

# CAIR QUARTERLY



## DIRECTOR'S NOTE

*From Dr. Metin Gurcan*

Dear CAIR Community,

As we progress through 2024, I am thrilled to share the remarkable advancements and achievements that have shaped our journey at the Center for Artificial Intelligence Research (CAIR). Our mission to advance healthcare through innovative AI research, education, and collaboration continues to thrive, and I am proud to highlight the exceptional work and growth within our center.

### Research Excellence and Innovations

CAIR has consistently been at the forefront of pioneering research, driving projects that address critical healthcare challenges. Our faculty and researchers have made significant strides in various domains, including predictive modeling, AI-enhanced diagnostics, and remote patient monitoring. Notably, Dr. Oguz Akbilgic's work on continuous ECG monitoring has garnered substantial attention for its potential to revolutionize cardiovascular care. Similarly, Dr. Da Ma's research on neuroimaging for early detection of neurodegenerative diseases is setting new benchmarks in the field.

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**ON THE COVER:** Scenes from the 2024 CAIR Workshop, "AI in Healthcare: Transforming Medicine for a Better Future." [Coverage starts on pg. 7.](#)

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## SAVE THE DATE!

Wake Forest CAIR's "AI in Action" seminars feature the world's leading AI experts who discuss timely topics and share the latest developments within their scope of research. Make sure you mark your calendars for our next seminar when **Yu Huang, PhD** of the University of Florida discusses the concept of a health digital twin – a virtual replica of a patient that facilitates the simulation of disease trajectories and therapeutic effects. Learn more about Dr. Huang [here](#).

 **WAKE FOREST CAIR EVENT ANNOUNCEMENT**

**FRIDAY, SEPT. 6**  
**12:00 – 1:00 P.M. EDT**  
**HYBRID**

**ARTIFICIAL  
INTELLIGENCE  
IN ACTION**

 **YU HUANG, PhD**  
UNIVERSITY OF FLORIDA  
DEPARTMENT OF HEALTH OUTCOMES &  
BIOMEDICAL INFORMATICS

**“Health Digital Twin: AI and  
Machine Learning Meet  
Real-World Data”**

**JOIN US:**

WEBEX & BAILEY POWER PLANT, ROOM 421  
(486 N. PATTERSON AVE. WINSTON-SALEM)

## ALSO INSIDE

### Professional Development and Collaboration

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### Faculty Publications and Achievements

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[Da Ma](#)

[Umit Topaloglu](#)

### **Have you seen?**

The Coy C. Carpenter Library at the Wake Forest University School of Medicine has compiled an "Artificial Intelligence in Biomedicine" Knowledge Guide filled with resources and tools for AI researchers to leverage. CAIR thanks Senior Library Assistant Mego Franks for his hard work in compiling this handy research guide.

**Access the guide [here](#).**

**FOLLOW @wakeforestai**

To stay updated on CAIR research, events, and more!



# Director's Note

(continued)

This year, we welcomed several remarkable researchers into our community, including Dr. Ibrahim Karabayir and Dr. Mohammad Moghimi. Their expertise in deep learning for cardiovascular outcomes and wearable medical devices, respectively, is set to expand our research horizons significantly.

Moreover, CAIR has continued to support innovative projects through our grant programs. The recent joint pilot funding with Northeastern University's Institute for Experiential AI (EAI) for delirium research exemplifies our commitment to collaborative, cross-institutional research. This project, aimed at developing prognostic models for older patients with delirium, is a prime example of how we are leveraging AI to improve patient outcomes in real-world settings.

## Educational Excellence and Community Engagement

Education remains a cornerstone of CAIR's mission. Our summer internship program was a resounding success, with 19 interns from 15 academic institutions participating in a rigorous 10-week research program. These students, many from disadvantaged backgrounds, gained invaluable experience working on cutting-edge AI and biomedical informatics projects. The culmination of their hard work was showcased in a symposium where they presented their research findings, reflecting the high caliber of our educational initiatives.



**Dr. Metin Gurcan**

In addition, our AI in Action (AI-IA) seminar series continues to be a vital platform for learning and knowledge exchange. We have hosted a series of seminars featuring global experts who have shared insights into AI's role in healthcare innovation. These sessions have been instrumental in fostering a deeper understanding of AI among our community members and have highlighted the practical applications of AI in various medical fields.

## Looking Forward

As we look ahead to the latter half of 2024, CAIR is prepared for and excited about continued growth and impact. Our upcoming CAIR Colloquium, scheduled for September, promises to be a landmark event that will bring together leaders from clinical, industrial, and research communities. This event will showcase the latest advancements in AI and foster collaborations that will drive the future of healthcare innovation.

I encourage all CAIR members to stay engaged with our activities, participate in our events, and continue contributing to our shared goal of advancing AI in healthcare. Your dedication and enthusiasm are the driving forces behind CAIR's success, and together, we are making a significant impact on the future of medicine.

Thank you for your continued support.

Sincerely,

**Metin Gurcan, PhD**  
Director, Center for Artificial Intelligence Research  
Senior Associate Dean, Artificial Intelligence  
Professor, Internal Medicine  
Wake Forest University School of Medicine



**REGISTER TODAY**  
**DEADLINE: AUGUST 23**

# 2024 CAIR COLLOQUIUM

**ESTABLISHING CROSS-COLLABORATIONS  
BETWEEN THE CLINICAL, INDUSTRIAL,  
AND RESEARCH COMMUNITIES**

**THURSDAY, SEPTEMBER 12, 2024  
9:00 A.M. – 3:00 P.M. EDT**

**Wake Forest Biotech Place, 151 Auditorium  
575 N. Patterson Ave., Winston-Salem, NC**

The Wake Forest Center for Artificial Intelligence Research's annual colloquium will explore the benefits of collaborative relationships between the clinical, research, and industrial communities and how to establish them. The agenda also includes short talks, an expert panel discussion, a poster session, and the presentation of two travel awards: the **Early-Stage Investigator Award** and the **Trainee Award**.

## **KEYNOTE SPEAKERS**



**RYAN MCGINNIS, PhD**  
Director, Center for Remote Patient and Participant Monitoring  
**Wake Forest School of Medicine**



**PAUL THOMPSON, PhD**  
Director, ENIGMA Center for Worldwide Medicine, Imaging and Genomics  
**University of Southern California**



**REGISTER NOW TO  
RESERVE YOUR SPOT**

QUESTIONS? EMAIL [CAIR@WAKEHEALTH.EDU](mailto:CAIR@WAKEHEALTH.EDU)

## **Dr. Khalid Niazi Promoted to Associate Professor with Tenure**

**Khalid Niazi, PhD**, a CAIR faculty member within the Department of Internal Medicine at the Wake Forest School of Medicine, has been promoted to Associate Professor with tenure.

