgical outcomes. Outcomes were measured using frequency statistics, chi-square testing, and survival analysis using propensity score weighting to balance demographic and pre-operative comorbidity characteristics.

Results: The cohort was well-balanced before and after weighting, and included 1318 patients (240 MIS, 1178 open). Seven deaths occurred across both groups, with only 1 event occurring in the MIS group. The MIS group had fewer major morbidity events compared to the open group (MIS=2.81%,Open=4.13%; p=0.07).

The MIS group had fewer readmission, blood transfusion, infection, and bile leak events, and shorter length of hospital stay (MIS=3.0 days, Open=5.0 days; p<0.01). Conversely, the open group underwent biliary reconstruction more frequently (Open=15.22%, MIS=6.55%; p<0.01).

Conclusion: Our findings contribute to the growing body of evidence supporting MIS for RC as a potentially preferred alternative to the open approach. Improvements in length of hospital stay and readmission events demonstrate reduced post-surgical burden for patients who undergo minimally invasive RC.

Oral presentation
Clinical Science

Outcomes in obese adult veno-venous extracorporeal membrane oxygenation: a systematic review

02

Crespo-Regalado Ricardo, Reid Trista, Schneider Andrew, Boone Joshua, Hockran Sophie, Butler Logan, Perez Dakota, Holloway Alexa, Nguyen Phu, Gallaher Jared, Charles Anthony, Raff Lauren

Abstract:

Objective: To update an existing Natural Language Processing (NLP) algorithm to identify trends in EHR documentation of transgender and gender-diverse (TGD) patients, while attempting to account for current sociopolitical barriers the TGD community faces. Methods: Secondary data was collected from UNC's Gender-Affirming Primary Care Clinic patient panel. Patient charts were manually reviewed and categorized by billing code and EPIC SOGI (sexual orientation and gender identity) data. The algorithm was then adjusted and ran using EMERSE software to tailor a more accurate catchment of the entire patient panel. With each iteration of adjusted algorithm, the data set was analyzed for trends.

Results: Using an updated and expanded list of ICD-10 billing codes and keywords, we captured 99% (189/191) of the given patient list. 72% (128/190) of patients' gender identity was correctly documented in the SOGI section of EPIC. Of the 191 TGD patients identified, 15 (8%) were uninsured, 25 (13%) were insured through UNC's Financial Assistance Program. Patients with State Health Plan were more likely to secure healthcare using the E34.9 billing code. Patients utilized the Family Medicine Clinic most (99%), but also sought care from Plastic Surgery, Psychiatry, Urology, Gynecology, Pediatric Endocrinology, Endocrinology, Oral & Maxillofacial Surgery, and Emergency Medicine.

Conclusions: When capturing a strategically hidden population in a rough sociopolitical climate, the healthcare workers providing gender-affirming care have the best insight. By expanding and updating this algorithm, the care needed by this marginalized population continues to grow clearer.

Oral presentation
Clinical Science

Toxic Epidermal Necrolysis (TEN)-Like Lupus or TEN in Lupus: A Case Series

03

Emily G. Summers, Katherine I. Jicha MD, Carolyn M. Ziemer MD, MPH, Rachel C. Blasiak MD, MPH

Abstract:

Background: Toxic Epidermal Necrolysis (TEN)-like lupus is a rare manifestation of lupus erythematosus (LE) characterized by widespread sloughing of the epidermal layer and mucosal ulceration. Due to the rarity of the condition, little is known about disease triggers and differences in treatment outcomes.

Objectives: Identify characteristics of TEN-like lupus in identified patients, evaluate their clinical course, investigate clinical history and potential inciting factors, and increase literature representations of darker skin types.

Methods: After receiving approval from the UNC-Chapel Hill IRB, we identified patients 18 years old or older with TEN-like lupus seen by UNC Dermatology during UNC Health Medical Center hospitalization from 2013 to 2023 using the NC Translational and Clinical Sciences Institute's i2b2 web application and Carolina Data Warehouse for Health.

