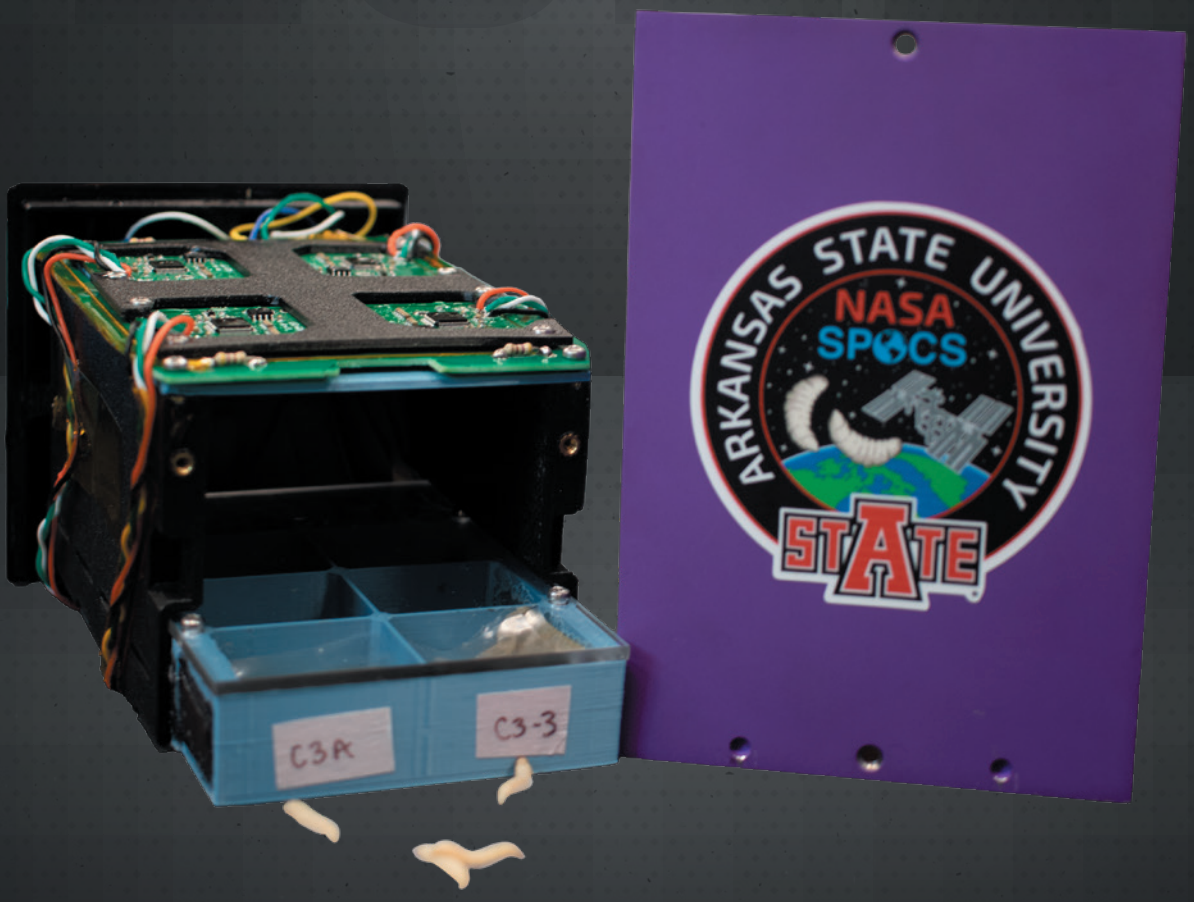
2022

Arkansas Biosciences Institute

ANNUAL REPORT



Arkansas Biosciences Institute

Arkansas Biosciences Institute, the agricultural and biomedical research program of the Arkansas Tobacco Settlement Proceeds Act of 2000, is a partnership of scientists from:

- Arkansas Children's Research Institute
- Arkansas State University
- University of Arkansas System Division of Agriculture
- University of Arkansas, Fayetteville
- University of Arkansas for Medical Sciences

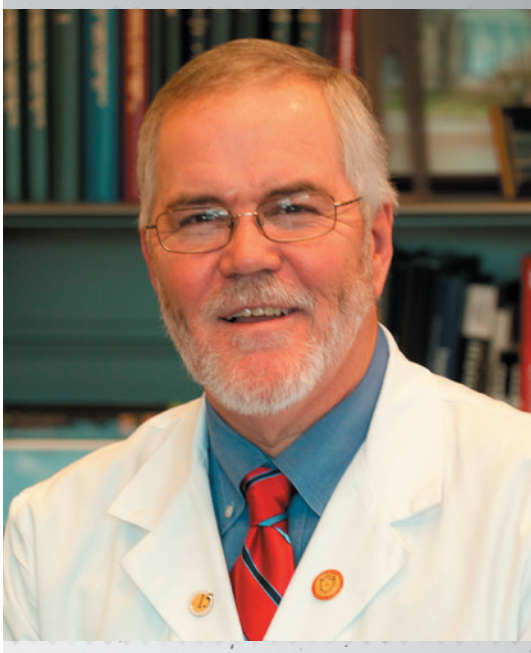
As outlined in the Act, the purpose of the Arkansas Biosciences Institute is to conduct:

- **Agricultural research** with medical implications;
- **Bioengineering research** that expands genetic knowledge and creates new potential applications in the agricultural-medical fields;
- **Tobacco-related research** that identifies and applies behavioral, diagnostic, and therapeutic knowledge to address the high level of tobacco-related illnesses in Arkansas;
- **Nutritional and other research** that is aimed at preventing and treating cancer, congenital and hereditary conditions, or other related conditions; and
- **Other areas of developing research** that are related or complementary to primary ABI-supported programs.

SOMETIMES IT IS "ROCKET SCIENCE"...

Dr. Maureen Dolan and Shea Harris at Arkansas State University led a team of students who successfully competed against teams from 19 other institutions to have an experiment launched on SpaceX's 25th Commercial Resupply Service mission, CRS-25, to the International Space Station (ISS). The program is part of NASA's Student Payload Opportunity with Citizen Science (SPOCS) that allow selected students enrolled in institutions of higher learning to design and build an experiment to fly to and return from the ISS. The team developed an environmental sustainability project, "Microgravity Environment Impact on Plastic Biodegradation by *Galleria mellonella* (waxworms)", to determine if waxworm larvae, known to consume polyethylene, found in plastic bags, would be able to do so in the zero-gravity of space. Over a two year plus project, the students *de-novo* engineered and designed a self-contained 10 x 10 x 15 cm module (cover image) containing circuit boards, micro-controllers, cameras for time-based photography, and multiple chambers to house the waxworms. For more information, see story on page 11.

EXCITING TIMES... Dr. Robert E. McGehee, Jr.

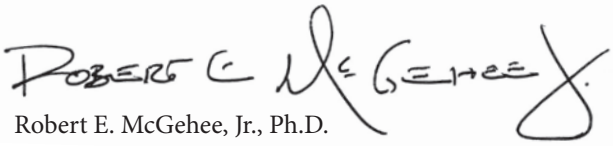


After the celebration of our 20th Anniversary last year, it is a great time to be very excited as we enter the first year of the next twenty. It is exciting for many reasons. For the first time in almost three years, as a state, country, and planet, we now have the SARS-CoV-2 virus under manageable control and the throes of the COVID-19 pandemic are largely behind us. What a toll those years took and while it will continue to cause change and become a part of our fabric of life, it is exciting to not have it front and center.

I am also incredibly excited to share our news that FY22 was another record year for ABI in our key metric of leveraged extramural funding by ABI investigators at our 5 member institutions. For FY22, the total ABI budget was $12.4 M, and we were able to leverage that into $83.5 M in extramural funding. This represents a remarkable 25% increase over last year's record of $67 million and represents a record leverage factor of $6.74 in return for every $1 we received from the Arkansas Tobacco Settlement Commission. Over our 21 years we have brought in a little over $883 million. That is a significant number, and it is particularly humbling to think that in the next couple years, we will be crossing the one-billion-dollar mark. These kind of returns on investment have been game changers for our institutions and the state as a whole. Every year they support 250-300 high paying knowledge-based jobs and help promote Arkansas as a destination state for biomedical and agricultural research.

We are at an exciting forefront of what is promising to be a period of remarkable breakthroughs in science and health. Artificial Intelligence is going to pretty much infiltrate almost every field of science. New capabilities in the rapid analysis of massive data sets and the application of machine learning to them is going to see exponential growth and expansion, whether it is applied to autonomous vehicles, analyzing medical images for earlier cancer detection, assimilating medical records data, and making diagnoses, or drone flyovers of crops for yield prediction or nutrient stress. Your ABI investigators are not following these new trends but are at the forefront of them. You will see examples of these applications in this year's annual report, and for many years to come, as ABI investigators continue to lead the way and push the envelope of discovery.

And I say this every year, but it is as true today as it was 21 years ago, we don't do this alone. We are grateful for the remarkable support of our Governors, the Arkansas Legislature, the citizens of Arkansas and our institutional administration. We are humbled by the trust you put in us and very proud of the stewardship we have been able to accomplish with these resources. We also welcome the opportunity to come visit your community group, organization, campus, or company to talk about and share our excitement about science and how Arkansas is making a difference. We hope you enjoy reading about our collaborative efforts and welcome your ideas and suggestions.



Robert E. McGehee, Jr., Ph.D.
Executive Director, Arkansas Biosciences Institute
Dean, UAMS Graduate School
Distinguished Professor, UAMS College of Medicine
Department of Pediatrics, Division of Neonatology

Arkansas Biosciences Institute

2022 PERFORMANCE METRICS

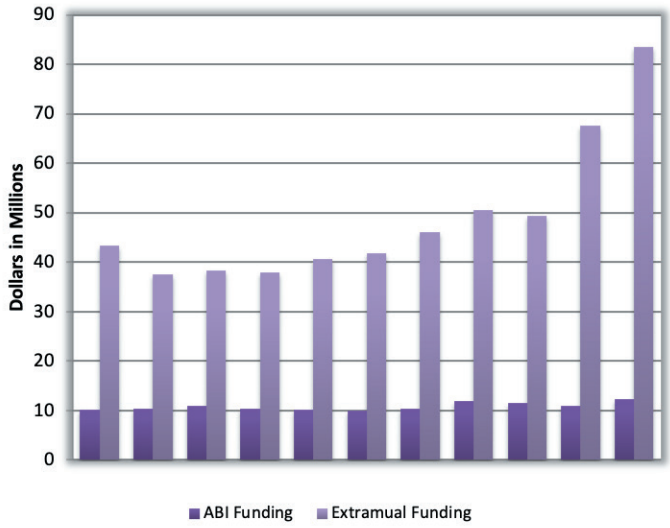
The 2022 Executive Summary provides a quick review of five performance indicators for the Arkansas Biosciences Institute. To access and track progress toward its mission, the Arkansas Biosciences Institute monitors five overall performance indicators for the long-term agricultural and biomedical research projects at its five member institutions. The following summary and graphs highlight ABI performance over the past ten years.