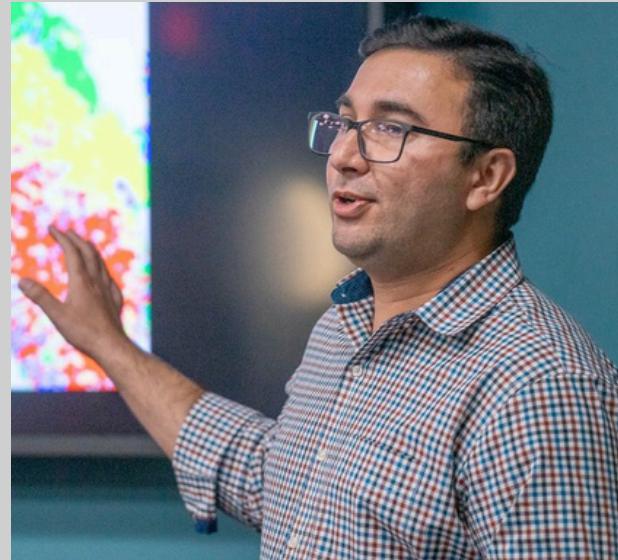
Dr. Niazi is a leading AI researcher at WFUSM, where he focuses on deep learning and its transformative applications in healthcare. His research is backed by The National Institutes of Health, the National Science Foundation, and various other foundations. He has also been honored with the prestigious NIH Trailblazer Award.

Most recently, he [co-authored a publication](#) that compared RNA-Seq and NanoString technologies in deciphering viral infection responses in lung organoids.

Beyond his research, he mentors PhD students, postdoctoral researchers, residents, fellows, and junior faculty, and is actively involved in teaching. He has also been an active member of NIH study sections for several years.

Dr. Niazi earned his PhD in medical image analysis from Uppsala University in Sweden. He then completed his postdoctoral training at The Ohio State University College of Medicine before joining WFUSM as a full-time assistant professor in February 2018.

CAIR congratulates Dr. Niazi on his well deserved promotion, thanks him for his commitment to CAIR's mission of enhancing the quality and safety of healthcare, and looks forward to his future advancements as an innovative researcher. 



**Since joining WFUSM in 2018, Dr. Khalid Niazi has developed an innovative AI research portfolio for which he's funded by the NIH and other organizations.**

## **Dr. Ibrahim Karabayir Joins CAIR as New Faculty Member**

**Ibrahim Karabayir, PhD**, has joined CAIR as a tenure-track faculty member with a primary affiliation in cardiology.

Dr. Karabayir brings a wealth of experience in artificial intelligence, having amassed a track record of developing and implementing cutting-edge, deep learning architectures and advanced AI techniques. His expertise extends to deploying models on edge devices using techniques like model quantization, pruning, and knowledge distillation.

His current research focuses on cardiovascular diseases, particularly the prediction and detection of outcomes such as heart failure, cardiomyopathy, and sudden cardiac death.



**Ibrahim Karabayir, PhD**

"I truly feel that I am in the right place at the right time," Dr. Karabayir said. "Together, I am eager to collaborate on projects aimed at enhancing patient outcomes and optimizing healthcare utilization by leveraging the power of AI and integrating it with remotely collected data sources."

Dr. Karabayir received his PhD in numerical methods from Istanbul University in Türkiye. He then served as a postdoctoral researcher at The University of Tennessee Health Science Center and at Loyola University Chicago before joining the Wake Forest School of Medicine as an assistant professor in September 2022.

Outside of work, Dr. Karabayir relishes spending quality time with his two children and engaging in outdoor activities with them. He also enjoys playing basketball and soccer, following the NBA and European soccer leagues, and watching thriller, science fiction, and biographical films.

CAIR welcomes Dr. Karabayir as he embarks on this new chapter of his career and looks forward to the valuable contributions he'll make as a dedicated AI researcher and data scientist. 

## **Dr. Mohammad Moghimi Joins CAIR as New Faculty Member**

**Mohammad J. Moghimi, PhD**, has joined CAIR as an assistant professor of biomedical engineering.

Dr. Moghimi has developed a body of research focused on wearable devices, medical Microsystems, and flexible bioelectronics. His experience extends to the design, fabrication, characterization, and testing of biomedical devices in laboratory-controlled environments. Specifically, he has developed wearable devices used for remote patient monitoring and ongoing data collection, as well as flexible patches for early identification of melanoma and monitoring signs and symptoms of cardiovascular diseases.



**Mohammad  
Moghimi, PhD**

In 2021, he received a National Institutes of Health (NIH) Early Career Research Award to develop flexible, noninvasive pediatric hearing aids. His project received \$430,000 over three years from the National Institute on Deafness and Other Communication Disorders (NIDCD), part of the NIH.

Dr. Moghimi obtained his PhD degree in electrical and computer engineering from Montana State University in Bozeman, MT. After completing his education, he conducted postdoctoral research studies at the University of Wisconsin-Madison. He later served as a research engineer at the Georgia Institute of Technology in Atlanta.

CAIR welcomes Dr. Moghimi and is eager to see how his cutting-edge research will advance biomedical technology and foster better health outcomes. 



## 2024 CAIR WORKSHOP COVERAGE

# CAIR's Annual Workshop Puts Spotlight on Pioneering AI Research in Healthcare

*Attendees get glimpse of medicine's future as researchers present AI-powered discoveries*

By Jesse Burkhart and Emma McKnight

**F**ACTS, FIGURES, AND FINDINGS were the highlights of the Wake Forest Center for Artificial Intelligence Research's 2024 Workshop, but when Dr. Martin Kohn took the podium, he cut straight to the ultimate objective for the attending clinicians and researchers.

"What I'm convinced of is that we have to show value - that [artificial intelligence] is not just great technology, but that it actually does something that makes a difference," said Dr. Kohn, an adjunct

professor at CAIR who made remarks prior to moderating a series of brief talks at the workshop. "Clinicians and the patients who use this technology have to be able to say, 'You've made a difference in my life. You've made it easier for me to work. You've made it easier for me to live.'"