Results: We found seven patients with TEN-like lupus diagnosed either during their hospital course or whose presentation retrospectively favored a TEN-like lupus diagnosis. 71% of identified patients were African American. Common findings included interface dermatitis on histology, and high antinuclear titers, pancytopenia, and hypocomplementemia on labs. Identified inciting factors included medication exposure and medication holiday.

Conclusion: Distinguishing characteristics of TEN-like lupus resemble current literature, including interface dermatitis, high antinuclear titers, pancytopenia, and hypocomplementemia. In many of our patients, medication was a trigger for their TEN-like lupus presentation. Further research could investigate differences in histological presentation and clinical course based on trigger. Given the large proportion of African American patients identified in our study, we plan to increase literature representation of darker skin types with publication of our findings.

Oral presentation
Clinical Science

Deep learning to estimate gestational age from fly-to cineloop videos: a novel approach to ultrasound quality control

04

Ambika V. Viswanathan, B.Sc., Teeranan Pokaprakarn, Ph.D., Margaret P. Kasaro, M.D., Hina R. Shah, M.S., Juan C. Prieto, Ph.D, Chiraz Benabdelkader, Ph.D, Yuri V. Sebastião, Ph.D., Ntazana Sindano, M.S., Elizabeth Stringer, M.D., Jeffrey S. A. Stringer, M.D.

Abstract:

Objective: Low-cost devices have made obstetric sonography possible in settings where it was previously unfeasible, but ensuring quality and consistency at scale remains a challenge. We sought to create a tool to reduce sub-standard fetal biometry measurement while minimizing care disruption.

Methods: We developed a deep learning AI model to estimate gestational age (GA) in the second and third trimester from fly-to cineloops – brief videos acquired during routine ultrasound biometry – and evaluated its performance in comparison to expert sonographer measurement. We then introduced random error into fetal biometry measurements and analyzed the AI model's ability to flag grossly inaccurate measurements such as those that might be obtained by a novice.

Results: The mean absolute error (MAE) of our model (± standard error) was 3.87 ± 0.07 days, compared to 4.80 ±0.10 days for expert biometry (difference -0.92 days; 95% CI, -1.10 to -0.76). Based on simulated novice biometry with average absolute error of 7.5%, our model reliably detected cases where novice biometry differed from expert biometry by 10 days or more, with an area under the receiver operating characteristics curve of 0.93 (95% CI, 0.92, 0.95), sensitivity of 81.0% (95% CI, 77.9, 83.8), and specificity of 89.9% (95% CI, 88.1, 91.5). These results held across a range of sensitivity analyses, including where the model was provided sub-optimal truncated fly-to cineloops.

Conclusions: Our AI model estimated GA more accurately than expert biometry. Because fly-to cineloop videos can be obtained without any change to sonographer workflow, the model represents a no-cost guardrail that could be incorporated into both low-cost and commercial ultrasound devices to prevent reporting of most gross GA estimation errors.

Oral presentation
Basic Science

Regulation of Cardiomyocyte Senescence by Alpha-1A Adrenergic Receptors

01

Noah Rice, Brian Jensen

Abstract:

Cellular senescence is a critical feature of cardiac aging and develops in an accelerated fashion in heart failure (HF). The regulation of senescence in the heart is poorly understood. Previous experiments have demonstrated that activation of alpha-1A-adrenergic receptors (alpha-1A-ARs) protects against the development of HF, and mice overexpressing these receptors have longer lifespans than their wildtype (WT) counterparts. However, no prior studies have examined whether alpha-1A-ARs regulate cardiomyocyte senescence. This study's aim was to determine if genetic loss of alpha-1A-ARs contributes to cardiomyocyte senescence. RNA was isolated from the hearts of young and old wild type (WT) and alpha-1A-AR knockout (AKO) mice. Senescence and senescence-associated secretory phenotype (SASP) factor gene expression was then analyzed via quantitative real-time PCR (qPCR). Our findings showed that old AKO mice exhibited a 1.5-fold increase in mRNA expression of senescence genes compared to old WT mice ($p<0.01$). CDKN2A, which codes for the tumor suppressor protein p16 and is a well-studied senescence marker, was upregulated by 20-fold in the old AKO group ($p<0.05$). Old AKO mice demonstrated a 50-fold increase of SASP factor mRNA expression compared to their old WT counterparts ($p<0.05$). Significant differences in senescence and SASP factor mRNA expression were not seen between young WT and young AKO mice, suggesting alpha-1A-ARs might play a role in cardiomyocyte senescence, predominantly in older mice. Further research is warranted to support these findings and quantifying senescence with other methods would be valuable to better understand the role of alpha-1A-ARs in regulating cardiomyocyte senescence.