ABI AND RELATED EXTRAMURAL FUNDING

All five institutions invest resources in supporting outstanding investigators. These investments are most often used in part to initiate pilot projects, hire critical research technicians, purchase new equipment, and building new collaborations. These efforts help build strong preliminary data and provide infrastructure support to make extramural grant applications more successful. Every year ABI investigators receive funding from agencies such as the National Institutes of Health, the National Science Foundation, American Heart Association, and the US Department of Agriculture. In this way, ABI-supported research investigators "leverage" their ABI funding and this leverage is one of the key performance metrics.

For FY2022, ABI-supported research investigators brought in more than $880M in extramural grant awards. ABI funding during this time was $12.3M, representing a record $6.74 direct return that was leveraged for each ABI dollar received. Since FY2002, research investigators have been awarded more than $880M in extramural dollars from outside agencies and foundations. Both the ABI funding and extramural funding for the past ten years are presented in Figure 1.

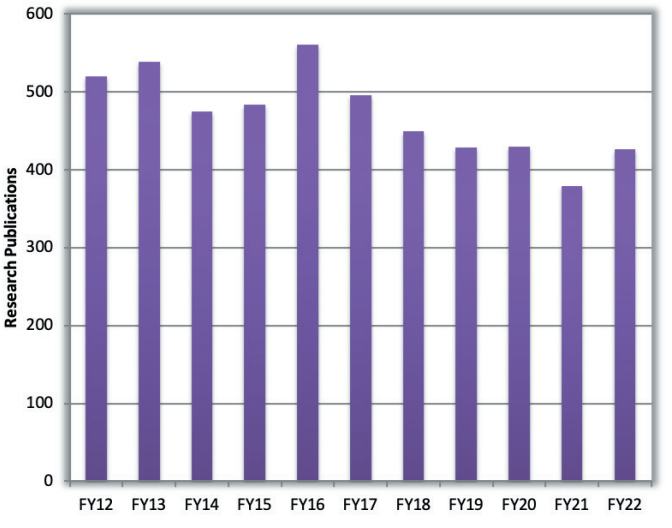
FIGURE 1



ABI-SUPPORTED RESEARCH PUBLICATIONS

Publications provide the primary mechanism through which research results get disseminated to the public and scientific community. Publications also serve as a measure of investigator productivity, and they bring positive national recognition to the state. ABI-supported investigators publish their results in peer-reviewed medical and scientific journals, textbooks, and online journals. For FY22, ABI investigators more than 400 publications related to their ABI research. Since inception more than 8,436 research publications have been generated by ABI research investigators. Figure 2 shows the trend in number of publications for the past 10 years.

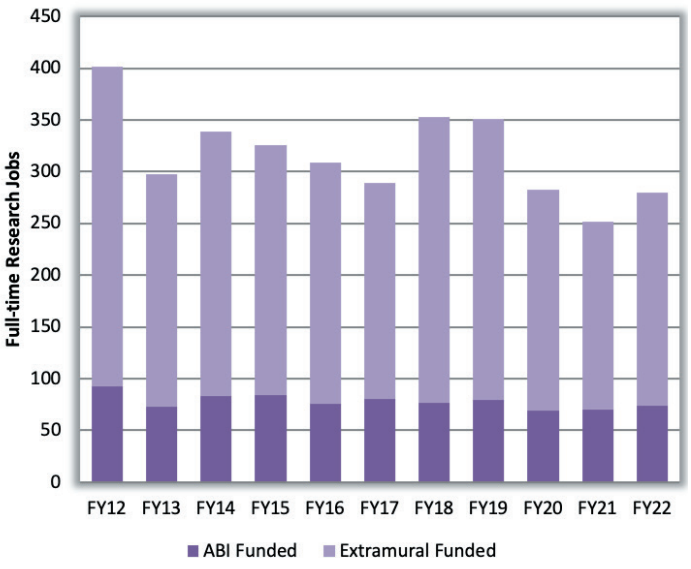
FIGURE 2



FTE EMPLOYMENT SUPPORTED BY ABI AND EXTRAMURAL FUNDING

The key to success for ABI has always been the people who conduct the research, and ABI and extramural funding support many knowledge-based jobs at the five member institutions. These research related positions include research support personnel, post-doctoral research fellow, biostatisticians, and animal care technicians. Since FY2002, ABI and extramural funds from agencies and foundations have supported an average of 291 full time equivalent (FTE) jobs annually. Figure 3 shows the FTE data for the past 10 years.

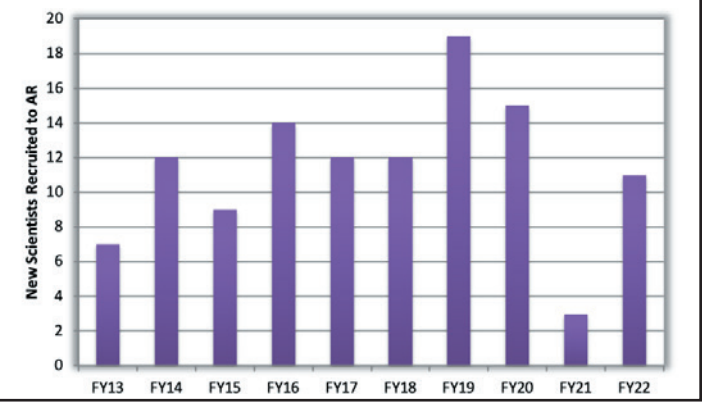
FIGURE 3



ABI-SUPPORTED RECRUITMENT OF NEW RESEARCH INVESTIGATORS TO ARKANSAS

ABI resources are often used to help recruit experienced research investigators to Arkansas, significantly contributing to Arkansas's biomedical and agricultural research infrastructure. In FY2022, there were 11 research investigators recruited to Arkansas. Figure 4 shows the new faculty recruitment numbers over the past 10 years.

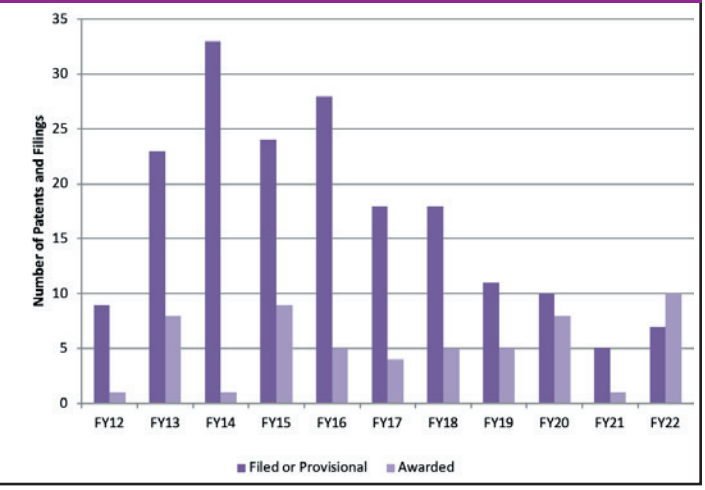
FIGURE 4



ABI PATENT ACTIVITY

By default, the scientific research conducted by ABI-supported agricultural and biomedical investigators is new and moves fields of study forward. This work often leads to unique and intellectual property and commercial applications that are eligible for patent protection. Patent filings and patent awards are key indicators of entrepreneurship, innovations, and potential commercial opportunities. In FY 2022, there were seven patent filings and ten patents awarded to ABI-supported research investigators. Figure 5 shows the trend in patent activity for the past 10 years.

FIGURE 5



2022 INVESTIGATORS OF THE YEAR

Investigator of the Year Awards were established in 2013 to recognize ABI research investigators for exemplary research based on relevance to ABI's five research areas, contributions to respective field of study, and the potential for extramural funding. The new investigator award is open to research investigators with fewer than four years of support from ABI, while the established award is for four or more years of ABI funding support.

Emily Bellis, Ph.D.
Assistant Professor of Bioinformatics, Department of Computer Science; Associate Director, ASU Center for No-Boundary Thinking, Arkansas State University, Jonesboro

2022 ABI NEW INVESTIGATOR OF THE YEAR

ARTIFICIALLY INTELLIGENT FARMING...

Dr. Emily Bellis joined A-State in the fall of 2019 after completing an NSF National Plant Genomics postdoctoral fellowship at Penn State. She earned her BS degree in Genetics and Biochemistry at Texas A and M, and her PhD in in Integrative Biology at Oregon State University. Emily's work primarily used computational approaches to study interactions with abiotic and biotic environments and how these interactions change across space and over time. In the No-Boundary Thinking Center, she focuses on defining major research questions without the boundary of disciplines and promote deep feedback between machine learning and other fields, including evolutionary genomics, spatial ecology, and plant science. That sounds a bit daunting, but as an example, one of her projects with scientists at the University of Arkansas System Division of Agriculture, is focused on the use of unmanned aerial vehicles, or drones, to better predict agricultural rice yields as well as nutrient and drought stress. Crop flyovers by drones across time, collect massive amounts of data from photographic images while simultaneously collecting multi-spectral and thermal images. Using artificial intelligence and deep machine learning techniques to analyze these incredibly large data sets, they have been able to develop early warning detection of crop stress throughout the growing season for rice in east Arkansas irrigated rice fields. With similar computational approaches, they have also been able to predict yield potential in a rice field at very early growth stages. The potential here is almost limitless. This level of investigation can be applied to questions about what environments are best for certain plants, what cultivars are more suited to a particular environment, early mitigation of crop stress or nutrient replacement and certainly can be applied to other agricultural products such as row crops. Dr. Bellis is highly engaged with the inclusion of students in her work and publications. She has published over a dozen peer-reviewed manuscripts since arriving at A-State and has been able to garner very substantial national funding from the NSF, USDA, and the NIH-INBRE.

Judith L. Weber, Ph.D.
Professor and Associate Dean for Research, College of Nursing; Professor, UAMS, COM, Department of Pediatrics and Fay W. Boozman COPH, Department of Health Behavior and Education Director, Center for Childhood Obesity, ACRI University of Arkansas for Medical Sciences

2022 ABI ESTABLISHED INVESTIGATOR OF THE YEAR

Dr. Judith Weber has been a predominant figure in obesity and nutritional research in Arkansas for almost 25 years. She joined the UAMS Pediatric faculty in 1999. She quickly became funded and established a strong collaborative and multidisciplinary approach in her research and has not slowed down. She has mentored at many levels including faculty, graduate students, medical students, and undergraduate students. Her work focuses on addressing individual and environmental risk factors for obesity and related chronic diseases through food systems and sustainable agriculture-based strategies. Through one of the early ABI Annual Symposiums where she met Dr. Rudy Rayga, then a professor at the UA System Division of Agriculture, she helped establish one of our first major successful collaborations, that led to a $4.7 M grant from the USDA-NIFA. She was the Principal Investigator (PI) of the USDA Agricultural Research Service-funded Delta Garden Study, the largest school garden-based childhood obesity prevention research study in the country. Since 2016, Dr. Weber has been the PI of the NIH-COBRE award for the Center of Childhood Obesity. This award alone has provided over $20 M in NIH funding since the Center opened. Through her COBRE, Dr. Weber has been responsible for mentoring over 23 faculty at UAMS, UAMS Northwest, and the UA System Division of Agriculture. Through her work with AmeriCorps and the Arkansas Garden Corps, she has been able to mentor over 180 teachers and students in more than 60 communities across Arkansas.

PAVING THE WAY AND PAYING IT FORWARD.

From incredibly humble beginnings in southeast Arkansas, University of Arkansas Alumnus, Dr. Tameka Bailey charted her journey through undergraduate, graduate school, postdoctoral fellowship, and has now returned as a faculty member where she is opening doors and opening eyes of elementary students to STEAM education in the Arkansas Delta.