Dr. Kohn's first contact with AI was nearly 60 years ago, so his comments served as a authoritative reminder of the reason why CAIR's annual workshop exists - to showcase the cutting-edge research of its

faculty and affiliated researchers, and by extension, the progress being made in a field which is poised to transform healthcare.

That research was on display throughout a jam-packed agenda that began with a keynote address from Dr. Susan Gregurick, the associate director of data science for the National Institutes of Health. Her presentation was followed by eight specialized talks delving into topics ranging from disease prevention to treatment innovation, a poster session, and the announcement of two travel awards.



**Dr. Susan Gregurick convenes with CAIR adjunct professors Dr. Umit Topaloglu (middle) and Dr. Martin Kohn during an intermission.**

### **'All-Government Approach'**

In her 45-minute keynote, Dr. Gregurick focused on the NIH's plans for the responsible implementation of AI in healthcare.

She discussed those plans in the context of

the executive order on AI that was signed by President Joe Biden on Oct. 30, 2023.

One of the longest executive orders written in U.S. history, the directive includes key provisions for the regulation and ethical development of AI. Those provisions relate to safety and security standards, economic impact and job creation, equity and civil rights, international collaboration, support for research, and transparency and public engagement.

Dr. Gregurick specifically mentioned the National AI Research Resource (NAIRR), which she described as an "all-government approach" to strengthening and democratizing the country's AI innovation ecosystem in a way that protects privacy, civil rights, and civil liberties.

To build NAIRR, she explained, federal agencies are tasked with providing resources, data access, and training to research communities in order to facilitate the broader adoption of AI. The NIH, for example, contributes large amounts of curated, AI-ready data and provides access to

its cloud-based platforms and programs in order to better serve communities with fewer resources. "We are starting to think about ways we can better address real health outcomes using data in its rawest form in a way that will lower the barriers for the medical institutions and raise the capacity for us to use that data," she said.

## Plaudits and Prizes

In the workshop's final hour, CAIR Director Dr. Metin Gurcan announced the winners of two new travel awards: the Early-Stage Investigator Award and the Trainee Award. Only researchers affiliated with Advocate Health and/or the Wake Forest University School of Medicine were eligible for the awards.

**Christian Sanderfer, MD**, a physician and researcher at Atrium Health's Carolinas Medical Center in Charlotte, won the Early-Stage Investigator Award for leading a study in which researchers determined that predictive models including skeletal muscle gauge and age can identify high-risk groups and predict post-operative mortality after minimally invasive esophagectomy.

**Shekhar Singh, PhD**, a post-doctoral research fellow at the Wake Forest University School of Medicine, won the Trainee Award for leading a study examining the association between atrial fibrillation and sleep apnea in which his team utilized convolutional neural networks to analyze a set of physiological features from a sleep study.

Dr. Sanderfer and Dr. Singh were each awarded a \$1,500 prize for either presenting at an AI-related scientific conference or enrolling in an AI certificate program.

## Looking Ahead

CAIR will hold another of its signature scientific events this fall.

The 2024 CAIR Colloquium is slated for Thursday, Sept. 12 at Wake Forest Biotech



**Dr. Shekhar Singh (left) was presented with the Trainee Award by CAIR Director Dr. Metin Gurcan.**

Place in Winston-Salem, NC and will carry the theme: "Establishing Cross-Collaborations Between the Clinical, Industrial, and Research Communities."

Featuring esteemed experts who will share their insights on bridging the gap between these communities, the event will also highlight new innovations at the intersection of AI and healthcare.

The agenda includes two keynote speakers: **Ryan McCinnis, PhD**, the director of the



**Dr. Mostafa Rezapour, a postdoctoral research fellow at CAIR, speaks with two attendees during the workshop's poster session.**

Center for Remote Patient and Participant Monitoring at the Wake Forest School of Medicine, and **Paul M. Thompson, PhD**, the director of the ENIGMA Center for Worldwide Medicine, Imaging and Genomics at the University of Southern California.

An interactive panel discussion, short talks, a poster session, and the presentation of two travel awards are also part of the event agenda. A catered lunch will be provided.

"The 2024 CAIR Colloquium offers a unique opportunity for clinicians, researchers, and healthcare professionals to come together, exchange ideas, and learn from each other," said Dr. Gurcan. "If you want to get a glimpse into the future of healthcare and understand how the clinical, industrial, and research communities can work together to advance AI in medicine, then join us in September." 

## Researcher Rundown

Following Dr. Gregurick's address, eight researchers affiliated with Advocate Health and/or Wake Forest University each gave a brief presentation on a healthcare research project that utilized AI.

Dr. Kohn and **Brian Wells, MD, PhD** associate professor of biostatistics and data science at WFUSM, served as co-chairs of the eight talks. **Arezoo Movaghah, PhD**, an assistant professor of pediatrics at WFUSM, served as chair of the workshop's poster session.

CAIR thanks Dr. Kohn, Dr. Wells, and Dr. Movaghah for lending their time and expertise in moderating the workshop proceedings, and also thanks the eight researchers below for presenting their projects:

**Da Ma, PhD**, assistant professor of gerontology and geriatric medicine, WFUSM

**Jonathan C. Salo, MD**, chief of GI surgical oncology section, Atrium Health Levine Cancer Center

**Ibrahim Karabayir, PhD**, associate professor of cardiology, WFUSM

**Jeffrey A. Cleveland, MD, FAAP**, chief medical information officer, Atrium Health Information and Analytic Services

**Seth Mischo**, graduate research student, Center for Injury Biomechanics, WFUSM

**Mostafa Rezapour, PhD**, research fellow, Center for Artificial Intelligence Research

**Shekhar Singh, PhD**, research fellow, WFUSM

**Usman Afzaal**, PhD student in medical image analysis, Wake Forest-Virginia Tech of Biomedical Engineering and Sciences

# Delirium Researchers Win Joint Pilot Funding from CAIR and Northeastern EAI

Two researchers who are using machine learning to predict prognoses for delirium patients are the inaugural recipients of a \$50,000 joint pilot award from CAIR and Northeastern University's Institute for Experiential AI (EAI).

The research teams are led by **Ariba Khan, MD, MPH** of Advocate Health Care's Aurora Center for Senior Health & Longevity in Milwaukee, WI and **Suzanne Wendelken, MD, PhD** of Northeastern University's The Roux Institute. Their project is titled, "An Innovative Approach Using Machine Learning to Predict Prognosis in Older Patients with a Diagnosis of Delirium."