Oral presentation
Basic Science

Continuous hypoxia rescues retinal ganglion cell death in a mouse model of mitochondrial optic neuropathy

02

Alexander Warwick, Judy Wang, Howard Bomze, Mikael Klingeborn, Ying Hao, Sandra Stinnett, Sidney M Gospe III

Abstract:

Optic atrophy resulting from retinal ganglion cell (RGC) degeneration is a prominent ocular manifestation of mitochondrial dysfunction and occurs in diseases such as Leber Hereditary Optic Neuropathy. Previously, we have developed a mouse model of mitochondrial optic neuropathy in which the mitochondrial complex I accessory subunit NDUFS4 is knocked out specifically in RGCs. These mice develop progressive optic atrophy, beginning at approximately postnatal day 45 (P45) and becoming profound (~60% RGC loss) at P90. As continuous hypoxia has previously been reported to ameliorate the systemic phenotype of the germline ndufs4 knockout mouse, we proceeded to investigate whether continuous exposure of our ndufs4 conditional knockout mice to 11% O2 beginning at P25 would have a neuroprotective effect on RGCs. We observed a complete rescue of RGC death at P60, with robust RGC neuroprotection (only ~25% RGC loss) durable through P90. Similarly, we observed a significant reduction of reactive gliosis within the retinas of ndusfs4 conditional knockout mice housed under hypoxia compared to normoxia. Although complete rescue of RGC death was not durable to P90, understanding the mechanism by which hypoxia reduces RGC death may pave the way for therapies for optic neuropathies resulting from less profound mitochondrial impairment, such as Leber Hereditary Optic Neuropathy.

Oral presentation
Basic Science

Functional Characterization and Therapeutic Susceptibility of RRAS/RRAS2 mutations

03

Alexander J. Pfeil, Tom Zhang, Soo-Ryum Yang, Marc Ladanyi, Romel Somwar

Abstract:

Introduction: Lung cancers account for the most cancer-related deaths worldwide, with lung adenocarcinoma (LUAD) being the most common histological subtype. Activation of the MAPK signaling axis is considered a hallmark of LUADs, however, up to 30% of LUADs do not possess canonical mutations along the RTK/RAS/RAF pathway. We thus utilized MSK-IMPACT's database to identify novel mutations in LUADS without canonical drivers. We found recurrent mutations in RRAS and RRAS2 in a subset of such driver-negative LUADS and sought to determine the functional role and therapeutic vulnerabilities of cells harboring these mutations.

Methods: Lentiviral-mediated cDNA overexpression was used to generate RRAS and RRAS2 mutations in Ba/F3 cells to study their potential oncogenic capacity. Cell counting following growth factor withdrawal was utilized to determine transforming ability. Western blot and a phospho-kinase array were utilized to characterize differential pathway activation. Cell viability assays with Alamar Blue Reagent were performed to assess drug sensitivities.

Results: RRAS Q87L and RRAS2 Q72L mutations are found in a subset of driver-negative LUADs. Both mutants showed transforming capabilities in Ba/F3 cells and drove MAPK and AKT/PI3K pathway activation. RRAS Q87L as well as an RRAS2 Q72L driven ovarian cancer cell line, A2870, showed increased sensitivities to MAPK inhibition.

Conclusion: Mutations to RRAS and RRAS2, specifically at the Q87 and Q72 positions, respectively, may be novel oncogenic drivers in LUADs. Further investigation into these mutations in other cell lines as well as in vivo therapeutic strategies is warranted to potentially identify new treatment strategies in patients harboring such mutations.