Full STEAM Ahead

Tameka Bailey has always had a curious nature, and as a child, she questioned everything around her. "I always wondered how life happens," she said. "How do we get butterflies? How do frogs come about?"

Bailey, who grew up in the small town of Gould in the Arkansas Delta, channeled that curiosity into her studies, eventually earning a doctorate from the University of Arkansas in cell and molecular biology and returning to the U of A to teach and conduct research. As an assistant professor in biological sciences, she now works on the front lines of the war against cancer, inspires students in the classroom and leads a biomedical research camp for young people from the Delta who may or may not have considered a career in science.

Her biomedical research camp is her pride and joy. Bailey started it for the benefit of students in Gould and the neighboring community of Dumas and has seen her efforts come full circle, as students from her inaugural class have gone on to enroll at the U of A and embrace the life-changing opportunities introduced to them by her outreach.

"As an underrepresented minority within the STEM disciplines, it's very important to me that we change the demographic – the representation that's within those disciplines," Bailey said. "I want to connect the two communities – my home in Fayetteville and my native home of Gould and Dumas. For me, growing up, opportunity was everything. Had I not been exposed to STEM very early on; I would not have become a research scientist."

"I want to connect the two communities – my home in Fayetteville and my native home of Gould and Dumas."

THE GIFT OF EDUCATION

Bailey beams with pride when she talks about her childhood and her parents' dedication to work, family, and their shared dream that she and her brother would find success through education. They worked multiple jobs to ensure Bailey and her brother had everything needed to succeed in school. Her father worked a full-time factory job and a part-time custodial job at the high school at night.

Tameka Bailey, PhD - Assistant Professor
Department of Biological Sciences
Fulbright College of Arts and Sciences
University of Arkansas, Fayetteville

Bailey remembers joining him some nights to help, so he could get home and they could all spend time together. She smiles when she recalls that she always had fresh clothes for school while her father would patch up his worn-out clothes to wear year after year.

"He sacrificed for us," she said.

They did everything they could to feed their young scientist's budding curiosity, spending hours at the library looking for books to answer her many questions and borrowing encyclopedias from neighbors.

Bailey's high school biology teacher recognized her potential and recommended she attend college to further her passion for biology. This inspired not only a lifelong pursuit for the subject but also planted a seed for how she could inspire others in the future.

Bailey wanted to come to the U of A but felt it was unlikely because of the distance between the campus in Fayetteville and her hometown, so she chose the University of Arkansas at Pine Bluff for her undergraduate studies. There, she met fellow female scientists who inspired and encouraged her to pursue her doctorate.

But this was never just about a diploma. For Bailey, it was a path to fulfilling a promise and helping to build a better world – specifically for those battling cancer. After visiting her grandmother, whose sister died from breast cancer, Bailey made it her mission in life to find a cure.

OPPORTUNITY IS EVERYTHING

The University of Arkansas became the place where Bailey envisioned herself improving lives.

"The campus was so beautiful, and I said to myself, 'I have to go here!'" she said. On her visit to campus, she met Douglas Rhoads, professor of biological sciences and the director of the interdisciplinary graduate program in cell and molecular biology. When they talked, he told her that the U of A was the place she belonged.

"The ongoing mentorship that I received from Dr. Rhoads changed the trajectory of my life," Bailey said. "He understood that as an underrepresented minority from rural Arkansas, I would need extensive

Why the Arkansas Delta? Bailey believes the Delta offers untapped resources, and "STEM exposure opens the window of opportunity to explore ways to develop the community."

and engaging mentorship to be successful in the program. He challenged me to excel in graduate school, and he had high expectations for me. After I graduated from the U of A, he helped me find my first job, advised me through my postdoc and has been instrumental in my career development now as a faculty member. I wouldn't be here without the generosity, wisdom, and compassion of Dr. Rhoads."

In 2021, Rhoads and his wife, Marsha, made a planned gift to create the Rhoads Endowed Graduate Assistantship, so more students from underrepresented backgrounds can pursue graduate degrees in Cell and Molecular Biology from the U of A.

In her role in the Fulbright College of Arts and Sciences, Bailey researches triple-negative breast cancer, a rare but particularly aggressive type that metastasizes from the primary tumor directly to the brain. She is looking at specific proteins for the pathway used by the cancer cells to move from breast tissue and colonize in the brain, to stop the cells from spreading.

She's also a beloved teacher, whose calm demeanor and extensive knowledge help her students understand the most difficult of concepts.

Devon Hoehn, a pre-med student, said, "Dr. Bailey is one of my favorite teachers I have. She really wants you to understand the material and succeed in her class."

Rhoads and Bailey catch up on the steps of Old Main.

SUMMERS OF STEAM

Every summer since 2015, Bailey returns to the Arkansas Delta determined to inspire a new cohort of students to love science and envision the opportunities available in the field. What started as a camp at the Dumas Community Center for 15-20 fifth through tenth grade girls has evolved into a weeklong immersive experience involving a field trip to Fayetteville, tours of the campus and hands-on lab work, regardless of gender.

Bailey's research provides an outlet for her curiosity about science and the world around us, while also addressing real-world problems.

For many, it's the first time they've had a chance to visit Northwest Arkansas, much less a college campus. Students tour Crystal Bridges Museum of American Art, stay in one of the residence halls and work with current students before returning home to organize a showcase of their work for family, friends, and the community.

The inaugural camp was funded by the Women's Giving Circle at the U of A and was a collaboration with Bailey's mentor, Doug Rhoads. She also received support from the university's Multicultural Center, Dr. Leslie Yingling, and Dr. Charles Robinson in establishing the program.

"It's one thing to tell a person about the collegiate experience, but it's a whole different story when you expose them to the college campus," she said. "To walk the grounds of the University of Arkansas, to stay in a dormitory, to eat in Fulbright Dining Hall…it brings college alive and increases the desire to attend college. It also helps them be aware to what the Northwest Arkansas community is like – how welcoming and how inviting it can be and the amenities that are available here."

Bailey's camp focuses on the ages

Camp participant Ava Allen works with student mentor Devon Hoehn on a lab experiment

between fifth grade and seventh grade, because she says that's a pivotal time for when students decide whether they're going to study STEAM.

"Studies show that around the fifth grade, students decide what they're going to be in life – those decisions are made that early on. The earlier we expose students to biomedical research, the more likely they will study those disciplines. And by exposing them to the University of Arkansas, the more likely they are to attend the University of Arkansas. So, we want to put the University of Arkansas at the top of their radar."

Ava Allen, a rising sixth grader, attended the camp in 2022 and said it was the first time she had done lab experiments and the first time she had visited Fayetteville. Prior to the camp, Allen said she was not as interested in science, but the experience changed her mind. By the fourth day of camp, she expressed a desire to become a dermatologist.

Trinity Bruce, another rising sixth grader, said meeting everyone involved in the camp was her favorite thing. "I'm interested in architecture, but I want to try new things," she said, noting that she was most proud of herself for dissecting a sheep's brain earlier in the week, because it meant overcoming her weak stomach.

In 2022, the U of A was awarded $1.25 million from the Science Education Partnership, which is sponsored by the National Institute of General Medical Sciences, a component of the National Institutes of Health. A key component of the five-year grant is a one-week STEAM summer program at the U of A – led by Bailey – that will target rising sixth graders from Reed Elementary in Dumas.

"It's effective, it's working," she said. "Students are becoming interested in the University of Arkansas and they're attending, so the camp is paying off. That's what it's all about for me."

— Jennifer Holland
UA Marketing Communications

Launch of SpaceX CRS-25

Sometimes it IS Rocket Science

As a SpaceX rocket lifted off from the NASA Kennedy Space Center on July 14, seven Arkansas State University students who were on-site watched anxiously, knowing their work was on board and headed to the International Space Station (ISS). The rocket, SpaceX's 25th Commercial Resupply Service mission (CRS-25) and carrying the Student Payload Opportunity with Citizen Science (SPOCS) project including an experiment by A-State and four other universities.

The launch was literally the highpoint of the students' work that began in the fall of 2020. Their proposal to NASA's SPOCS program was started, selected and funded with a $20,000 NASA grant. The biology and engineering majors began planning their proposal for the competitive program several weeks prior to their presentation, then made their presentation to the selection committee online during the height of the pandemic.

NASA SPOCS team taken at the entrance of the International Space Station Processing Center at Kennedy Space Center. Pictured left to right: Maureen Dolan, Claire Greene, Katherine Willis, Hannah Seats, Mason Rhodes, Landon Perdue, Benjamin Whitfield, Jacob Oster, Shea Harris

The interdisciplinary SPOCS team has seven members: Benjamin Whitfield of Little Rock, an electrical engineering major and team leader; Katherine Willis of Blue Springs, MO, Claire Greene of Conway, and Hannah Seats of Brookland, all biological sciences majors; and Landon Perdue of Brookland, Mason Rhodes of Benton and Jacob Oster of Bay, who are mechanical engineering majors. NASA TV aired a live interview with Whitfield and Greene, representing the SPOCS team, just minutes before the launch. Six of these students have just graduated in May and are moving on to incredible next steps, with two going to graduate school at Princeton and the University of Queensland, St. Jude Children's Research Hospital, Northrup Drummond, and applying to medical school.

Project mentors were Dr. Maureen Dolan, associate professor of molecular biology, and Shea Harris, outreach coordinator for ABI at A-State. Dolan counts ABI support as key to the success of the project, "A-State ABI instrumentation, ABI Summer Undergraduate Research Fellowships, and access to our A-State ABI core facilities and equipment provided these students the required resources to design and test many iterations of the eventual test module that flew to the ISS, run the critical waxworm preliminary experiments to sustain waxworm health, and maximize conditions for plastic degradation for the 36 day journey to and from the ISS."

"The successful launch and deployment of the A-State SPOCS module to the ISS will have a lasting impact on ABI's outreach

program," Harris predicted. "K-12 students interested in space sciences to sustainability will benefit from knowing they can gain valuable experiences like these, right here in Jonesboro."

The team was making final preparations for their experiment in the labs at Kennedy Space Center, right up until they handed off their experiment to mission managers.

"They have all multitasked on this project and all team members have been involved in most all aspects," Dolan emphasized. "Each member took lead on various aspects of the project, from designing and conducting waxworm preliminary experiments, to the experimental prototyping and build-out of the housing unit (cover image), leading curriculum development for citizen science and outreach activities, to social media management."

Throughout the project development, the SPOCS team spent a lot of time adjusting to make the experiment fit within NASA's required size, time and budget constraints. The number of specimens they could carry out in a 10 x 10 x 15 centimeter nanomodule was limited. The final experimental design to be housed in the module was set up in duplicate with an experimental group that contained worms, food, and plastic, and two control groups, one with worms, food and no plastic, and another with food and plastic, and no worms.