Funds will be split evenly between Wake Forest/Advocate and EAI researchers, with CAIR and EAI staff working closely with funded teams throughout the grant period to monitor progress and provide assistance when necessary. The project period is anticipated to run from Sept. 1, 2024 until Aug. 31, 2025.

While it's well known that delirium is associated with poor prognosis, Dr. Khan says there is a lack of research regarding which clinical factors are associated with worse prognosis in older patients with delirium. To the best of her team's



**Dr. Ariba Khan**



**Dr. Suzanne Wendelken**

knowledge, there are no prognostication prediction models specifically available for predicting outcomes in patients diagnosed with delirium, making it challenging for clinicians to predict prognosis at the bedside.

In this project, the researchers have two aims: (1) to establish a foundational understanding of the prognostic factors associated with inpatient mortality and non-home discharge for patients diagnosed with delirium, and (2) to develop and validate a prognostication predictive model using machine learning.

The researchers' work intends to lay the foundation for the integration of a prognostication predictive model into the electronic medical record for real-time use by clinicians at the bedside. 

# JOINT PILOT COLLABORATION

PRESENTED BY:

Wake Forest Critical Illness, Injury and Recovery Center (CIIRRC) and the Center for Artificial Intelligence Research (CAIR)

THURSDAY, AUG. 29, 2024

3 P.M. – 5 P.M. EDT



Hosted by Wake Forest CIIRRC and Wake Forest CAIR, this collaboration session will feature brief presentations from clinicians and researchers who are employing novel AI and machine-learning methodologies to improve treatment and outcomes of acutely ill or injured patients.

Interested in presenting?

Email [CAIR@wakehealth.edu](mailto:CAIR@wakehealth.edu) and let us know! Presenters are encouraged to bring an idea that could be proposed in a pilot study. CIIRRC and CAIR will issue a joint pilot request for application depending on the degree of investigator interest.

## RESERVE YOUR SEAT



### LOCATION:

Wake Forest Biotech Place  
575 N. Patterson Ave.  
Winston-Salem, NC 27101  
Auditorium 151 &  
Conference Room 152

FOR MORE INFORMATION, CONTACT: [CAIR@WAKEHEALTH.EDU](mailto:CAIR@WAKEHEALTH.EDU)

LEARN MORE ABOUT CAIR AT: [SCHOOL.WAKEHEALTH.EDU/CAIR](http://SCHOOL.WAKEHEALTH.EDU/CAIR)

**CAIR**  
CENTER FOR ARTIFICIAL INTELLIGENCE RESEARCH

# CAIR and CALIBIR Interns Complete 10-Week Summer Research Program

This summer CAIR hosted 19 interns who participated in a intensive, 10-week research program, which concluded in late July with a symposium-like event in which the interns presented their projects.

CAIR's summer internship program gives students the opportunity to work on cutting-edge AI and biomedical informatics projects. Of the 19 interns, 10 are funded by CAIR, and nine are part of the Culturally Augmented Learning in Biomedical Informatics Research (CALIBIR) program, which is funded by an R25 grant from The National Institutes of Health.



Here's a by-the-numbers breakdown of the program:

- CAIR's summer interns represented 15 academic institutions across 13 states
- 12 of the 19 interns came from a disadvantaged background; 8 of 9 CALIBIR interns came from a disadvantaged background
- Class makeup: 2 freshmen, 6 sophomores, 6 juniors, 1 senior, and 4 graduate students

The interns participated in AI and biomedical informatics bootcamps, facility tours, and weekly Research Experience for Undergraduates (REU) seminars. They also attended the third annual Diversity Networking Reception jointly hosted by CAIR and the Wake Forest Department of Biomedical Engineering.

Seven of the interns recorded interviews about their experiences at CAIR, which can be found on the [Wake Forest AI YouTube channel](#).

CAIR salutes each of these interns for their achievements this summer and is grateful to all of the mentors and staff members who made the program possible. 🌱

# **Invitation to Contribute to AI Research Project Inventory**

**As part of CAIR's ongoing efforts to highlight and support the diverse and innovative work being undertaken in our community, we are compiling an inventory of AI research projects at Advocate Health (including Aurora Healthcare, Advocate Healthcare, and Atrium Health) and Wake Forest University School of Medicine.**

## **What Is an "AI Research Project"?**

**An AI research project encompasses any research initiative that involves developing or applying AI technologies.**

**This includes, but is not limited to, projects focusing on machine learning, deep learning, AI algorithms, computer vision, natural language processing, robotics, and AI applications in various disciplines. The aim is to understand, augment, or create systems that exhibit some form of human-like intelligence or autonomous decision-making.**

**To ensure that your project is included in this inventory and to foster collaboration and awareness within our community, we kindly ask you to complete [this questionnaire](#). The questionnaire seeks to gather essential information about your project.**

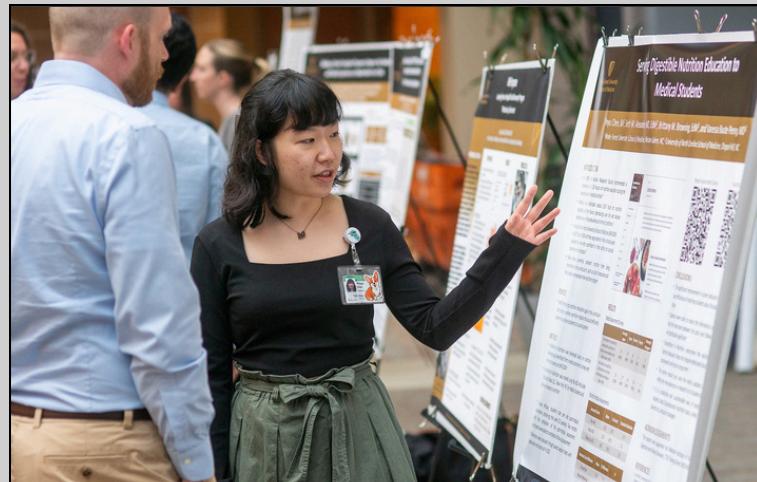
**Please complete the questionnaire as soon as possible. Your contributions are invaluable, and we believe that this inventory will serve as a vital resource for fostering collaboration, securing funding, and showcasing our collective achievements in AI research.** 

# Recent Events

The Wake Forest Center for Artificial Intelligence Research sponsored the 2024 Educator Conference in mid-May and also held five “Artificial Intelligence in Action” seminars since then. Here’s a recap of each event:

## **2024 Educator Conference**

Held at Wake Forest Biotech Place, the sixth annual Educator Conference presented by the Health Professions Education Institute (HPEI) hosted faculty, students, residents, fellows, physicians, and providers who are interested in teaching and training in the health professions. The conference showcased original research and featured best-practice updates, evidence-based teaching, opportunities for networking with educators, and thoughtful discussions about how to train current and future generations of medical and biomedical professionals.