UNC SCHOOL OF MEDICINE

Oral presentation
Basic Science

In vitro reconstitution of HIV-1 reverse transcription, capsid destabilization, and innate immune sensing via cGAS

04

Tiana M. Scott, Delaney McCann, Jordan Powers, Lydia Arnold, Wen Zhou, Philip J. Kranzusch, Wesley I. Sundquist, and Jarrod S. Johnson

Abstract:

Under specific conditions, reverse transcribed DNA from retroviruses can be detected by the innate immune sensor cyclic GMP-AMP synthase (cGAS). cGAS activation can restrict infection, but HIV-1 evades detection in most target cells, presumably because the HIV capsid protects the genome as the viral core traffics through the cell. However, the extent to which the capsid shields the reverse transcribed DNA from innate immune sensing remains unclear. To better understand this process, we developed a cell-free system to reconstitute HIV-1 sensing in vitro. Building on previously described endogenous reverse transcription assays, we permeabilized virions to release intact viral cores, initiated reverse transcription, and performed "sensing assays" in the presence of recombinant human cGAS. We found that HIV-1 capsids remain stable and largely protect their genomes from cGAS detection even 24h after initiating reverse transcription. However, by reducing concentrations of inositol hexakisphosphate (IP6), we could "deprotect" genomes and increase cGAS activity. Similarly, mutations that stabilize or destabilize the capsid (E45A, Q63/67A) were associated with decreased and increased 2'3'-cGAMP production, respectively. We also discovered that the capsid inhibitor lenacapavir potentiated cGAS activity in our in vitro assay and recapitulated these effects in cells during infection with single-cycle HIV-1 reporter virus. Together, our data demonstrate that the HIV-1 capsid shields the viral genome from innate immune sensing and suggest that triggering disassembly can drive robust cGAS activation. We anticipate that our in vitro system will help reveal how host factors promote disassembly of HIV-1 capsids and facilitate cGAS-mediated recognition of reverse transcripts.

Poster Presentations

Posters are categorized as public health (PH), clinical science (CS), or basic science (BS).

#	Topic	Presenter	Title
101	PH	Soha Raja	The Association Between Food Insecurity and Parental Feeding Patterns Prior To, and During, the COVID-19 Pandemic: A Scoping Review
102	PH	Gabrielle Adams	Attitudes and Behaviors That Impact Skin Cancer Risk Among Men
103	PH	Noah Berens	Title: How Should we Allocate Divisible Resources? An Overlooked Question
104	PH	Amy Zhang	Circulating trans fatty acids are associated with prostate cancer in Ghanaian and American men
105	PH	Sophia McFarlane	Is there a global disparity in our backyard? Cervical Cancer Screening among foreign-born women at Urban Ministries Open Door Clinic
106	PH	Ayesha Syed	Reconstructing Person-Centeredness from a Systems Perspective: Implications for the Care of Older Adults
107	PH	Alleigh Wiggs	The Association Between Living in a Food Desert and Hypertension in Victims of Sudden Death
108	PH	Katie Leiner	Cruel and Unusual Punishment? The Influence of State Level Variables on Medication for Opioid Use Disorder in Prisons in the United States
109	PH	Cordelia Muir	Understanding the Effects of Maternal Care Unit Closures on Emergency Department Utilization Among Pregnant Individuals in North Carolina
110	PH	Arjun Juneja	Spread of Sugar-Sweetened Beverage Disinformation
111	PH	Myrha Qadir	Modernization, Manipulation, and Mass Sterilization: Population Control in India and the Loss of Patient Autonomy
112	PH	Anna Andreevna Ilyasova	Identifying barriers to opioid agonist therapy in the Kyrgyz Republic: a nominal group technique study among People who inject drugs
113	PH	Yuka Koyama	Lipids in High-Density Lipoprotein (HDL) Subclasses and Risk of Myocardial Infarction (MI)