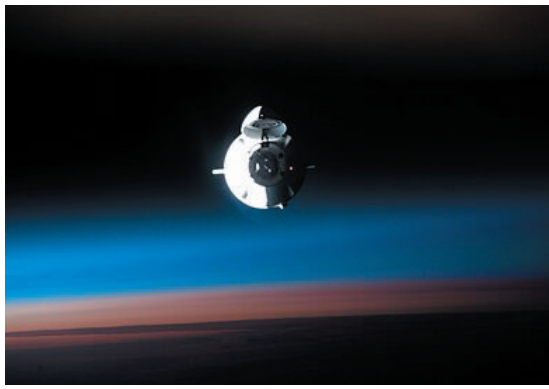
In addition to the experiments conducted in space, all SPOCS projects are required to have ground-based collaborations with K-12 based students. The A-State team partnered with 4th, 5th and 6th grade students from Nettleton STEAM School and Blessed Sacrament Catholic School in Jonesboro to engage elementary/middle school students. The team members used near-peer mentoring to engage these students and brought authentic project-based learning into their local classrooms over an entire academic year. The results of the 4th-6th grader's experiments provided important data that drove the final experimental design that ended up launching to the ISS. The experiment that was launched to the ISS was also conducted simultaneously on Earth by these students so that results could be compared between gravity-based and zero gravity-based experiments. Team member Landon Perdue notes that, "One of the coolest parts for me was the first time we had an outreach event with Blessed Sacrament and Nettleton STEAM. Watching the kids excitedly get to work on the engineering competition I had worked on and apply things from our talk was wonderful to see. The creativity in their final designs and how invested they were in the testing was shocking to me at the time and amazed me." One can quickly begin to see the highly integrative and interdisciplinary nature of the project, and the experiential opportunities it provided for all involved.

Polly EthylAnn (Claire Greene) at Nettleton STEAM Kick-off assembly

The experiment was returned to Earth after 33 days on the ISS, and the SPOCS team initiated and continues to analyze results. Via a Zoom conference, in December 2022, the NASA SPOCS team presented their results highlighting findings/analyses to date for the ISS plastic eating waxworm experiment to NASA STEM Education and Outreach personnel, NASA scientists, and administrators.

In reflection on the experience, Dr. Dolan notes, "To help these students apply the scientific method, to optimize variables for ensuring a sound experimental design, and sharing in their trials and challenges they faced, to get this project to Kennedy Space Center and ultimately the ISS, is priceless. Knowing that Shea and I have been a small part in something that each one of these students will take into their respective careers….it just doesn't get any better than this as science educators."

ASA TV aired a live interview with Benjamin Whitfield and Claire Greene, representing the SPOCS team, just minutes before the launch



Cargo Dragon Capsule approaching the International Space Station

Dr. Maureen Dolan and Shea Harris at NASA Kennedy Space Center with SpaceX CRS-25 in background

Note: Significant sections of this article were compiled from press releases from Arkansas State, and the A-State Alumni Association publication, Voices, volume 22, 2022.

DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Nathan McKinney, PhD
Associate Vice President for Agriculture
Assistant Director of the Arkansas Agricultural Experiment Station
UA System Division of Agriculture
ABI Institutional Director

INSTITUTIONAL UPDATES

Agricultural research is inextricably linked to human health. The University of Arkansas System Division of Agriculture's research aims are to develop new knowledge and technologies that ensure a safe, sustainable, and nutritious food supply from farm to fork. Beyond these crucial discoveries, numerous areas of agricultural sciences have direct implications for human health and medical research. Many of these projects provide models that inform new strategies to increase our understanding of how to improve the quality of life and health for all Arkansans.

"Arkansas Biosciences Institute leadership had remarkable foresight to include agricultural research in ABI's research strategy," said Nathan McKinney, assistant director of the Arkansas Agricultural Experiment Station and ABI institutional director for the Division of Agriculture. "A lot of our work has applications and implications in human medicine.

"Fundamental questions can be explored in animal models that connect the dots to solving common health problems among Arkansans," McKinney said.

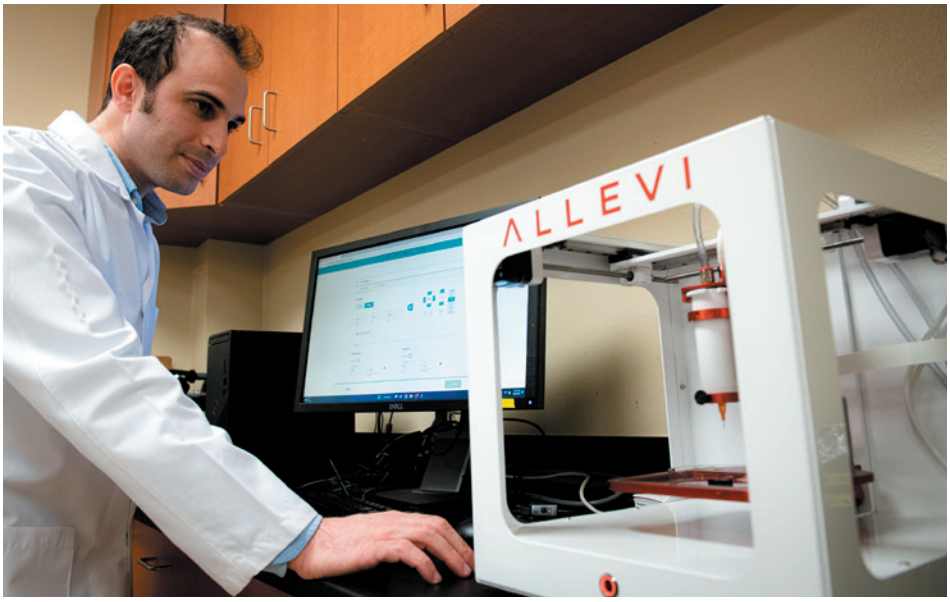
"ABI-funded research projects have been a great catalyst for growing health related research in the Arkansas. Some of these projects have led to the development of intellectual property that has matured into commercial products that will benefit the health and welfare of Arkansas citizens for generations," said Jean-François Meullenet, senior associate vice president for agriculture-research and director of the Arkansas Agricultural Experiment Station, the research arm of the Division of Agriculture.

ABI is funding 16 Arkansas Agricultural Experiment Station research projects totaling $794,593 in fiscal 2023.

Half of all Arkansas Biosciences Institute funds to the Division of Agriculture go directly to fund research projects. The other half supports faculty researchers and provides resources to train graduate students who are the next generation of scientists that will continue the work.

McKinney also said that while no ABI funds are used to recruit new faculty in the Division of Agriculture, the grant support and

Graduate student Annegret Jannasch, and Arkansas Agricultural Experiment Station food scientist Ya-Jane Wang, steam rice that has been parboiled using a new method Jannasch developed.



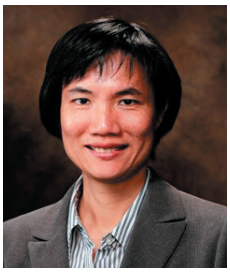
Dr. Ali Ubeyitogullari uses 3-D printing to infuse printed foods with phytochemical nutrient additives.

interdisciplinary collaborations that the institute fosters are valuable draws for young, motivated scientists and dedicated, seasoned researchers.

"The ABI grants we administer have proven to be an invaluable resource to our faculty for experimental proof-of-concept, acquisition of preliminary data, and research design. All are necessary to be competitive for larger, competitive extramural grants," McKinney said.

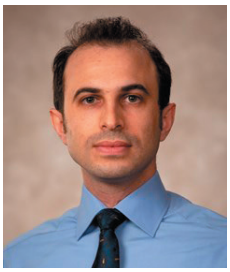
Division of Agriculture research at the Arkansas Agricultural Experiment Station covers the ABI mission areas of applied and basic research and validation and quantification of results. From start to finish, Division of Agriculture researchers are committed to conducting research and making discoveries that will benefit all Arkansans.

APPLIED RESEARCH



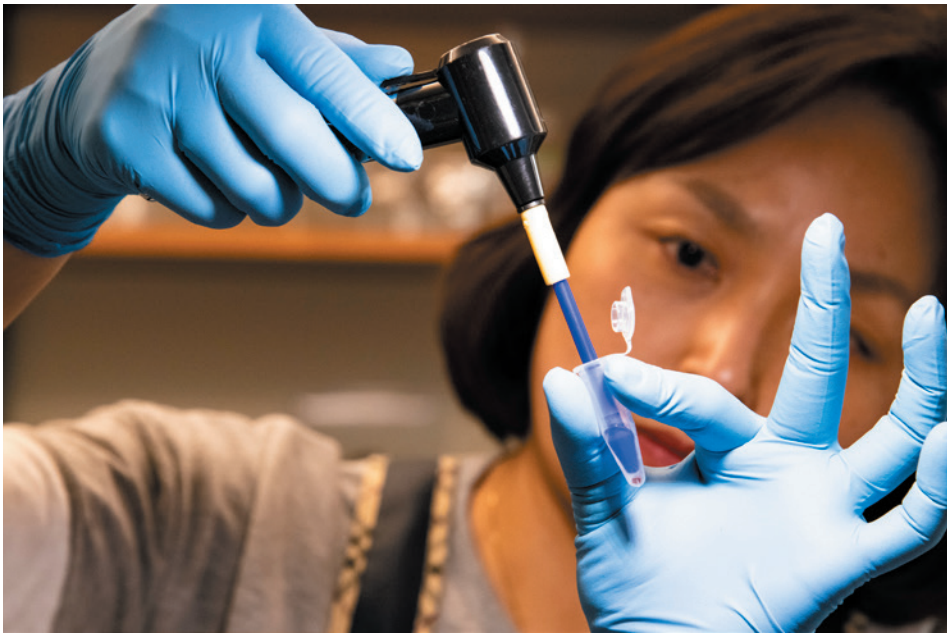
Ya-Jane Wang, PhD: Professor of Food Science, has developed fortified parboiled rice that can deliver essential vitamins and minerals to people living with nutrition-poor diets. She and her research team have devised a simple means of parboiling rice that conserves water and can be implemented on a community level.

In related research, Wang is investigating the use of porous starch as a means of delivering controlled-release bioactive compounds.



Ali Ubeyitogullari, PhD: Assistant Professor of Food Science, is developing novel 3-D printing technology to produce foods on demand. He is also exploring the use of printed foods to infuse functional food extracts from fruits and vegetables into commonly consumed foods. This offers the possibility of adding nutritional value to anything from pizza to cookies.

Through an ABI-funded project, Dr. Ubeyitogullari has recently received two major grants from the USDA grants. The money supports his research and development of supercritical carbon dioxide particle formation to create nanoscale nutritional supplement and bioactive probiotic infusions for 3-D-printed foods that promote human health.



Research technician Renee Kong breaks cell samples in order to extract DNA that may identify pathogens carried by ticks.

Emily McDermott, PhD: Assistant Professor of Entomology and Plant Pathology, focuses on medical and veterinary entomology, particularly on identifying and controlling biting insects that transmit pathogens to humans and animals. Her goal is to reduce the risk and incidence of insect-transmitted diseases to livestock.

Because biting pests can also carry human pathogens, livestock workers are also at risk. McDermott's work can help protect Arkansas farm workers from such severe maladies as Lyme disease, Dengue fever and other serious ailments.

Jin-Woo Kim, PhD: Professor of Biological and Agricultural Engineering, leveraged ABI support to acquire an Established Program to Stimulate Competitive Research grant from the National Science Foundation. The grants supported his research in the development of a nanotechnology toolbox that provides information and engineering tools for the development of nanotechnology. Kim used the grants and the toolbox to develop cellulosic nano particles that have use or potential use for everything from enhanced control of agricultural chemicals to human health applications.