Dr. Verity Schaye, MD, MHPE, an associate professor at the New York University Grossman School of Medicine, delivered a keynote address, “From the Classroom to the Clinical Learning Environment: How Artificial Intelligence Can Transform Medical Education.”



In her presentation, she discussed the fundamentals of AI technology and its limitations and best practices for implementation. She also covered AI medical education use cases across the medical education spectrum.

Following her presentation, she led a breakout session titled, “Putting ChatGPT into Practice: Exploring Medical Education Use Cases” in which she covered how to devise solutions for common medical education challenges. 🌱

## PROFESSIONAL DEVELOPMENT & COLLABORATION

### 2024 Artificial Intelligence in Action Seminar Series

**Wednesday, May 15**

**Presenters: W. Keith Robinson & Raina Haque**

Professors, Wake Forest School of Law



**Title: "Patent Law 101: Basics of the Law with a Focus on AI"**

**Summary:** Professors Robinson and Haque discussed the fundamentals of patent law, with a particular emphasis on how these principles apply to the burgeoning field of AI. They laid the groundwork by explaining the core concepts of patent law – including the criteria for patentability, the process of obtaining a patent, and the scope of protection it offers – and then detailed the specific challenges that AI presents for the patent system.

**Thursday, May 30**

**Presenter: Brian E. Chapman, PhD**

Associate Professor, University of Melbourne



**Title: "Pushing Against Ignorance: Medical Informatics, Artificial Intelligence, and the Quest to Improve Healthcare"**

**Summary:** Dr. Chapman spoke about the rise of medical informatics, which he calls a “rebellion” against habits that lead to inefficient and ineffective care. He explained that the implementation of AI and information technologies can push against these bad habits and lead to improved treatment and outcomes.

**Friday, June 7**

**Presenter: Neslihan Yalcin Bayramoglu, PhD**

Senior Research Fellow, University of Oulu (Finland)



**Title: "Exploring Advanced Applications of Machine Learning in Medicine, with a Focus on Osteoarthritis"**

**Summary:** In the first half of this seminar, Dr. Bayramoglu offered a foundational understanding of the core mechanisms driving machine learning applications in medicine. In the second half, she focused on the specific application of machine learning, deep learning, and AI in the context of osteoarthritis, including diagnosis and treatment.

## PROFESSIONAL DEVELOPMENT & COLLABORATION

### 2024 Artificial Intelligence in Action Seminar Series

**Tuesday, July 9**

**Presenter: Ulas Bagci, PhD**

Associate Professor of Radiology, Northwestern University



**Title: “Trustworthy AI for Imaging-Based Diagnoses”**

**Summary:** Dr. Bagci described the failures of deep learning and AI algorithms and proposed several approaches to increase robustness of AI-powered medical imaging systems. He focused on three key areas for developing trustworthy systems: algorithmic robustness, interpretable/explainable machine learning systems, and human-in-the-loop machine learning systems. He also provided insights into what medical imaging physicians and scientists might anticipate as AI technology continues to advance.

**Monday, August 5**

**Presenter: Oguz Akbilgic, PhD**

Associate Professor of Cardiovascular Medicine,  
Wake Forest University



**Title: “An AI-Assisted Continuous Representation of Biological Sex: ECG Sex Index”**

**Summary:** Dr. Akbilgic pointed out that biological sex is associated with a number of clinical and subclinical conditions, affecting risk factors, prevalence, age of onset, symptomatology, prognosis, biomarkers, and treatment effectiveness of diseases. Therefore, sex is reported to be a very important risk factor for many chronic diseases including cardiovascular diseases. In this talk, he introduced a novel continuous representation of sex – namely, the ECG Sex Index – and its utility in prediction of cardiovascular and non-cardiovascular events.

# Upcoming Events

**Wednesday, August 21**

**12 p.m. – 1 p.m. EDT**

**WHAT:** Artificial Intelligence in Action Seminar:  
“Evaluation and Governance of Health AI Technologies”



**WHO:** Michael J. Pencina, PhD; Duke University School of Medicine

**WHERE:** Bailey Power Plant, Room 421 (486 N. Patterson Ave., Winston-Salem, NC) / WebEx

**Thursday, August 29**

**3 p.m. – 5 p.m. EDT**

**WHAT:** Joint Pilot Collaboration, Wake Forest Critical Illness, Injury and Recovery Center (CIIRRC) + Wake Forest CAIR

[Register here.](#)

**WHO:** Presentations from researchers who are employing novel AI methodologies to improve treatment and outcomes of acutely ill or injured patients. CIIRRC and CAIR will issue a joint pilot request for application depending on investigator interest.

**WHERE:** Wake Forest Biotech Place, Auditorium 151 & Conference Room 152 (575 N. Patterson Ave., Winston-Salem, NC)

**Friday, September 6**

**12 p.m. – 1 p.m. EDT**

**WHAT:** Artificial Intelligence in Action Seminar:  
“Health Digital Twin: Artificial Intelligence and Machine Learning Meet Real-World Data”



**WHO:** Yu Huang, PhD; University of Florida

**WHERE:** Bailey Power Plant, Room 421 (486 N. Patterson Ave., Winston-Salem, NC) / WebEx

# Upcoming Events

**Thursday, September 12**

**9 a.m. – 3 p.m. EDT**

**WHAT:** 2024 CAIR Colloquium: “Establishing Cross-Collaborations Between the Clinical, Industrial, and Research Communities”

[\*\*Register here.\*\*](#)



CAIR’s annual colloquium will feature short talks, an expert panel discussion, a poster session, and the presentation of two travel awards.

