

Summer Science Program 2020

Each summer since 1989, the UAMS Department of Pediatrics/ACRI Summer Science Program has provided outstanding students the experience of a career in academic medicine—in both the clinical and the research aspects. However, the COVID-19 pandemic has changed how the program will provide the Summer Science Program students a meaningful experience with basic science and clinical research techniques and exposure to clinical medicine.

This year, the Summer Science Program selected its participants from more than 130 applications. Initially, 25 students were selected to participate in the program. When the restrictions on students on the Arkansas Children's campus was announced, a decision was made to still offer the program, but the student experiences would occur remotely. Student scholars selected for the program were offered the choice of attending the program through teleconferencing or deferring their participation to next summer. Ten of the students elected attend electronically while four deferred to next year. Mentors will involve their summer science scholars in various ways despite the restriction of the students at Arkansas Children's.

Marie Burdine, PhD, an Assistant Professor in the Department of Surgery and Junior Investigator with the Center for Translational Pediatric Research, is among 12 mentors this summer. Her research involves developing novel immunosuppression therapies for solid organ transplant patients that reduce side effects and ease financial burden. Dr. Burdine is adapting how she will integrate the summer science scholar into her laboratory team. As students cannot be physically at Arkansas Children's facilities, Dr. Burdine will engage her student by having him help write a publication reviewing the scientific literature regarding the protein DNAPKcs which her lab is investigating for its role in the immune response to transplanted organs.

This protein is known in the cancer field to help repair DNA damage, but its effects on the immune system are largely unknown with scattered information that hinders additional research. The immune system of many organ recipients will attack the transplanted organ resulting in organ rejection requiring patients to be on life-long immunosuppressants. These drugs often result in additional side effects. The Burdine lab believes that DNA-PKcs inhibitors could be better, more effective immunosuppressants with less side effects. A clearer understanding of its impact on the immune system is crucial to understanding its potential as a therapy target. Therefore, the literature review will pull together all current data from published articles describing observed effects of DNA-PKcs on the immune system.

The review will allow for a clear understanding of what researchers know so far and what additional experiments are needed to be done in order to thoroughly understand this protein in the immune system. The collection of this information is key to begin an understanding of these effects providing support for stronger hypotheses for the scientists to pursue and to establish stronger applications for research funding. Dr. Burdine will meet electronically twice weekly with her scholar to discuss progress on the literature review publication.

In addition, Dr. Burdine will use teleconferencing to connect the summer science scholar to laboratory activities. She will ensure the student can view experimental procedures and ask questions of her and the



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laboratory team. The scholar will also attend weekly laboratory meetings through teleconferencing enabling him to hear about other projects in the laboratory and additional work the laboratory is conducting regarding transplantation improvement. At the end of the program, Dr. Burdine task the student to lead a laboratory team meeting to present the findings of the review and to propose scientific questions and experiments based on the Summer Science Program experience.

Dr. Burdine explained that students graduating into medical and doctoral programs have to know how to read and critically analyze the literature to be successful, and they need the ability to translate this knowledge into scientific inquiry. She noted that researchers may spend 80% of their time in such activities. Also, the production of a scientific publications by the student is important for application to graduate or medical school. Crucially, the Summer Science Program will influence the future education and careers of these outstanding students.

Student	School	Project Title	Mentor
Kayla Churchwell	Ouachita Baptist University	TOXIC Consortium	Lawrence Quang, Emergency Department
Ashley Hall	University of Central Arkansas	Headaches and Stress in a Pediatric Population	Tiffany Atkins Howell, Pediatric Psychology
Andrew Palmer	University of Arkansas, Fayetteville	The Data Analysis of Moyamo at ACH	Tomoko Tanaka, Neurosurgery
Jacob Paris	University of Arkansas, Fayetteville	International Pediatric Stroke Study: Towards the Establishment of Standards of Practice and the Initiation of Multi-center, Multi-national Clinical Trials for Neonates and Children with Stroke	Erin Willis and Sarah Cobb, Neurology
Clara Puente	University of Arkansas, Fayetteville	Several Projects on Headaches and Muscular Dystrophies	Aravindhan Veerapandiyan, Neurology
Andrea Riera	University of Arkansas at Pine Bluff		Jessica Snowden, Infectious Disease
Ashton Rogers	University of Arkansas, Fayetteville	Assessment of Anxiety, Depression and Resilience in Food Allergic Adolescents and Primary Caregivers during the COVID-19 Pandemic	Stacie Jones and Amy Scurlock, Allergy and Immunology
Cara Shipley	Baylor University	Changes in Microbiome Composition in Response to Thermogenic Challenge in Mice	Umesh Wankhade, Developmental Nutrition
Noah Slater	Baylor University	Characterizing the Function of DNA-PKcs in the Adult Immune System	Marie Burdine, Center for Translational Pediatric Research
Adanna Mogbo	Episcopal Collegiate School	National Emergency Airway Registry for Children	Ron Sanders, Critical Care