BASIC RESEARCH

Walter Bottje, PhD: Professor of Poultry Science, began with a curiosity about oxidative stress — an imbalance in cells — that can cause health complications in animals. His focus is on poultry,

Dr Vibha Srivastava induces sprouting in gene-edited rice plant tissue cultures.

but oxidative stress has similar health consequences for humans.

His research requires delving into the actions of molecules in living cells and how they affect such functions as feed conversion into muscle. He has followed that line of research to an ABI-funded study looking into the regulation of bioenergetics, the transformation of energy in living organisms. He has been able to successfully leverage ABI support for multiple extramural grants, including a $9.95 million grant from USDA's National Institute and Food and Agriculture to lead a multi-institution research effort to transform water use and nutrition in U.S. poultry production.

Jamie Baum, PhD: Associate Professor of Nutrition, and Director of the Center for Human Nutrition, investigates the role of dietary protein, amino acids and fatty acids in regulation of skeletal muscle function for prevention of chronic diseases. She is in the second year of a three-year study of using proteins in personalized nutrition.

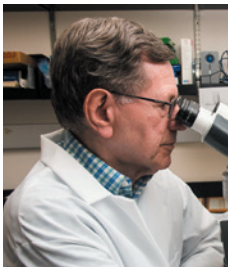
Baum's research demonstrated that a protein-based breakfast, when compared to a carbohydrate-based breakfast, increased metabolism and helped eaters feel full. The result is a reduced caloric intake in overweight children.

VALIDATION AND QUANTIFICATION

Ashley Dowling, PhD: Professor of Entomology and Plant Pathology, has conducted a tick and pathogen survey of Arkansas that identified populations of disease-spreading ticks throughout Arkansas. A resulting, interactive map allows Arkansans to discover what ticks and what disease-causing pathogens they carry are present anywhere in the state. It is an important tool for medical professionals who treat patients suffering from diseases caused by tick bites.

Dowling's survey revealed high levels of pathogens in ticks collected in Arkansas and revealed the statewide scope of tick-vectored pathogens.

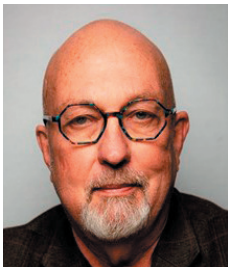
Wayne Kuenzel, PhD: Professor of Poultry Science, Physiology and Neurobiology, investigates stress receptors and blockers in avian brains, an avenue of research with direct implications for human health and medicine.



IMPACTS

ABI-funded projects are making remarkable impacts in agricultural industries.

Billy Hargis, PhD: Distinguished Professor of Poultry Science, has developed and patented direct-fed microbial feed additives and novel vaccines that reduce or eliminate the need for antibiotics. These significant developments in sustainable poultry health products are models for parallel developments in human health technology.



Vibha Srivastava, PhD: Professor of Crop, Soil, and Environmental Sciences, has patented gene stacking technology that provides practical means for adding multiple genetic traits in plant breeding. In plant breeding, two lines are crossed to get an improved variety, but as the number of genes increases it becomes exponentially difficult. A cultivar with 10 genes, for example, would require scanning of 1 million seedlings. It is estimated that eight to 15 genes are required for combined weed and pest management in corn, for example. This mandates genetic transformation with multiple genes.

Traditional methods are generally impractical for multi-gene transformation because these methods often introduce more than one copy of genes into random sites, leading to silencing of one or more genes. Breeding with genes stacked into a single locus simplifies the breeding of cultivars with multiple genes.

Tom Risch, PhD
Vice Provost for Research and Technology Transfer
Judd Hill Endowed Chair of Environmental Biology
ASU ABI Institutional Director

INSTITUTIONAL UPDATES

— Asela Wijeratne, PhD

Assistant Professor, Department of Bioinformatics, ASU

Plant pathogens are a major threat to global food security, and Phytophthora sojae is a particularly devastating disease that causes root and stem rot (PSR) in soybean. This disease results in significant yield losses, with global estimates exceeding 1.1 million tons annually. While host genetic resistance and disease-suppressive cultural practices have been used to manage PSR, the pathogen has shown remarkable adaptability to these practices, highlighting the need for novel approaches to disease management.

One of our goals is to develop a better understanding of the molecular mechanisms governing soybean's immune response to *P. sojae* and identify genes that could be used to manage PSR. We analyzed how soybean plants respond to infection by compatible and incompatible races of the pathogen, and identified defense-related transcription factor families that are overrepresented in these responses. We then generated DNA-protein interactome data for the two most represented transcription factors and using an artificial intelligence approach, trained deep learning-based models to predict novel transcription factor targets in soybeans for six transcription factor families. Based on this analysis, we constructed a gene regulatory network with prioritized components and identified hub transcription factors from the WRKY and ERF families. These genes are likely to play a significant role in orchestrating immune responses in the soybean against the pathogen and, thus, represent ideal candidates for crop improvement.

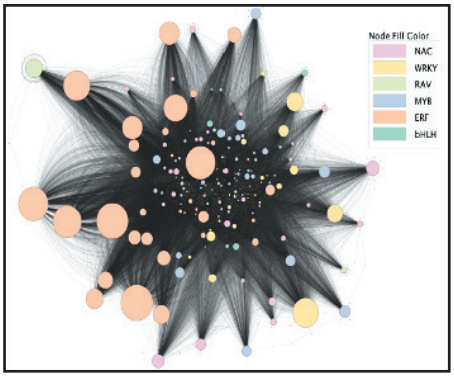


Figure 1. The soybean gene regulatory network by *P. sojae*

Training & Development Activities

- USDA National Institute of Food and Agriculture Grant
- 5 publications in past 2 years and 4 abstracts
- One PhD, 1 MS and 2 undergraduate students

— Argelia Lorence, PhD

Professor of Metabolic Engineering, Vaughan Endowed Professor, Director, A-State Phenomics Facility, ASU

Dr. Argelia Lorence leads a dynamic and groundbreaking research program in rice at Arkansas State University (ASU), focusing on various aspects of rice biology, genomics, and crop improvement. With a passion for enhancing the productivity and sustainability of rice cultivation, Dr. Lorence's research initiatives have garnered international recognition. Recently, her work identifying genes in rice plants that can render them resistant to nighttime heat, a result of climate change, was featured in an article in the New York Times.

At the heart of Dr. Lorence's research program is the exploration of the molecular and cellular mechanisms underlying rice growth, development, and stress responses. They investigate the plant's response to pathogens, pests, drought, salinity, and nutrient deficiencies. By elucidating the defense mechanisms and signaling pathways activated in rice under stress conditions, she and her team aim to develop strategies to improve rice resilience and reduce yield losses caused by these challenges.

In addition to fundamental research, Dr. Lorence's program actively collaborates with industry partners and farmers to translate their findings into practical solutions for rice growers. They work closely with breeding programs to incorporate beneficial traits into elite rice varieties, ultimately providing farmers with improved cultivars that exhibit enhanced productivity, disease resistance, and stress tolerance.

Dr. Lorence is also committed to training and mentoring the next generation of scientists. Under her guidance, graduate students and postdoctoral researchers gain hands-on experience in cutting-edge techniques, experimental design, and data analysis, fostering their development into independent researchers.

Overall, Dr. Argelia Lorence's research program in rice at Arkansas State University combines innovative molecular biology, genomics, and crop improvement approaches to address the challenges faced by rice growers. Through their multifaceted investigations, the team aims to advance our understanding of rice biology and develop sustainable agricultural solutions to ensure global food security.

Training & Development Activities

- USDA National Institute of Food and Agriculture Grant, Arkansas Research Alliance, NIH-INBRE, Google-X, NSF-EPSCoR, NSF Engines (~$2M Annually)
- 6 publications in past year and 12 abstracts
- Multiple graduate and undergraduate students

— Fabricio Medina-Bolivar, PhD

Professor of Plant Metabolic Engineering, Department of Biological Sciences, ASU

The Medina-Bolivar research lab focuses on the discovery and bioproduction of medicinal compounds from plants. His labs utilize "immortalized" root cultures (known as "hairy roots") as factories for a large diversity of plant natural products. Using a combination of molecular, cellular, and biochemical approaches, his research team has developed strategies to increase the levels of selected natural products in hairy roots by several thousand times compared to the parental plant. A current project in his lab focuses on studying the anticancer and anti-inflammatory properties of prenylated stilbenoids purified from hairy root cultures of peanut. His research team has shown that these compounds exhibit anticancer effects in triple-negative breast cancer cells. Furthermore, they have shown that arachidin-1, a prenylated stilbenoid purified from the peanut hairy root cultures, increases the anticancer effects of the chemotherapy drug, paclitaxel, in 2D and 3D triple-negative breast cancer cell cultures. This compound is being studied as a potential adjuvant for triple-negative breast cancer, which is the most difficult breast cancer to treat.

Training & Development Activities

- Arkansas Blue and You, Arkansas Blue and You, USDA National Institute of Food and Agriculture Grant, Arkansas Research Alliance, NIH-INBRE
- In the past year, 2 patents, 3 publications and 5 abstracts
- Multiple graduate and undergraduate students

— Lori Neuman-Lee, PhD

Assistant Professor, Department of Biological Sciences, ASU

Dr. Neuman-Lee along with collaborator Dr. Emily Bellis are engaged in a project, "Correlating environmental microbial diversity to prevalence and vertebrate disease", with a goal to examine microbial diversity on snakes in Northeast Arkansas and the potential presence of a fungal pathogen, Ophidiomyces ophiodiicola. To date, they have captured and sampled 99 snakes from 17 different species at 14 sites. Soil samples have been collected at each of the sites to compare the soil microbial diversity to the snake scale microbial diversity. In addition to microbial samples, blood samples to assess the endocrine and immune function were also taken from each snake. We conducted flow cytometry to assess cell populations and bactericidal ability assays to assess immunocompetence. They have also completed a preliminary species distribution model to predict the occurrence of microbes associated with O. ophiodiicola in snakes. Additionally, our team has isolated O. ophiodiicola using PCR from snakes, which has not been reported in peer-reviewed literature from Arkansas. Currently, all samples are being extracted to send for sequencing to complete the examination of the microbial diversity. This work is currently supporting several undergraduates and one PhD student.