**WHO:** Keynote speakers Ryan McGinnis, PhD (Wake Forest School of Medicine) and Paul Thompson, PhD (University of Southern California)

**WHERE:** Wake Forest Biotech Place (575 N. Patterson Ave., Winston-Salem, NC)

**Wednesday, September 18**

**12 p.m. – 1:30 p.m. EDT**

**WHAT:** Research Integrity Training for Early-Career Scientists (RITE Seminar Series). [\*\*Register here.\*\*](#)



**WHO:** Metin N. Gurcan, PhD

**WHERE:** Bailey Power Plant, Room 421 (486 N. Patterson Ave., Winston-Salem, NC) / WebEx

**Wednesday, September 18**

**2 p.m. – 4 p.m. EDT**



**WHAT:** “Toward Gold Standards in Data Creation – AI Strategies to Address Data Accessibility Challenges in Biomedical Research”  
Presented by the National Library of Medicine. [\*\*Register here.\*\*](#)

**WHO:** Özlem Uzuner, PhD, George Mason University; C. Karen Liu, PhD, Stanford University; Lee Cooper, PhD, Northwestern University

**WHERE:** Virtual (Zoom)

# Upcoming Events

**Friday, September 20**

**12 p.m. – 1 p.m. EDT**

**WHAT:** Artificial Intelligence in Action Seminar:  
“Using Machine Learning to Increase Equity in  
Healthcare and Public Health”

**WHO:** Emma Pierson, PhD; Cornell University

**WHERE:** Virtual (WebEx)



**Wednesday, September 25**

**12 p.m. EDT**

**WHAT:** DIVE-In Session: “Research Data in the Encompass World.” Presented by the Wake Forest Clinical and Translational Science Institute (CTSI). [Register here.](#)

**WHO:** Brian Ostasiewski, Wake Forest CTSI Director of Research Informatics

**WHERE:** Virtual (WebEx)



**Monday, October 21**

**12 p.m. – 1 p.m. EDT**

**WHAT:** Artificial Intelligence in Action Seminar

**WHO:** Joseph Rigdon, PhD; Wake Forest School of Medicine

**WHERE:** Bailey Power Plant, Room 421 (486 N. Patterson Ave., Winston-Salem, NC) / WebEx





# WE ARE HIRING

## POSTDOCTORAL RESEARCHERS

The Clinical Image Analysis Lab (CIALAB) at the Wake Forest Center for Artificial Intelligence Research (CAIR) is seeking postdoctoral researchers to help pioneer the future of AI-driven healthcare solutions.

### Key Responsibilities:

- Develop and implement advanced AI algorithms for medical image analysis
- Collaborate with interdisciplinary teams to execute research projects
- Publish research findings in high-impact journals and present at conferences
- Mentor and guide junior researchers and students

### Required Qualifications:

- PhD in Computer Science, Electronics, Biomedical Engineering or related field
- Experience in AI/ML algorithms and medical imaging
- Strong programming skills and experience with deep learning frameworks
- Excellent communication and teamwork skills

### HOW TO APPLY

Email Dr. Metin Gurcan ([mgurcan](mailto:mgurcan@wakehealth.edu) at [wakehealth.edu](mailto:mgurcan@wakehealth.edu)) with the subject line "Post-Doc Application" and include a cover letter, CV, and references.

## FACULTY PUBLICATIONS & ACHIEVEMENTS

# Metin Gurcan, PhD

Director, Center for Artificial Intelligence Research  
Senior Associate Dean, Artificial Intelligence  
Professor, General Internal Medicine  
Professor, Wake Forest Institute for Regenerative Medicine



## Publications

Davis JM, Niazi MK, Ricker AB, Tavolara TE, Robinson JN, Annanurov B, Smith K, Mantha R, Hwang J, Shrestha R, Iannitti DA, Martinie JB, Baker EH, Gurcan MN, Dionisios V, “Predicting response to neoadjuvant chemotherapy for colorectal liver metastasis using deep learning on prechemotherapy cross-sectional imaging,” Journal of Surgical Oncology, 1-9, 2024, PMID: 38712939 DOI: 10.1002/jso.27673.

Rezapour M, Walker S, Ornelles DA, McNutt PM, Atala A, Gurcan MN, “Analysis of Gene Expression Dynamics and Differential Expression in Viral Infections Using Generalized Linear Models and Quasi-Likelihood Methods,” Frontiers in Microbiology, 2024;15:1342328.

Rezapour M, Seymour RB, Sims SH, Karunakar MA, Habet N, Gurcan MN, “Employing machine learning to enhance fracture recovery insights through gait analysis,” Journal of Orthopaedic Research, 2024 Apr 10, PMID: 38596829.

## Achievements

### **Patent:**

Gurcan MN, Senaras C, Lozanski G, “Synthetic IHC-stained digital slides generated using artificial neural networks,” issued May 7, 2024, Patent Number: US# 11,978,536B2.

### **Talks:**

“Role of generative AI on future of Education and Society,” Panel Discussion, Responsible AI day, Winston Salem State University, Winston Salem, April 19, 2024.

“Artificial Intelligence to Improve Otoscopic Diagnosis,” Otolaryngology Update (2024), Wake Forest University School of Medicine, Winston Salem, April 20, 2024.

## FACULTY PUBLICATIONS & ACHIEVEMENTS

# Meredith Adams, MD, MS

Associate Professor, Anesthesiology  
Associate Professor, Public Health Sciences



## Publications

### **Peer-Reviewed Publications:**

Adams, M. C., Hurley, R. W., Siddons, A., Topaloglu, U., & Wandner, L. D. (2024). **NIH HEAL Common Data Elements (CDE) implementation: NIH HEAL Initiative IDEA-CC** (Vol 24, pg 743, 2023). PAIN MEDICINE, 25(5), 365-365.

Njoku IO, Chin EL, Adams MC. **Physician Burnout: Designing Strategies Based on Agency and Subgroup Needs.** Journal of Healthcare Leadership. In Press 2024

### **Scholarship without Authorship:**

Sharathkumar A, Wendt L, Ortman C, Srinivasan R, Chute C, Chrischilles E, Takemoto C, **The National COVID Cohort Collaborative Consortium\*. COVID-19 outcomes in persons with hemophilia: results from a US-based national COVID-19 surveillance registry.** Journal of Thrombosis and Haemostasis. 2024;22(1) <https://doi.org/10.1016/j.jtha.2023.04.040>. (\*member of the writing group cited in the appendix of the manuscript)

## Achievements

### **In the Spotlight:**

Selected to "Women to Know in Health IT" list by [Becker's Hospital Review](#)

### **Administrative Appointment:**

Scientific Member, Atrium Health Wake Forest Baptist Comprehensive Cancer Center

### **Pending Awards:**

Title: **Developing a Diverse Workforce: Advancing Data Science for Addiction Research and Professional Training (ADAPT)** - scored a 26 during review. Role: PI; Dates: 09/01/2024-08/31/2027; \$405,980