UNC | SCHOOL OF MEDICINE

114	PH	Rayna Haque	Exploring How Public Health Partnerships with Community-Based Organizations (CBOs) can be Leveraged for Health Promotion andOrganizations (CBOs) can be Leveraged for Health Promotion and Community Health
115	PH	Rayad Shams	Examining the Impact of Social Vulnerability and Other Determinants of Health on Hidradenitis Suppurativa Disease Severity: A Census Tract Level Analysis
116	PH	Makayla Matthews	Analysis of HPV Vaccine Related Content on TikTok
201	CS	Joshua Romero	Is the Stomach of an ICU Patient Empty at 8 Hours Fasting?
202	CS	Aitana Rizzo	Decreasing Fall Risk in Older Adult Patients by Deprescribing Medications Included in 2019 American Geriatrics Society (AGS) Beers Criteria
203	CS	Erina Fujino	Residual gastric contents in appropriately fasted patients on GLP-1 agonists
204	CS	Courtney Quick	Characterization of Comorbidities and Mortality in Barrett's Esophagus Patients Treated with EET
205	CS	Megan Walsh	Post-traumatic stress from a first episode psychosis: a case report
206	CS	Maya Patel	Relationship between metformin use and preterm preeclampsia in pregnancies with type 2 diabetes
207	CS	Madison Calvert	The fates of ovarian dominant follicles in the first two gynecologic years: an investigation of morphologic and endocrinologic features
208	CS	Madeline Lillich	Pediatric Ewing's Sarcoma and Permanent Chemotherapy-Induced Alopecia: A Case-Control Study
209	CS	Saigopala Reddy	May-Thurner Syndrome Diagnosis and Management and Concurrent Lower Extremity Lymphedema
210	CS	Rajon Scott	From a Brain Awry to a Dysfunctional Heart: The Intoxicating Pathway from Incentive Salience to Cardiovascular Dysfunction
211	CS	Emma L. Myers	Methotrexate in Immune Checkpoint Inhibitor-Induced Bullous Pemphigoid
212	CS	Hyoungjun Sim	Association of Cardiac Biomarkers with Clinical Status and Outcomes in Patients with Heart Failure – A Real-world Data Analysis
213	CS	Sierra Rae Parkinson	Atypical Nonbullous Pemphigoid in a Patient with Previously Controlled Classic Bullous Pemphigoid: A Case Report

UNC SCHOOL OF MEDICINE

214	CS	Matthew Lucas Regan	Sex and Age Differences in Atypical Chief Complains for Heart Failure in Emergency Department Visits
215	CS	Katherine Li	Developing an automated pipeline for CT-derived body composition analysis as a predictor for toxicity and survival in cancer patients
216	CS	Harini Sridhar	Phenomenology of Identity: Mobilizing Narrative Medicine Towards the Care of Eating Disorders
217	CS	Alexandra Chura	Anesthetic Management of Pediatric Patients with Mucopolysaccharidoses
218	CS	Kane Cooper	Antibiotic Treatment Preferences for Infective Endocarditis Among Persons Who Inject Drugs: A Single Center Cross-Sectional Study
219	CS	Samantha Kodikara	Tumor Characteristics and Progression Free Survival in Older and Younger Women with Early Breast Cancer
220	CS	Arielle Johnston	Characterizing Missed Opportunities to Reduce Inappropriate Aspirin Use: A Pilot Study
221	CS	Logan Long	Use of Apple Watch to acquire baseline wearable biometric data for patients with sickle cell disease and correlations to symptoms such as pain and fatigue
222	CS	Matthew Wang	Using POCUS to evaluate sarcopenia and frailty status in older adults
223	CS	Arvind Rajan	Impact of Facility Volume on Outcomes in Patients with Pancreatic Cancer Treated with Radiotherapy
224	CS	Linnea Westerkam	Biologic treatment safety and efficacy in patients with Down syndrome
225	CS	Natasha Tamagni Kulick	Association of Coronary Flow With Response to Intracoronary Tenecteplase in Patients With ST Elevation Myocardial Infarction With Thrombotic Complications During Primary Percutaneous Coronary Intervention
226	CS	Estefania (Stef) Gonzales	Pelvic Venous Disorders (PeVD): A Preliminary Investigation into Imaging Findings and Clinical History in Patients with and without Symptoms
227	CS	Matthew Washko	Treatment Outcome Priorities of Older Adults with Newly Diagnosed Blood Cancers Elicited through Best-Worst Scaling and Direct Elicitation
228	CS	Spencer Scott	A Rare Case of Dedifferentiated Liposarcoma with Heterologous Rhabdomyosarcomatous Differentiation in the Bone Marrow