Emily Bellis (co-PI), Ethan Saffle (undergraduate Honors student), Lori Neuman-Lee (PI), and Natalie Haydt (PhD student) sampling snakes

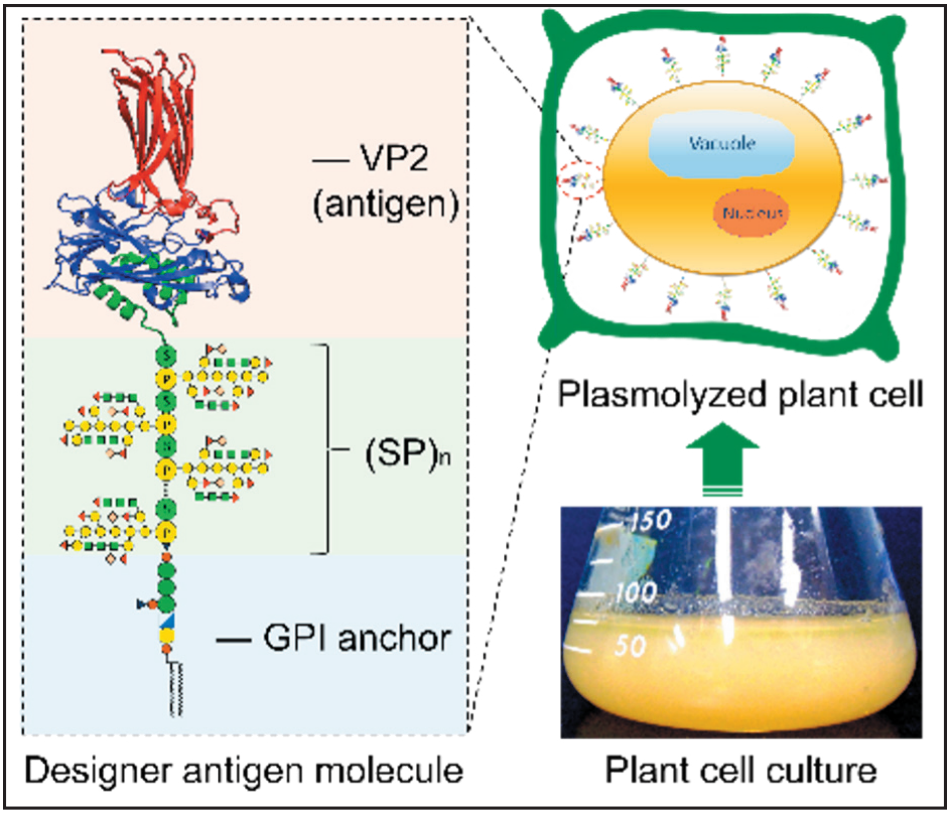
Training & Development Activities

- NSF, NIH-INBRE, Memphis Zoo
- In the past year, 5publications and 15 abstracts
- Multiple graduate and undergraduate students

— Jianfeng (Jay) Xu, PhD

Professor, College of Agriculture, ASU

Dr. Jay Xu has been at A-State since 2008, and overall, his research work focuses on genetic engineering of plants and plant cells to produce biopharmaceuticals to treat human disease as well as engineering plants for use in biofuel production. One of his recent projects has been to develop a new edible vaccine against infectious poultry diseases. By using a GPI-anchor to modify plant proteins, he and his team are strategically designing and engineering novel antigen molecules that can be expressed in tobacco plant cells and consumed by poultry as a vaccine. As a proof of concept, they are developing vaccines against infectious bursa disease (IBD), a highly contagious, immunosuppressive disease of young chickens. The disease if responsible for major economic losses in the poultry industry worldwide. In progress so far, they have been able to several new antigen proteins and demonstrate that these proteins are able to be expressed at very high levels on the surface of tobacco cells. A challenge with oral vaccines is degradations by enzymes present in the stomach, and they have been able to show that these proteins are able to remain stable for over 30 minutes in an environment that experimentally replicates the stomach, more than long enough to be absorbed. Ongoing experiments are now underway to assess the immunogenic response of these new antigen expressing cells in chickens.



Development and Display of Designer Antigen Molecule Expressed on Plant Cell Membrane

Training & Development Activities

- USDA, DOE, NIH, Arkansas Research Alliance, NIH-INBRE
- In the past year, 5 publications and 1 patent
- Many graduate and undergraduate students

— Mohammad Alam, PhD

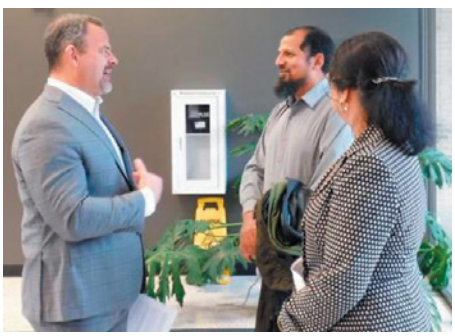
Associate Professor, Department of Chemistry, ASU

Dr. Mohamad Alam leads a groundbreaking pharmaceutical development research program aimed at addressing two of the most pressing challenges in modern healthcare. One of these is antibiotic resistance, where he is focused on understanding the mechanisms underlying antibiotic resistance and developing innovative strategies to combat this global health crisis. Here his approach is targeting highly infectious methicillin-resistant Staphylococcus aureus and vancomycin-resistant enterococci. His other line of investigation is focused on the development of new drugs to treat cancer, specifically melanoma, or skin cancer. Recognizing the urgent need for alternative treatments, Dr. Alam's team screens natural products and synthesizes novel molecules to identify potent antimicrobial and anticancer agents. Central to his research is a multidisciplinary approach that combines molecular biology, microbiology, genomics, and bioinformatics.

Dr. Alam was also recently recognized as the inaugural recipient of the endowed Beck Professorship in Chemistry. The Beck Professorship in Chemistry is one of two new endowments from Arkansas State University alumni Buddy and Charlotte Beck, through their Beck Foundation, established with a goal of enriching faculty opportunities to conduct vital research. Dr. Alam was selected for this honor based on his cutting-edge work in antimicrobial and anticancer research, and his continued efforts to involve and mentor students.

Training & Development Activities

- Beck Professorship, NSF, UAMS Winthrop P Rockefeller Cancer Institute
- In the past year, 11 publications, 1 book chapter, 8 abstracts, and 1 patent
- Many graduate and undergraduate students



Chancellor Todd Shields speaks with Professor of Chemistry Mohammad Abrar Alam, the inaugural Beck Professorship in Chemistry recipient.

Arkansas Children's Research Institute

Pete Mourani, MD
President, Arkansas Children's Research Institute
Professor, UAMS Department of Pediatrics
ACRI ABI Institutional Director

ABI has just commemorated 20 years of encouraging, supporting, and increasing innovative research in the state. Through its responsible stewardship of ABI support, Arkansas Children's Research Institute continues to drive significant research to make children better today and healthier tomorrow.

INSTITUTIONAL UPDATES

Recruiting New Scientists To Arkansas

Ellen van der Plas, PhD, Associate Professor, Pediatrics-Hematology/Oncology: At her previous institution, University of Iowa Hospital & Clinics, Dr. van der Plas demonstrated that young kids with cancer can go into a scanner without sedation and provide quality data. Her goal at Arkansas Children's Hospital, where she is associate professor of pediatric hematology and oncology in the UAMS College of Medicine, is to ensure that childhood cancer survivors enjoy the same quality of life as their cancer-free peers.

Unlike decades ago, most kids with leukemia will be cured, yet many survivors will have problems after cancer, or "late effects," which may include physical and mental health concerns. While we often know how to address physical conditions, much less is known on how to help survivors with mental health problems. Dr. van der Plas focuses on mental health and, more specifically, neurocognitive late effects of childhood cancer. Her research has shown that childhood leukemia survivors have difficulties with tasks that require them to keep multiple things in mind. Using MRI, Dr. van der Plas' research also showed that there are subtle differences between the brains of survivors and their cancer-free peers, and these differences helped explain some of the cognitive difficulties experienced by survivors.

At Arkansas Children's, Dr. van der Plas' team is using MRI for identifying signs or symptoms of abnormal brain development during treatment for leukemia to lead to prevention of neurocognitive late effects. This endeavor is now supported by her receipt of an NIH MERIT R37 award from the National Cancer Institute for a 5-year study, "Identifying Markers of Abnormal Neurocognitive Trajectories during Chemotherapy Treatment of Childhood Acute Lymphoblastic Leukemia," for $2,519,298.

In this newly funded study, Dr. van der Plas will assess neurodevelopmental changes in patients during treatment to help pinpoint the timing and extent of neurotoxic exposures in children treated for acute lymphoblastic leukemia (ALL), providing opportunities to implement strategies of remediation and prevention. Her study's objective is to identify markers of altered neurocognitive development in ALL patients, 3 to 6 years of age, undergoing active treatment at major treatment milestones. Results from this work will have impactful implications for understanding early neurodevelopmental changes in children undergoing treatment for ALL, providing a framework for subsequent studies linking early markers to neurocognitive outcomes in survivorship. Gaining insight into early neurodevelopmental change is invaluable for future efforts aimed at curbing neurotoxicity of cancer treatment.

Additionally, Dr. van der Plas is actively involved in various groups that prioritize late effects of childhood cancer, including Children's Oncology Group (COG), the International Guideline Harmonization Group (IGHG), and the Childhood Cancer Survivor Cohort (CCSS). She is the Silo Leader of the Neurocognitive Task Force of COG where she coordinates large literature reviews for developing guidelines for clinicians who take care of long-term childhood cancer survivors. Likewise, she is a working group leader for IGHG where her group focuses on gathering evidence that helps identify survivors who are at high risk for neurocognitive late effects. In her role as member of the Publication Committee of CCSS, Dr. van der Plas advises on research proposals that aim to use the CCSS database.

Colin D. Kay, PhD, Professor, Pediatrics: Dr. Kay arrived on the Arkansas Children's campus from North Carolina State University, where he was the David H. Murdock Distinguished Professor of Translational Nutrition in the Department of Food, Bioprocessing and Nutrition Sciences and at NC State's Plants for Human Health Research Institute and Phytochemical and Foodome Center.

At ACRI, Dr. Kay has joined the Arkansas Children's Nutrition Center (ACNC) as Scientific Director of the ACNC Metabolomics and Analytical Chemistry Research Core, and he will serve as the Director of Precision Health Research within ACRI. His UAMS faculty appointment is as Professor of Developmental Nutrition in the Department of Pediatrics.

Dr. Kay's research centers on establishing the metabolism of dietary phytochemicals and the potential impact this has on their biological activity. His team focuses on the development of qualitative and quantitative metabolomic methodologies for establishing the contribution of dietary phytochemicals to the human metabolome. His work led to the development of a food composition knowledge database (MetaboFood®) comprising chemical composition and metabolome data, including metabolic and disease pathway associations for supporting precision nutrition and health initiatives.

Dr. Kay's research program and expertise fit perfectly within the mission of the ACNC to conduct cutting-edge research to understand how maternal-child nutrition and physical activity optimize health and development. The ACNC is a cooperative effort of the United States Department of Agriculture-Agricultural Research Service (USDA-ARS) and Arkansas Children's, in collaboration with ACRI and UAMS. Established in 1994 on the Arkansas Children's Hospital campus, the ACNC is one of six National Human Nutrition Centers that receives funds through the USDA-ARS and one of two centers to focus primarily on pediatric/maternal nutrition and metabolic health. With its state-of-the-art procedures, equipment, and facilities, Dr. Kay and the entire ACNC team work to determine how early-life exposures to dietary factors, physical activity and other environmental factors affect physiology, including brain and behavior, bone, adipose and body composition, metabolic organs and GI tract, cardiovascular system, and others.

Timothy Koscik, PhD, Associate Professor, Pediatrics: Recruited from the University of Iowa Carver College of Medicine, Dr. Koscik's research expertise is in human neuroimaging and analytical tools regarding neurodegenerative disorders. Neuroscience research has largely focused on the microscale of neurons and molecular biology or the macroscale of brain regions and networks. However, the organizational principles in between these two extremes at the mesoscale are the critical determinants of brain function (and dysfunction). For example, the layered organization of neurons in the cerebral cortex determines information processing capabilities, and variations in this layered organization determines functional localization throughout the brain. However, technological limitations, that is, the need to see tiny structures across vast areas, have limited the understanding of mesoscale neuroanatomy and the contributions of the mesoscale to neurodevelopment and neurodegenerative disease.