### **Presentations at Professional Meetings:**

"Machine Learning, AI, and Informatics: Connecting Pain and Addiction Research Data" 05/2024, Department of Anesthesiology Visiting Professor, University of Virginia, Charlottesville, VA

"Enabling Informatics, Health System and Outcomes Research", "Marketing You and Your Science to the NIH: Grant Prep Workshop", "Role of the Anesthetist in the Opioid Crisis and the Science of Mitigation" 05/2024, IARS Annual Meeting, Seattle, WA

"Economic Impact of COVID on Pain and Opioid Use Disorder" 05/2024, SBE Covid Consortium Annual Meeting, Ann Arbor, MI

"Mostly Finicky, Sometime Awesome: Building Data Infrastructure and AI for Pain and Addiction Research." 05/2024, Chronic Pain and Fatigue Research Lab, University of Michigan, Ann Arbor, MI

"Glowing-up Your NIH Biosketch & Personal Statement", "Understanding Data Standards & Requirements as You are Building Your Research Program" 05/2024, PURPOSE Annual Meeting, National Harbor, MD

"What I wish I knew as a FAER Awardee", FAER Mentored Training Grant Annual Meeting (5/24, Washington, D.C.)

# Stephen Downs, MD, MS

Professor, Pediatrics – General



## Publications

South AM, Giannmattei VC, Bagley KW, Bakhoum CY, Beasley WH, Bily MB, Biswas S, Bridges AM, Byfield RL, Campbell JF, Chanchlani R, Chen A, D'Agostino McGowan L, Downs SM, Fergeson GM, Greenberg JH, Hill-Horowitz TA, Jensen ET, Kallash M, Kamel M, Kiessling SG, Kline DM, Laisure JR, Liu G, Londeree J, Lucas CB, Mannemuddhu SS, Mao KR, Misurac JM, Murphy MO, Nugent JT, Onugha EA, Pudupakkam A, Redmond KM, Riar S, Sethna CB, Siddiqui S, Thumann AL, Uss SR, Vincent CL, Viviano IV, Walsh MJ, White BD, Woroniecki RP, Wu M, Yamaguchi I, Yun E, Weaver DJ Jr. **The Study of the Epidemiology of Pediatric Hypertension Registry (SUPERHERO): Rationale and Methods.** Am J Epidemiol. 2024 Jun 17;. doi: 10.1093/aje/kwae116. [Epub ahead of print] PubMed PMID: 38881045.

Lehmann CU, Adams WG, Chaparro JD, Fiks AG, Grout RW, Leu MG, Mendonca EA, Michel JJ, Okechukwu K, Salmon J, Sharifi M, Downs SM. **Better Guidelines and Policies: AAP's Partnership for Policy Implementation.** Pediatrics. 2024 Jun 12:e2023061360. doi: 10.1542/peds.2023-061360. Epub ahead of print. PMID: 38864111.

## Achievements

CHICA-CN (child neurology) running at Norton Children's Hospital in Louisville, KY.

Grant submission to Thrasher Foundation.

Serving on FAIR AI project and Emerging Tech Ethics Committees with Atrium.

## FACULTY PUBLICATIONS & ACHIEVEMENTS

# Ajay Dharod, MD

Associate Professor, General Internal Medicine

Associate Professor, Implementation Science



## Publications

Jacqueline G. You, MD<sup>1,2</sup>, Lipika Samal, MD, MPH<sup>2</sup>, Tiffany I. Leung, MD, MPH<sup>3,4</sup>, **Ajay Dharod, MD<sup>5,6</sup>**, Haipeng Mark Zhang, DO, MMSc<sup>7</sup>, David C. Kaelber, MD, PhD, MPH<sup>8</sup>, Rebecca G. Mishuris MD, MS, MPH<sup>2,9</sup>. "A Call to Support Informatics Curricula in US-Based Residency Education" Published to Applied Clinical Informatics. Accepted for publication. October 2023

## Achievements

### **Presentations at Professional Meetings:**

Stern S, Obermiller C, Witek L, Rigdon J, Moses A, Chebrolou S, Anderson M, Xiao T, Richardson K, Cristiano J, Dharod A, Lippert W. **"Updating Residency Note Templates to Reduce Documentation Burden."** Ignite Style Talk at: American Medical Informatics Association (AMIA) Clinical Informatics Conference (CIC), May 2024. Minneapolis, MN.

Poster: David Miller, Ajay Dharod, Anna Snavely, Mark Dignan, Elena Wright, Aliza Randazzo, and Kristie Foley- Title: **"High touch vs low touch strategy for implementing a colorectal cancer screening digital health intervention in primary care practices: a hybrid randomized implementation trial."** Presented at the SGIM Conference May 15-18, 2024, in Boston, MA.

Poster: Corey Obermiller, Richa Bundy, Lauren Witek, Adam Moses, Christine Sinsky, Gary Rosenthal, Lindsey E. Carlasare, and Ajay Dharod. **"Unplugged or Plugged In? Physician time in the Electronic Health Record (EHR) During Paid Time Off (PTO)."** Presented at the SGIM Conference May 15-18, 2024, in Boston, MA.

Poster: Matthew Ellis, Lauren Witek, Corey Obermiller, Richa Bundy, Adam Moses, Ajay Dharod, Nyree Thorne, Sean Hernandez, and Nancy Denizard-Thompson- Title: **"Implementing High-Value Care with Ambulatory Costs Transparency (ACT): Improving Provider Awareness of Orders Expenses."** Presented at the SGIM Conference May 15-18, 2024, in Boston, MA

### **Invited Extramural Presentations and Seminars:**

Oral Presentation: Chris T. Kelly, MD, Hal Atkinson, MD, Donna Williams, MD, Ajay Dharod, MD, Lauren Witek, M Stat, Casey Glass, MD. **"POCUS Champion Pathway: Innovative Training Structure Supporting the Ultrasound Curriculum of a large Internal Medicine Residency Program."** Presented at the 2024 Health Professions Education Institute (HPEI) conference on May 14, 2024.