About the Summer Science Program

Dr. Robert Fiser, Chairman of the Department of Pediatrics (1975 to 1994), created the Summer Science Program in 1989 to encourage Arkansas college students to pursue careers in medicine and science. Initially, a few college students worked in various research laboratories in the department. Throughout the history of this program, it has been funded using seed money from drug companies, then private companies and a pediatric clinic, and currently through the UAMS Department of Pediatrics, Arkansas Children's Research Institute, and the Stella Boyle Smith Trust (which sponsors Stella Boyle Smith Summer Science Scholars from Episcopal Collegiate School)—testimony to the broad range of research and clinical support for this program.

Jenny Kubacak is the Coordinator of the Summer Science Program. Since 1992, approximately 350 students and over 100 pediatric research faculty members have participated in the program. This year, the program selected its participants from more than 130 applications and received the support of 12 faculty members serving as mentors.

NIH Awards \$1.2 Million for TCE and Immune Disorders Research of Sarah Blossom, PhD

The National Institutes of Health has awarded more than \$1.2 million for a five-year study by Sarah Blossom, PhD, that looks at the impacts of exposure to trichloroethylene (TCE), an industrial solvent and common environmental pollutant. When TCE enters the body, it takes the form of its major metabolite (TCAH). The study will use this metabolite to test how TCE may alter immune cells associated with autoimmune disorders in humans. Dr. Blossom, an Associate Professor of Pediatrics at the UAMS College of Medicine, is the principal investigator for the project, which will continue through December 2024. She aims to uncover how TCE alters novel gene or epigenetic patterns in CD4 cells that may be responsible for these immune disorders. Blossom and her team will study how TCAH alters CD4 cells. This study will use both in vitro and in vivo methods to determine if TCAH promotes either the differentiation of pathogenic effector cells or decreases the expansion of effector cells that are associated with the suppression of autoimmunity. Read the Arkansas Children's media release [here](#).



Sarah Blossom, PhD

\$910,000 NIH Grant for Diamond Blackfan Anemia Research of Jason Farrar, MD

A research proposal, "Mechanisms of Erythroid Remission in Diamond Blackfan Anemia (DBA)," by Jason Farrar, MD, will be funded by a \$910,000 three-year grant from the National Heart, Lung, and Blood Institute of the National Institutes of Health.

DBA is an inherited bone marrow failure syndrome characterized by severe anemia due to failure to produce red blood cells, congenital abnormalities, and predisposition to cancer. Patients needing significant medical treatment for DBA, such as dependence on red cell transfusions, may stop requiring medical treatment and maintain adequate red cell levels on their own for an indefinite period of time. This condition, "hematologic remission," unpredictably occurs in one out of every five to ten DBA patients who require treatment. It is also reversible; therefore, the patient in hematologic remission may lose that remission and become dependent on medical therapy later, again in an unpredictable fashion.

Dr. Farrar and his team will examine the reversible nature of hematologic remission in DBA to understand the epigenetic factors mediating the pathways that bypass the red blood cell defect. Importantly, his results identify new directions for developing medical therapies to ameliorate anemia in DBA.



Jason Farrar, MD

Dr. Farrar is an Assistant Professor in the Section of Hematology and Oncology in the Department of Pediatrics and an inaugural project leader in ACRI's Center for Translational Pediatric Research (P20GM121293), which provided infrastructure and guidance to propel the study. Please join us in congratulating Dr. Farrar. A media release is forthcoming from Arkansas Children's.

\$500,000 USDA Grant for Soy Diet Research of Reza Hakkak, PhD

A research proposal, “Obesity, Gut Microbiota and Non-Alcoholic Fatty Liver Protection in Adolescents and Adults by Soy Protein Diet,” by Reza Hakkak, PhD, will be funded by a \$500,000 three-year grant from the United States Department of Agriculture.