Dr. Koscik, an Associate Professor of Neurology in the Department of Pediatrics, focuses on understanding mesoscale neuroanatomy, using ultra-high-resolution neuroimaging in postmortem human brains. While typical neuroimaging research explores resolution of 1 mm3, studying the laminar architecture of the cerebral cortex requires whole brain imaging approximately 300 to 1,000 times more detailed around 150 microns. Dr. Koscik's team is combining advances in scan acquisition, image processing, and deep learning technologies to explore mesoscale neuroanatomy in higher detail and with higher throughput than previously possible. The ultimate goal of this research is to provide novel insight into mesoscale neuroanatomical features, such as cortical laminar architecture, that simultaneously provide us with our fantastic abilities as humans, but where subtle perturbations may contribute to neurological, psychiatric, and neurodegenerative disease.

In line with this idea, emerging evidence suggests that maladaptive development of the cortical lamina may drive the pathology of Huntington's disease (HD). Early in HD, neurons fail to migrate into normal laminar patterns in the cortex, resulting in hyperexcitability in cortical circuits. Through a subsequent cascade of events this hyperexcitability may cause downstream neurodegeneration through excitotoxic pathways. A goal of Dr. Koscik's current research is to explore maladaptive laminar development in HD and explore how this mediates HD pathology. Ultimately, a better understanding of the cascading, neurodevelopmental, pathological

mechanisms in HD will provide the knowledge necessary to guide therapeutic agents to appropriate neuroanatomical targets and to deliver these therapeutics to developmental stages that are appropriate for rectifying the underlying pathology.

INVESTING IN INNOVATIVE IDEAS

Over 20 years, ACRI has built strong, highly competitive intramural grant programs funded exclusively with ABI funds. These programs have funded postgraduates, nursing and allied health professionals, early stage and independent researchers, and new and established research programs. Each program has firm goals that match the missions of both ACRI and ABI, all central to building the research endeavors of the awardees and ACRI.

The ACRI/ABI Postgraduate Research Awards were created by ACRI to support investigator-initiated, hypothesis-driven research directed by trainees conducting pediatric research at Arkansas Children's. Eligible candidates are in their second year of postgraduate training and must apply with a mentor who is a full-time UAMS faculty member.

Daniel Sadler, PhD, received one of these two-year intramural awards in 2022. Dr. Sadler is a postdoctoral fellow in Pediatric Developmental Nutrition at the Arkansas Children's Nutrition Center (ACNC). At the ACNC, he is harnessing rodent models to study the role of the mitochondrion in models of hypermetabolism and metabolic disease, gaining experience with a rat model of divergent cardiorespiratory fitness and with high-resolution respirometry to assess mitochondrial respiratory function. A large number of children have poor metabolic health of which cardiorespiratory fitness is a key determinant, and low cardiorespiratory fitness levels are highly prevalent in US children.

Though research suggests that physical activity in children and adolescents is effective in improving cardiorespiratory fitness and metabolic health, individual metabolic responses to physical activity interventions are seldom considered, which is important given that genetics determine between 50% to 60% of cardiorespiratory fitness. The goal of Dr. Sadler's project is to uncover how genetics and physical activity link skeletal muscle and liver metabolism to whole-body metabolic health in early life in a rodent model. His study is novel as there have been no studies to address whether increasing early life physical activity can improve intrinsic (genetic) aerobic fitness, metabolic health, and skeletal muscle and liver mitochondrial bioenergetics.

A vital component of the ACRI/ABI Postgraduate Research Awards is that a grant-supported postgraduate has a mentor. Craig Porter, PhD, Director of the Rodent Metabolic and Behavioral Phenotyping Core at the Arkansas Children's Nutrition Center, is Dr. Sadler's mentor for the project. Dr. Porter's contributions to the project will promote scientific and professional growth for Dr. Sadler as he begins his research career.

Jason Farrar, MD, Associate Professor, Pediatrics-Hematology/Oncology: Dr. Farrar has received intramural support through the ACRI/ABI Investigator-Initiated Research Grant Awards. This ACRI intramural program encourages exploratory/developmental research by providing support for the early and conceptual stages of project development. Funded applications must focus upon novel, original research that is directly relevant to the development and/or health

of infants, children, or adolescents. ABI support has been critical to Dr. Farrar's research understanding the molecular basis of childhood diseases that lead to abnormal bone marrow function, such as acute myeloid leukemia (AML) and inherited bone marrow failure syndromes.

Dr. Farrar's work in AML, the second most common childhood leukemia, seeks to identify better markers for prognostication and treatment selection, with a particular focus on epigenetic factors that influence treatment outcomes. While research has led to great progress in outcomes of acute lymphocytic leukemia, the most common childhood leukemia, outcomes in AML have remained stagnant, with ~40% of affected children succumbing to this disease and many more suffering life-altering late effects of treatment. ABI support has been critical to this project in providing the research infrastructure to assay DNA methylation levels across the genome, as well as bioinformatic support to analyze these complex, high-dimensional data for predictive modeling.

Regarding inherited bone marrow failure syndromes, Dr. Farrar is examining the reversible nature of hematologic remission in Diamond Blackfan Anemia (DBA), an inherited bone marrow failure syndrome characterized by severe anemia, congenital abnormalities, and predisposition to cancer. While many children require long-term medical treatment for DBA, some stop requiring medical treatment and maintain adequate red cell levels on their own for

an indefinite period. This unpredictable remission condition can reverse later in an unpredictable fashion, however.

Dr. Farrar was awarded an NIH R01 grant to identify epigenetic factors that may predict remission and to identify new directions for developing medical therapies to ameliorate anemia in DBA by identifying these innate red cell escape pathways. ABI support was critical to this project in supporting the advanced cell-sorting equipment needed to separate discrete but tiny populations of human red cell precursors during their development in ex vivo culture models of this disease. Dr. Farrar now has a grant application under consideration for funding from the Department of Defense to further his DBA research efforts. ABI presented Dr. Farrar with its 2021 ABI New Investigator of the Year award for his contributions to his field of study and the potential for extramural funding.

TRAINING THE NEXT GENERATION OF SCIENTISTS

In addition to recruitment and intramural research programs, ACRI invests ABI funds to support training of its researcher community. These training opportunities include established professional development programs such as the KL2 Scholars program of the NIH-funded Translational Research Institute at UAMS, formal academic training through UAMS' Master of Science-Clinical and Translational Science program, and early-stage investigator research programs through the Pilot Projects awards of ACRI's two NIH-funded COBRE awards, the Center for Childhood Obesity Prevention and the Center for Translational Pediatric Research. Support of these programs with ABI funds provides opportunities for ACRI researchers at various career stages, from new investigators to research independence to established research programs.

Craig Porter, PhD, Professor, Pediatrics: One of Dr. Porter's primary research goals in joining ACRI was to develop and sustain a burn research program at Arkansas Children's Hospital, home to the state's only dedicated burn center. Dr. Porter examines whole body metabolism by studying cellular bioenergetics to better understand the way the body behaves at the cellular level. As a metabolic physiologist, he has noted a high rate of energy expenditure in burn patients, which can often lead to unintended weight loss. Dr. Porter's studies focus on understanding the nature of increased energy expenditure in burn patients, ascertaining the role of the mitochondrion in this response. By better understanding the mechanism underlying increased energy expenditure in burn patients, Dr. Porter will leverage this new knowledge to increase energy expenditure as an anti-obesity strategy.

The Pilot Awards program of the Center for Childhood Obesity Prevention (CCOP) is supported by ACRI's ABI funds. CCOP has identified Dr. Porter's work as opportunity to support him to lead future research projects addressing the COBRE's theme. His pilot project provided Dr. Porter with substantial preliminary data for a successful five-year Maximizing Investigators' Research Award (MIRA) from NIH, which will sustain an impactful burn research program at ACRI. In addition to the MIRA award, Dr. Porter has been instrumental in obtaining two equipment supplement grants from NIH for the CCOP, to enhance the Center's Metabolism and Bioenergetics Core, a shared-use core laboratory providing specialized metabolic phenotyping services. Dr. Porter not only serves as Associate Director of this core, but also has been appointed leader in core development at ACRI. Among these core facilities is a Rodent Metabolic and Behavioral Phenotyping Core at the Arkansas Children's Nutrition Center.

Since ABI's beginning, ACRI has thoughtfully and productively guided its ABI support contributing to the growth of research in Arkansas to uphold the missions of ABI and Arkansas Children's and more importantly improve the health of our state's children and their families and communities.

UNIVERSITY OF ARKANSAS

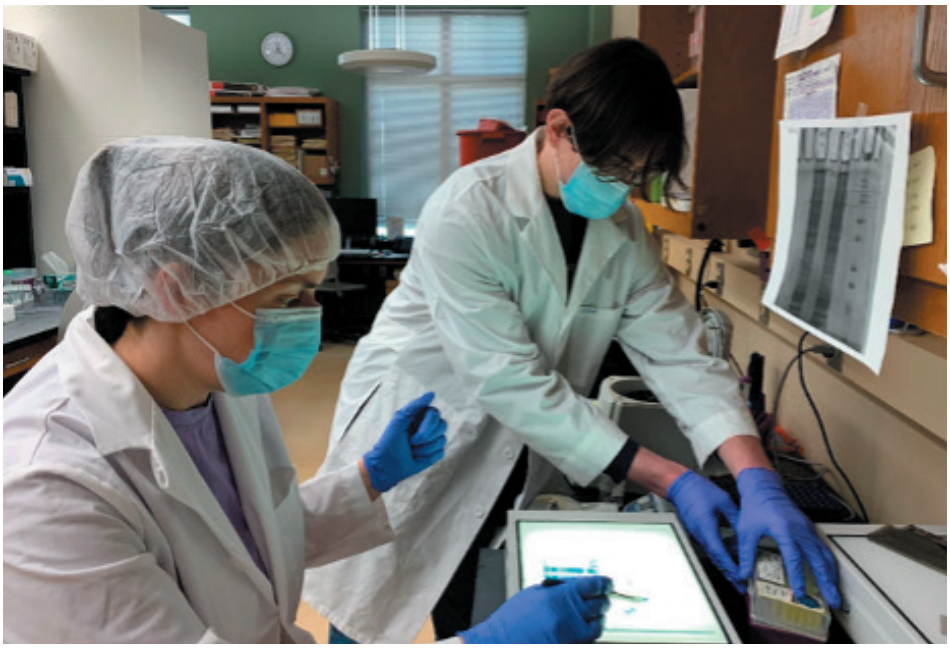
John English, PhD
Vice Chancellor for Research and Innovation
Professor, Department of Industrial Engineering
UA Fayetteville ABI Institutional Director

ABI resources at the University of Arkansas, Fayetteville, have long been used to support the next generation of scientists. This year we are highlighting a number of our students and postdoctoral fellows across a variety of programs.

INSTITUTIONAL UPDATES

Stephanie Kane
PhD Candidate, Psychological Science

Stephanie's research interest lies in investigating the neural correlates of mind-wandering and creativity, and how these constructs vary by psychopathology. In particular, her aim is to understand the relationship between these cognitive processes, while utilizing mindfulness meditation as a well-being mechanism to point to intervention targets in individuals with mental health disorders. To investigate these interests, she uses behavioral and electrophysiological (EEG) approaches.