229	CS	Grace Anne Longfellow	Radiculopathy on electromyography is associated with symptomatic macromastia?
230	CS	Brayan Corona-Macedo	Stroke-Like Migraine After Radiation Therapy [SMART] syndrome
231	CS	Adelaide Rosalie Cooke	Primary care physicians' knowledge and confidence in providing cancer survivorship care: a systematic review
232	CS	Nishita Sheth	Hidradenitis Suppurativa: Perceptions on pregnancies and personal relationships
233	CS	Katherine Drew Marapese	Esophageal Cancer Staging in Malawi: Feasibility of Routine Imaging in Patients Undergoing Endoscopy
401	CS	Austin Coale	Long-term outcomes of Ventral Hernia Repair Using a New Prosthetic Mesh
402	CS	Samuel O'Rourke	Changes in resting and smile symmetry after selective denervation surgery
403	CS	Kevin Welch	Chronic Pain Development After ORIF Surgery
404	CS	Timothy Meade	Tinnitus Treatment and Outcomes at a University of North Carolina Clinic
405	CS	Noah Cassidy	Evaluating Outcomes Across Axillary Staging Methods in Node Positive Breast Cancer Patients
406	CS	Benjamin Succop	Ultrasound versus clinical follow up for simple coccygeal dimples: a cost-benefit analysis
407	CS	Jake Reed	Utilizing the Tobra Bone Basket in TLIF Surgeries to Reduce Allograft Use and Decrease Patient Cost
408	CS	Océane Mauffrey	Factors Influencing Brace Compliance in Clubfoot Patients Treated with the Ponseti Method at UNC
409	CS	Morgan Batley	What are the Psychosocial Impacts of Pavlik Harness Treatment? A Prospective Study on Family Function & Maternal-Fetal Bonding.
410	CS	Caroline Miller	Analyzing outcomes of Veno-venous Extracorporeal Membrane Oxygenation in treating Acute Respiratory Distress Syndrome based on patient BMI
411	CS	Julian Mobley	The Clinical Significance of Utilizing PASS Thresholds when Administering IKDC and KOOS Patient-Reported Outcomes Post Anterior Cruciate Ligament Reconstruction
412	CS	Manjima Sarkar	Investigating Effects of Auditory Salience on TMS-EEG Artifact and Local Cortical Excitability
413	CS	Parsa Pazooki	Contributions to lumbar lordosis across adulthood in males and females

UNC SCHOOL OF MEDICINE

414	CS	Chandler Kotseos	Comparison of Patient-Reported Outcomes and Functional Assessment Using a Marker-Less Image Capture System in End-Stage Knee Arthritis
415	CS	Priya Desai	Surgeons' Perspectives on Nutritional Prehabilitation Prior to Hepatectomy in Hepatic Steatosis
416	CS	Katherine Poulos	A Mixed Methods Study of Drivers for Treatment Choice for Patients with Newly Diagnosed T1 Renal Masses
417	CS	Aurelia Monk	The creation of the reSNOT-22: improving readability of patient reported outcome measures in the ENT field
418	CS	Justin Magin	Preoperative Optimization Bridge-to-decision using Impella 5.5: a case report
419	CS	Kira Griffith	The Utilization of Uterine Artery Embolization for Adenomyosis
420	CS	Julia Kessel	Laparoscopic repair of large paraesophageal hernias with concomitant percutaneous endoscopic gastrostomy (PEG) may reduce recurrence: A single-institution series
421	CS	Emily Huber	Investigating Patterns of First-Line Treatment Failure in Patients with De Novo Metastatic Breast Cancer
422	CS	Alexander Requarth	Team STEPPS in Surgery: A Scoping Review
423	CS	Wilson Fisher	Anterior Column Reconstruction for the Treatment of Radiation-Induced Cervical Sagittal-Plane Deformity
424	CS	Drew Caddell	Age as an Indicator of Endoscopic Third Ventriculostomy Failure in Pediatric Hydrocephalus Patients
425	CS	Diana Nguyen	Clinical Indications for Rapid Sequence MRI in Pediatric Patients and the Limitations and Barriers to Implementation
426	CS	Marvin Albert Meza Jarquín	Data Sources and the Potential for Bias in the Study of Clinical T1 Kidney Cancer
427	CS	Connor Willis-Hong	Evaluating Generalized Joint Hypermobility as a Potential Risk Factor for Increased Injury in Division I Athletes – A Prospective Cohort Study
501	CS	Ashlee Taylor Winslow	Perspectives of Black women with breast cancer on their treatment decision-making experience.
502	CS	Deveney Franklin	The Impact of Collaborative Mentorship Programs on Belonging for URM Students Interested in Neurosurgery
503	CS	Christian Cook	Relationship Between Neighborhood Disadvantages and Outcomes After CRS/HIPEC