Non-alcoholic fatty liver disease (NAFLD) is the leading cause of liver disease in adolescents and adults in the US and world, and its risk has increased with the rise of obesity. Dr. Hakkak has previously reported that consumption of soy protein diet reduced fatty liver, and he hypothesizes that a soy protein diet will reduce development of obesity-related NAFLD in part by altering gut microbiota and will reverse damage to liver cells with established NAFLD in part through gut microbiota alterations. His project focuses on investigating the role of soy diets and gut microbiota on protection from NAFLD, determining for the first time if soy diets and gut microbiota alterations can reverse obesity-related NAFLD, and determining the effects of soy protein diet on liver damage and inflammation markers.



Reza Hakkak, PhD

He and his team will use state-of-the-art metagenomics and metaproteomics to identify the population of gut microorganisms as well as the functional bacterial proteins present. Analysis of the microbiota will generate novel data on the interaction of obesity, soy protein diets, and intestinal microbiota, and the possible link to protection from NAFLD. Study findings will support increased domestic consumption of soy-containing foods and ultimately promote health for obese adolescents and adults.

His project team includes Alan Tackett, PhD, Co-Project Director (Professor of Pediatrics, Biochemistry & Molecular Biology, and Pathology, and Program Director of the Center for Translational Pediatric Research (P20GM121293) at ACRI); Soheila Korourian, MD, Co-Project Director (Professor and Director of Breast Pathology at UAMS); Stephanie Byrum, PhD, Bioinformatician: Research Assistant Professor of Biochemistry and Molecular Biology and Co-Core Director of the Systems Biology Bioinformatics Core of the Center for Translational Pediatric Research at ACRI); Beverly Spray, PhD, Biostatistician (Senior Biostatistician at ACRI); and Dan Doerge, PhD, Collaborator (Research Chemist in the Division of Biochemical Toxicology at the National Center for Toxicological Research, US Food and Drug Administration). Please join us in congratulating Dr. Hakkak!

ACNC Brain Research Featured in USDA-ARS Annual Report

In its 2019 Annual Report on Science, the USDA-Agricultural Research Service (ARS) has featured research from the Arkansas Children’s Nutrition Center. ACNC researchers led by Xiawei Ou, PhD, found that brain activation in children with obesity differs from that in normal-weight children. Their research suggests that normal-weight and obese children process high-calorie food stimuli differently, exhibiting different levels of brain activation when presented with images of high-calorie food. Understanding how normal-weight and obese young children process high-calorie food stimuli may provide ways to alter unhealthy eating behaviors.

Obesity is estimated to cost \$190 billion annually, and as its prevalence has increased over recent decades, ARS scientists have researched innovative ways of reversing that trend. Since agriculture primarily produces food for human consumption, integrating human nutrition research into ARS is critical for solving the biggest problems facing producers and consumers. The ARS human nutrition research program enhances the quality of the American diet and improves health through research, and the [ARS Annual Report on Science](#) is a compendium of ARS research accomplishments that demonstrates ARS’s impact on the food we eat, the water we drink, and the air we breathe.

Aline Andres, PhD, RD, Receives 2020 Fiser Research Achievement Award

At the 2020 Arkansas Children's One Team Awards banquet on February 6, Aline Andres, PhD, RD, received the Dr. Robert H. Fiser, Jr., Research Achievement Award. The award was created to honor the accomplishments of an Arkansas Children's Research Institute research scientist who has distinguished himself or herself through extraordinary scientific research that will have lasting impact on the health, development, and well-being of children and their families.



Aline Andres, PhD, RD

Dr. Andres is an Associate Professor in the Section of Developmental Nutrition of the UAMS Department of Pediatrics and the Associate Director for Clinical Research at the Arkansas Children's Nutrition Center (ACNC). At the ACNC, she also leads the Clinical Research Core and directs the Clinical Nutrition Lab. Dr. Andres joined the ACNC in 2007 as a Postdoctoral Fellow before being appointed to the faculty in 2008. Her research program is dedicated to examining the effects of prenatal and postnatal nutrition on anthropometrics, body composition, metabolism, and physical activity of infants and children. The main focus of her research is investigating how nutrition can influence child's growth and development during a very critical period, the first 1,000 days of life, which includes the prenatal and postnatal periods. Dr. Andres' laboratory collaborates with multiple other laboratories at ACNC and other institutions to tackle these complex questions using multi-disciplinary approaches. Her research funding includes awards from NIH and USDA-ARS. Please join us in congratulating Dr. Andres on receiving the Fiser Research Achievement Award.