## FACULTY PUBLICATIONS & ACHIEVEMENTS

# Oguz Akbilgic, PhD

Associate Professor, Internal Medicine,  
Cardiovascular Medicine



## Publications

"The Principles of Artificial Intelligence for Medicine," published as an invited editorial at the Journal of American Heart Association

"Outcomes of Ultrafiltration in Community-based Hospitals," published at the Current Problems in Cardiology

## Achievements

Completion of ECG data repository at Sanger Heart and Vascular institute including ~5M ECGs and an associated internal grant with MPI Sherry Saxonhouse in predicting risk for AFib occurrence following ablation

Co-leading an enterprise level working group on creation of ECG repository, development, validation, and dissemination of ECG-AI in clinical practice

## FACULTY PUBLICATIONS & ACHIEVEMENTS

# Eric Kirkendall, MD, MBI

Co-Director, Center for Healthcare Innovation

Professor, Pediatrics - Hospitalists

Professor, Implementation Science



## Achievements

Ongoing participation in Advocate AI Governance group

Participated in the FAIR AI framework workshop in Charlotte

Center of Healthcare Innovation project: participated in building electronic Cognitive Health Index to help find adults with mild cognitive impairment. Part of a large Alzheimer's Association grant.

# Khalid Niazi, PhD

Assistant Professor, General Internal Medicine



## Publications

Su Z, Rezapour M, Sajjad U, Niu S, Gurcan MN, Niazi MK. **Cross-attention-based saliency inference for predicting cancer metastasis on whole slide images.** IEEE Journal of Biomedical and Health Informatics. 8/6/24.

Koyuncu D, Tavolara T, Gatti DM, Gower AC, Ginese ML, Kramnik I, Yener B, Sajjad U, Niazi MK, Gurcan M, Alsharaydeh A. **B cells in perivascular and peribronchiolar granuloma-associated lymphoid tissue and B-cell signatures identify asymptomatic Mycobacterium tuberculosis lung infection in Diversity Outbred mice.** Infection and Immunity. 7/11/24; 92(7):e00263-23.

Gatti DM, Tyler AL, Mahoney JM, Churchill GA, Yener B, Koyuncu D, Gurcan MN, Niazi MK, Tavolara T, Gower A, Dayao D. **Systems genetics uncover new loci containing functional gene candidates in Mycobacterium tuberculosis-infected Diversity Outbred mice.** PLoS Pathogens. 6/11/24; 20(6):e1011915.

## Achievements

Gave a talk at the Pathology Department at The Ohio State University.

Gave a talk at Medtronic to their AI team of around 100 professionals.

# Arezoo Movaghar, PhD

Assistant Professor, Pediatrics



## Achievements

### **Grants and Proposals:**

Artificial Intelligence Assisted Screening for Maternal Mental Disorders using Population-based Medical, Familial, and Psychosocial Data, NIH, R01, Role: Principal Investigator, Submitted.

### **Conferences:**

Chen, Y., Movaghar, A., “**Machine Learning Frameworks for Characterizing Phenotypic Variations in Autism Spectrum Disorder with Lifetime Medical Records**”, 2024 Biomedical Engineering Society Annual Meeting, Accepted.

### **Presentations:**

DaWalt, L. S., Movaghar, A., Brilliant, M.H., Mailick, M., “**Co-occurring Health Conditions of Individuals with Profound Autism: Findings from Electronic Health Records**”, Autism Intervention Research Network on Physical Health (AIR-P) Research Day at Autism CARES 2024 Meeting, virtual, 7/22/24.

Chen, Y., Movaghar, A., “**Machine Learning Frameworks for Characterizing Phenotypic Variations in Autism Spectrum Disorder with Lifetime Medical Records**”, Wake Forest BME & CAIR Summer Research Internship Symposium, Winston-Salem, NC, 8/1/24 (Second Place Awardee).

Laws, C., Movaghar, A., “**Co-Occurrence of Depression and Physiological Conditions in Patients with Down Syndrome**”, Summer Research Poster Symposium, Wake Forest University School of Medicine, Winston-Salem, NC, 7/25/24.

# Da Ma, PhD

Assistant Professor, Gerontology and Geriatric Medicine



## Publications

### **Journal Publications:**

Tiffany Tse, Yudan Chen, Mahsa Siadati, Yusi Miao, Jun Song, Da Ma, Zaid Mammo, and Myeong Jin Ju. **Generalized 3D registration algorithm for enhancing retinal optical coherence tomography images.** Journal of Biomedical Optics, 6/1/24

### **Conference:**

Fatemeh T Hossein, Yaorong Ge, Da Ma. **Evaluating the Impact of Cardiometabolic Risk Factors on Neuroimaging-Based Brain Age: A Deep Learning Approach** AAIC 2024 development projects

## Achievements

### **Grants:**

Pathology Pilot Award: Matthew Jorgensen, Da Ma, Rebecca Sappington: **The VRC as an Ocular Disease Resource**

TreVR Pilot Award: Da Ma, Rebecca Sappington, Fang-Chi Hsu, Marco Feligioni: "**AI-assistant Retinal-imaging-based Ocular Biomarkers for Retinal Cytotoxicity and Glaucoma**"

## Umit Topaloglu, PhD

Adjunct Professor, Wake Forest School of Medicine  
Chief, Clinical and Translational Research Informatics Branch,  
National Cancer Institute



### Publications

Topaloglu U, Qin Q, Wilkins K, Jones SE, Bradwell KR, et. al. **Evaluating COVID-19 vaccine effectiveness during pre-Delta, Delta, and Omicron dominant periods among pregnant people in the US: Retrospective cohort analysis from a nationally sampled cohort in National COVID Collaborative Cohort (N3C)**. BMJ Public Health (Vol 2, Issue 1). 6/3/24

Yao Chen, Xiaochun Li, Vithal Madhira, Tyler Shugg, Shadia Ibrahim Jalal, Michael Eadon, Benjamin Bates, Noha Sharafeldin, Umit Topaloglu, Qianqian Song, Jing Su. **The survival benefits and the risk of severe renal injury of immune checkpoint inhibitors in patients with cancer: The real-world evidence from the National Clinical Cohort Collaborative (N3C)**. Journal of Clinical Oncology (Vol 42, Issue 16\_suppl). 6/1/24

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◆ NEW PUBLICATION RELEASED ◆

Researchers from @WakeForestAI and @WFIRMnews compared RNA-Seq and NanoString technologies in deciphering viral infection responses in lung organoids. Learn the key findings and implications for antiviral research here: [frontiersin.org/journals/genet...](https://frontiersin.org/journals/genet...)

#AI



 YouTube



Debashis Gupta  
Wake Forest University

 Wake Forest Center for Artificial Intelligence Research  
501 followers · 1mo • 4

The curtains have lifted on 10 poster presentations that showcase cutting-edge applications of #AI in #healthcare! ...more



Brittany Jones and 10 others  
1 repost

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