UNC | SCHOOL OF MEDICINE

504	CS	Jaewon Moon	Investigating the Role of Socioeconomic Status (SES) Measures Among Adults with Knee Osteoarthritis (KOA) Receiving a Diet and Exercise Intervention
505	CS	Christine Thai	Unmasking Misconceptions of Health Disparities among Asian Population
506	CS	Christina Toval	Specific Interventions to Mitigate Preterm Delivery among Black Birthing People: A systematic review
507	CS	Kaylee Deardorff	Assessing the Experience of Transgender and Nonbinary Patients in a Family Medicine Residency Clinic
508	CS	Priya Vadlamudi	International Relapsed/Refractory (R/R) Pre-B Acute Lymphoblastic Leukemia (ALL) Patients & Their Journey to Receiving Chimeric Antigen Receptor (CAR) T-cell Therapy
509	CS	Bradley Lauck	Gender Differences in Self-Description: A Linguistic Analysis of Orthopaedic Surgery Residency Application Personal Statements
510	CS	Scott Carl Jaros	Medical Education Research Study Quality Instrument: An Objective Instrument Susceptible to Subjectivity
511	CS	Daniel Winecoff	Comparing ChatGPT vs. Human Performance on the Anesthesiology Oral Board Exam
512	CS	Emily Broaddus	The Impact of New Abortion Restrictions on Medical Trainees: A Study of Responses to Texas Senate Bill 8
513	CS	Hailey Jenkins	Evaluation of access to care for patients with Hidradenitis Suppurativa in dermatology residency programs
514	CS	Seidah Congleton	Identifying Factors Influencing Anesthesiology Residents' Self-Evaluation of ACGME Core Competencies
515	CS	Matthew Garr	8760 Hours: An Analysis of Time Allocation, Academic Performance, and Happiness in Medical School
516	CS	Stephanie Peres-da-Silva	Use of Appropriate Blood Pressure Measurement Technique to Lower Prevalence of Uncontrolled Hypertension at NeighborHealth Federally Qualified Health Center
517	CS	Mili Dave	Successful Health Care Transition Outcomes for Parents and Caregivers of Adolescents and Young Adults with Special Health Care Needs
518	CS	Jessica Hu	Improving Follow-Up for Patients with Poorly Controlled Type 2 Diabetes Mellitus
519	CS	Nicole J. Buddenbaum	Increasing Parental Knowledge of American Academy of Pediatrics Guideline-based Feeding Transitions in Children 4 months to 3 years old during Clinical Well-Child Checks