ACRI Announces COVID-19 Intramural Research Awards

The COVID-19 pandemic has the potential to affect pediatric health in many ways including aspects well beyond the effects of an individual viral infection. In response, ACRI announced an intramural grant program in March to the urgent need for pediatric research regarding the effect of the COVID-19 pandemic on a wide variety of pediatric health outcomes in both individuals and communities. The call for letters of intent resulted in twelve responses from a wide range of research areas. Ten completed applications were received by the deadline of April 10. On April 16, funding for the following four projects were announced.

- "Investigate the Transmission of SARS-CoV-2 to Infants via Human Milk" - Aline Andres, PhD, Developmental Pediatrics, and Laxmi Yeruva, PhD, Developmental Pediatrics

Human milk provides all the nutrients and immunological factors to protect infants from early life infections, yet it can also be a vehicle for transmission of pathogens. Scientific evidence so far does not address if human milk is involved in transmission of SARS-CoV-2 to infants, thus this possibility must be addressed. The research team will determine whether SARS-CoV-2 is present in human milk from COVID-19 positive mothers and how long the virus may be present in the milk. They will also evaluate serum and milk antibody response to SARS-CoV-2 after infection clearance to evaluate the immune response to infection in both mother and child. The study results will inform recommendations concerning the continued consumption of human milk by infants and guidance to COVID-19 diagnosed mothers to maintain safe conditions during feeding to prevent environmental transmission to infants.

- "Design of a Novel Non-Invasive Positive Pressure Ventilation Device to Prevent Transmission of SARS-CoV-2" - James Hungerford, MD, Critical Care; Tara Johnson, MD, PhD, Neurology; and Amit Agarwal, MD, Pulmonology

To address the personal protective equipment (PPE) shortage during the COVID-19 pandemic, this multidisciplinary team (critical care, pulmonology, biomedical engineering, and process engineering) will work with additional engineering experts (audio, mechanical, and electrical) to complete the design and testing of a safe, comfortable ventilation device they have been actively developing for healthcare providers. The novel device is designed largely from medical-grade components readily available within Arkansas Children's that are not being used in the pandemic. Providing complete mucous membrane protection, the device will improve clinical practices in pediatric intensive care units, anesthesia

environments, transport departments, and other clinical settings with a high likelihood of aerosolized virus particles.

- “Biobanking Human Lung Slice Tissue for Coronavirus Research” - Richard Kurten, PhD, Allergy and Immunology

A scientifically appropriate platform is essential to study infection and for use in preclinical testing of antiviral drugs yet is absent for the study of SARS-CoV-2 infection. The Lung Cell Biology Laboratory will extend its human lung slice preparation to include biobanking for subsequent experimental use in coronavirus research. The laboratory will improve its technical capacity to prepare, store, and distribute precise-cut human lung slices with coronavirus experts, beginning with collaborators at UAMS and then nationwide, who have Biosafety Level 3 facilities suitable for coronavirus studies.

- “Characterization of Pediatric COVID-19 in the Emergency Department of Arkansas Children’s Hospital” - Lawrence S. Quang, MD, Pediatric Emergency Medicine

There are no published studies that have prospectively evaluated the prevalence, incidence, and clinical features of COVID-19 for symptomatic and asymptomatic pediatric patients presenting to an emergency department (ED) and the ED healthcare workforce treating these patients. Emergency medicine researchers will conduct the first pediatric COVID-19 study in which all subjects will undergo testing by nasal swab for SARS-CoV-2 to determine active viral shedding and by serum collection for SARS-CoV-2 to determine acute infection and remote exposures. The study will also be the first known prospective evaluation of pediatric ED staff for the presence of active viral shedding and/or past infection with COVID-19. The study will advance our understanding of the pandemic with respect to children and provide US and international public health systems with critical knowledge concerning clinical practices and testing recommendations for children and healthcare workers.

Project funding was up to \$50,000 for up to 12 months. The projects will begin on May 1 at the earliest. Please join us in congratulating these researchers.

Chancellor’s Innovation and Collaboration Award to Investigate Detection of Sepsis by AI and Machine Learning

Amir Mian, MD, Associate Professor of Hematology/Oncology in the Department of Pediatrics, is the Co-Investigator at ACH on a research award from the Chancellor’s Innovation and Collaboration Fund. The research project, “Towards AI-Driven Smart and Connected Care for Pediatric Patients, is led by Principal Investigator Shengfan Zhang, PhD, Associate Professor, Department of Industrial Engineering, at the University of Arkansas, Fayetteville. The award is for \$49,461 over a 12-month period beginning August 1, 2020. The collaborative effort will introduce artificial intelligence and machine learning algorithms for prompt detection of sepsis to improve patient-related clinical outcomes.