UNC SCHOOL OF MEDICINE

520	CS	Theodora Christopher	Low-Cost Interventions to Improve Spanish-Speaking Patient Experience in Academic Retina Clinic
521	CS	Drew Griggs	Establishing a peripheral artery disease screening workflow at Cherokee Indian Hospital Authority's primary care clinic
522	CS	Patrick Ende	Diverse Goals of Patients in Bridges to Health Program Demonstrates Need for Multidisciplinary Health Care Teams
523	CS	Cody Mitchell	A Novel Medical Student-Run Audit System for Unintentionally Retained Foreign Object Prevention
524	CS	Cassandra Small	A Multidisciplinary Fall Prevention Intervention within the Emergency Department
525	CS	Hannah King	Understanding No-Show Visits at a Community Health Center in Raleigh
526	CS	Mohamed Y. Ahmidouch	Analyzing clinical notes and patient-provider communications for persons living with dementia and concurrent chronic conditions to identify factors that will prevent ED visits.
527	CS	Avani Desai	Feasibility and Outcomes of Interventions to Reduce Cystoscopy Discomfort: A Quality Improvement Project
528	CS	Kara Lopez-Lengowski	Initiation of a Multidisciplinary Cardiac Care Team, Patient Characteristics and Pregnancy Outcomes
529	CS	Heather Swain	Implementation of the Epic Deterioration Index at an academic tertiary care medical center
601	BS	Brian Khov	Synaptic changes in the SCN associated with Alzheimer's disease
602	BS	Mary Caroline Kaufmann	Developing Mesoporous Melanin Nanoparticles for the Treatment of Age-related Macular Degeneration
603	BS	Bevin Neill	Synthesis, Characterization, and Cell Culture Applications of Aminoacrylate Hydrogels
604	BS	Ezan Ahmed Chaudhry	Investigating the role of CADM1 in the pathogenesis of Ulcerative Colitis
605	BS	Varun Potlapalli	Real-time PCR detection of mixed Plasmodium ovale curtisi and wallikeri infections in human and mosquito hosts
606	BS	Adrian Othon	GPx1 and GPx3 DKO Impacts Oxidative DNA Damage, Apoptosis, and Immune Cell Infiltration
607	BS	Dhuru Patel	Evaluating bony predictors of bite force across the order Carnivora
608	BS	Morgan Johnson	UhpC Senses Glucose Availability in Chlamydia trachomatis

UNC SCHOOL OF MEDICINE

609	BS	Jennifer Potts	Altered Gait and Grip Strength Following Brachial Plexus Birth Injury
610	BS	Jiwoo Kim	Immunophenotyping Chronic Pain in Trauma Survivors
611	BS	Noel Archer	RAFT Step-Growth Polymerization of Diacrylates
612	BS	Dominic Lal	Children's Perception of Physician's, Teachers, and Police Officers
613	BS	Cameron Kurz	Association of Cytokines and Gut Microbiome Composition with Osteoarthritis
614	BS	Hyun Ho (Michael) Lee	Adenosine Deaminase (ADA) Deficiency: A functional in vitro assay to assess the pathogenicity potential of 44 novel ADA gene variants of unknown significance (VUS)
615	BS	Alan Zhao	Comparison of CT and wide-angle stationary digital chest tomosynthesis in the detection of pulmonary nodules
616	BS	Caroline Walton	Mitochondrial Clumping vs. Mitochondrial Fusion in CMT2A Diseases
617	BS	Gabriella Sahyoun	Peripuberty as a sensitive period for prefrontal cortex development and adult cognitive flexibility
618	BS	Oliver Hansen	Primary Human Chondrocytes Exhibit a Decline in DNA Damage Repair with Age
619	BS	Yaser Iftikhar	Immune phenotypes that are associated with subsequent COVID-19 severity inferred from post-recovery samples
620	BS	Victor Madormo	Finite Element Analysis of Rehabilitation Exercises on Post ACL Reconstruction Surgery Knee
621	BS	Gabriella Hesse	Plating methods for developing a recurrent glioblastoma cell line for investigation of ferroptosis
622	BS	Addison Oliver	Modeling Viscoelastic Response and Anisotropic Tissue Properties Through Acoustic Radiation Force Impulse (ARFI) Imaging in Phantoms
623	BS	Emeraghi David	Epigenetic Remodeling in Acceleration of Alzheimer's Pathology by Adolescent Alcohol
624	BS	Maya Rinehart	Sinogram inpainting to improve imaging in novel s stationary CT scanner
625	BS	Ruth Vorder Bruegge	Development of temperature-sensitive, injectable, tumor-mimicking alginate-based ultrasound phantoms for use in ultrasound research.

UNC | SCHOOL OF MEDICINE