The project was among 10 funded from over 30 submitted proposals. The reviewers acknowledged the project supported the Chancellor’s objective of fostering bold thinking and risk taking that can launch discovery and creativity-based initiatives that advance the university’s strategic priorities and signature research areas while increasing the competitiveness of the university and faculty for external funding. Congratulations to Dr. Mian and his collaborators!

Zachary Waldrip, PhD, Named among Four Entrepreneurship Scholars

The UAMS Translational Research Institute Health Sciences Innovation and Entrepreneurship (HSIE) Postdoctoral Training Program has named Zachary Waldrip, PhD, as one of four postdoctoral scholars for its class of 2022. Dr. Waldrip is a Postdoctoral Fellow in the UAMS Department of Surgery, Division of Surgical Research, in the Burdine Laboratory (Dr. Lyle Burdine and Dr. Marie Burdine) at ACRI. He is also a member of the Center for Translational Pediatric Research (P20GM121293). Dr. Waldrip will be mentored by Marie Burdine, PhD, in the Department of Surgery, Division of Surgical Research, at ACRI. He will continue research focused on targeting specific kinases to improve transplant immunotherapy.

The HSIE Postdoctoral Training Program, which includes stipends up to \$55,000 per year, is designed to help promising scientists more quickly move their discoveries into everyday practice by teaching them commercialization and team science skills. It is supported by the NRSA Training Core (TL1) component of

the UAMS Clinical and Translational Science Award, grant TL1 TR003109. The scholars, selected in a competitive application process, will begin two years of mentored entrepreneurship training July 1.

The other three HSIE Postdoctoral Scholars, all from the UAMS College of Medicine, and their mentors, and project plans are Emilie Darrigues, PhD (mentor: Analiz Rodriguez, MD, PhD), improving circulating-tumor DNA detection in glioblastoma liquid biopsies and devising therapeutic nanoparticles as a strategy to specifically target glioblastoma; Shana Owens, PhD Candidate (mentor: Craig Forrest, PhD), developing an improved gammaherpesvirus (GHV) vaccine; and John Sherrill, MPH, PhD Candidate (mentor: David Bumpass, MD), designing a customized 3D printed stabilizer for orthopaedic applications.

“Our program goal is to accelerate biomedical discoveries to improve health,” said Nancy Rusch, PhD, who directs the program for the UAMS Translational Research Institute. “I am very enthusiastic about this group of scholars. They all have exceptional talent and they are pursuing projects that can make a real impact on health outcomes.”

The HSIE Postdoctoral Training Program provides support annually for eight postdoctoral fellows (four in each year of the two-year program). The program is a partnership between the UAMS Translational Research Institute and the Entrepreneurship Graduate Program in the Sam M. Walton College of Business at the University of Arkansas, Fayetteville. In addition to Dr. Rusch, professor and chair of the Department of Pharmacology and Toxicology, the program’s leadership team includes Kevin Sexton, MD, assistant professor of the Department of Surgery, and Nancy Gray, PhD, president of BioVentures and professor in the Department of Pharmacology and Toxicology. Pamela Kahler is program manager.

Jessica Snowden, MD, Appointed to AAP Committee on Pediatric Research

ACRI Associate Director for Clinical and Translational Research Jessica Snowden, MD, has been appointed to the 2020 Committee on Pediatric Research (COPR) of the American Academy of Pediatrics. COPR makes policy recommendations to the Board of Directors on various aspects of child health research such as identifying major research questions, promoting funding for pediatric research, and monitoring the status and practice of including children in federally sponsored research studies. COPR develops and collaborates with other committees on policy statements and maintains liaison relationships with many national pediatric associations and federal agencies that have a strong interest in promoting child health research. Dr. Snowden is also an Associate Professor of Pediatric Infectious Disease and Vice Chair for Research and the Principal Investigator of the IDeA States Pediatric Network Data Coordinating & Operations Center.

Find Out About Opportunities to Participate in Research

Information on currently enrolling clinical studies at ACRI is available at [ACH's Clinical Trials Webpage](#). Interested families can voluntarily join ACRI’s Research Registry at <https://secure.archildrens.org/ResearchContacts/> to be contacted about pediatric clinical research. To receive Text Alerts about currently enrolling clinical research studies, interested persons can text RESEARCH to 411247 (message and data rates may apply; terms and conditions at www.mobivity.com/411247terms).