Bridget Sicarios Meza and Elliott Ruegsegger in the laboratory conducting biomarker research for triple negative breast cancer

Bridget Sicairos Meza
PhD Candidate, Cell and Molecular Biology

Elliott Ruegsegger
Honors Undergraduate Student, Biology and Psychology:
Biomarkers for Triple Negative Breast Cancer

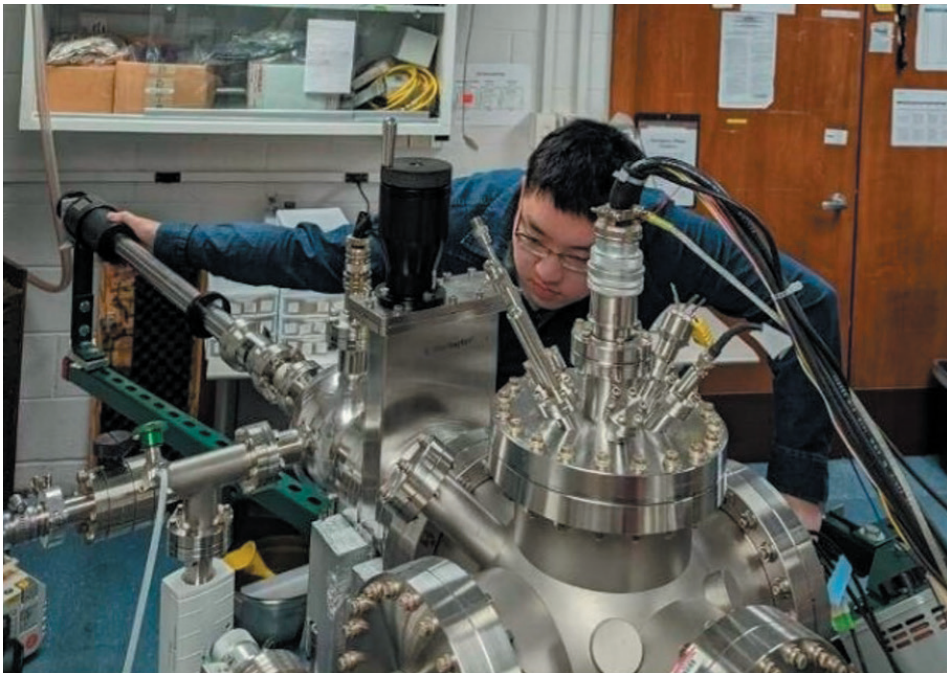
Biomarkers play a crucial role in the management and treatment of triple-negative breast cancer (TNBC). TNBC is a subtype of breast cancer characterized by the absence of estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2). Biomarkers, such as BRCA1 gene mutations and high levels of certain proteins like Ki-67, p53, and EGFR, help in identifying patients with TNBC and predicting their prognosis. Identification of new biomarkers, often unique to individual patients, biomarkers aid in determining the appropriate treatment strategies for TNBC, such as chemotherapy regimens, targeted therapies, and immunotherapies, optimizing patient outcomes and equally as important, minimizing unnecessary treatments. Many will also allow earlier detection, allowing a more rapid onset of treatment, leading to improved patient care and outcomes.

Megan Magness

PhD Candidate, Analytical Chemistry:
Microfabrication of Chip-Based Magnetohydrodynamic Microfluidic Device for Separations of Biochemical Mixtures

In microfluidic devices, such as many of the new biological assay carried out on chips, it is necessary to move samples and reagents from one part of the device to another, stir/mix them and then detect the presence of chemical and biological targets. Given the small size of these devices, always at the micro and nano-scale level, it poses a significant challenge. Magnetohydrodynamics (MHD) offers an elegant means to control fluid flow in these devices without a need for mechanical components, enabling multiple functions for chemical analysis on a chip.

Megan Magness, PhD with one of her microfluidic devices

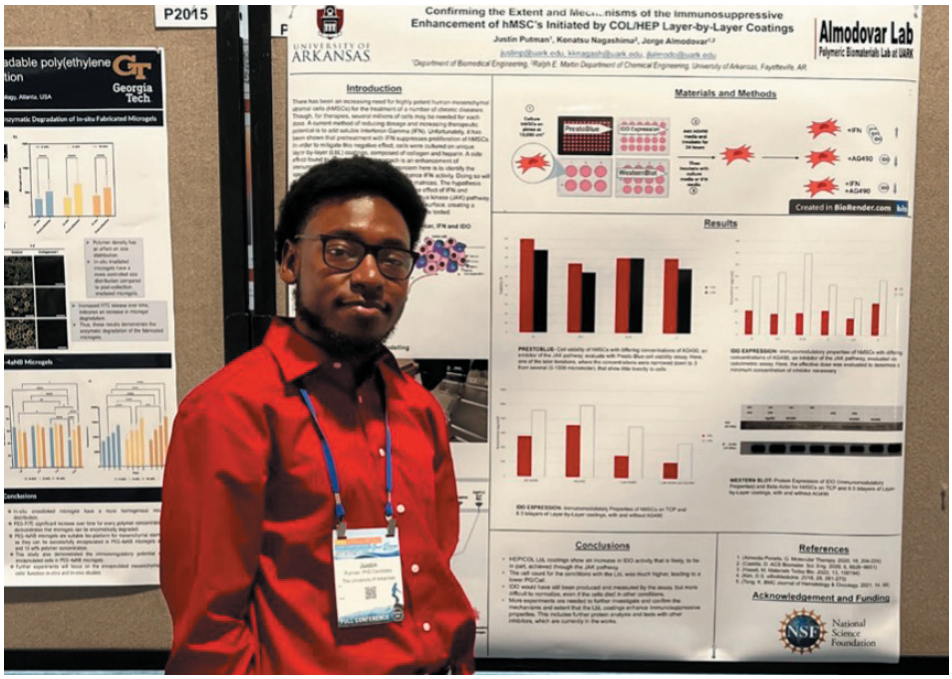


Haopeng Li, a Cell and Molecular Biology PhD student, is examining an ion beam sculpting system for silicon nitride nanopore fabrication.

Haopeng Li

PhD Candidate, Cell and Molecular Biology:
Silicon Nitride Nanopore Fabrication

Silicon nitride nanopore fabrication offers a wide range of utilities in various fields, including biomedical research, electronics, and nanotechnology. In biomedical research, silicon nitride nanopore fabrication enables the development of high-resolution DNA sequencing platforms, allowing for rapid and cost-effective analysis of genetic information, environmental monitoring, and disease diagnostics. They also have application in drug delivery systems, where they can be utilized to precisely control the release of therapeutic compounds, improving the efficiency and effectiveness of drug treatments, and highly specific personalized medicine.



Justin Putnam

PhD Student, Biomedical Engineering:
Confirming the Extent and Mechanisms of the Immunosuppressive Enhancement of hMSCs Initiated by COL/HEP Layer by Layer Coatings

Human mesenchymal stem cells (hMSCs) have gained significant attention in regenerative medicine and immunotherapy due to their unique ability to modulate the immune response. They possess immunomodulatory properties, meaning they can regulate the activity of immune cells and dampen inflammatory responses. This characteristic makes hMSCs promising candidates for treating various immune-mediated disorders and diseases, such as graft-versus-host disease (GVHD), autoimmune disorders, and organ transplantation.

Postdoctoral researcher, Dr Tamika Lunn, holding a bat recently removed from a net used in their trapping procedures. Each bat we catch is sampled and screened for viral pathogens.

Tamika Lunn

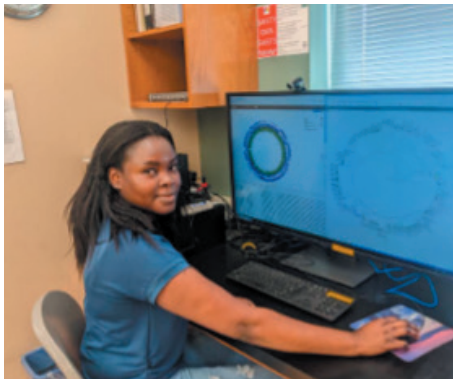
PhD, Postdoctoral Fellow, Wildlife Disease Ecology: Emerging Viruses from Bats in East Africa

ABI funding has enabled us to continue and expand our research into the emergence of viruses from bats in Kenya. More specifically, it has enabled us to detect new viruses that may pose health risks to humans, such bat-ebolavirus, and set up detection systems in international developing settings so that human disease outbreaks can be detected and contained before they spread and potentially become global outbreaks.

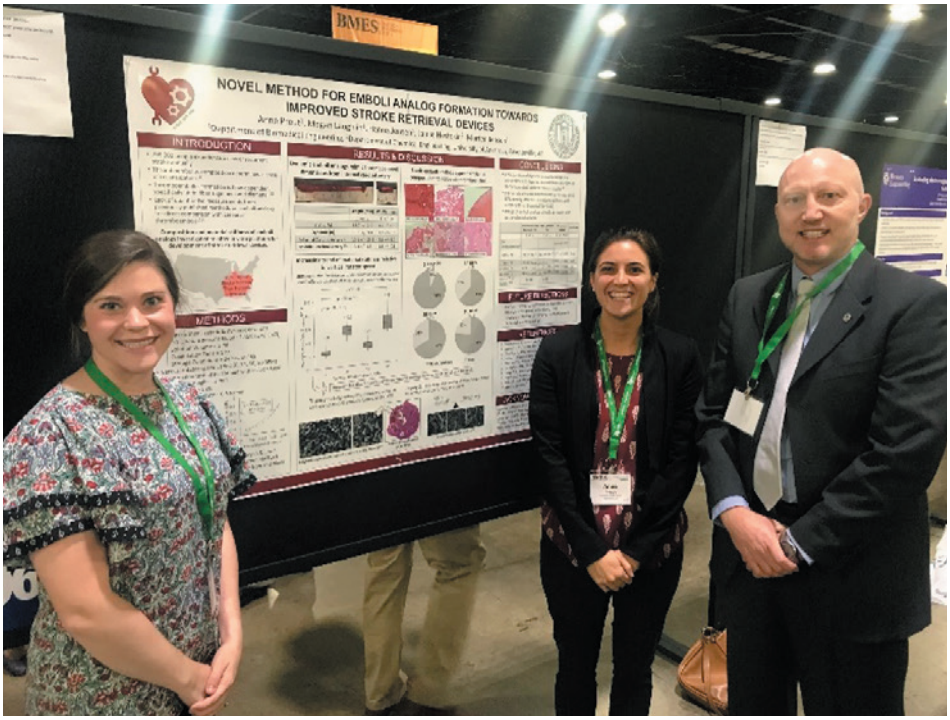
Aishat Lawal

MS Student, Cellular and Molecular Biology
Genomic Characterization of Enterococcus Species from Infecting Broiler Embryos

Bacterial infection of broiler chicken embryos is a challenge to the poultry industry, where it could result in the death of the embryos, which in turn reduces the yield of broiler chickens and negatively impacts the economy. Lawal's project is geared towards using molecular and bioinformatics approaches to understand the genetics of the Enterococcus bacteria and how they are adapting to poultry. This work is central to understanding of problems in hatchability and embryo mortality.



Aishat Lawal analyzing the Enterococcus bacterial genome



Megan Laughlin (left) and Anne Preutt, presenting a poster at the Biomedical Engineering Society, with Dr. Morten Jensen

Megan Laughlin

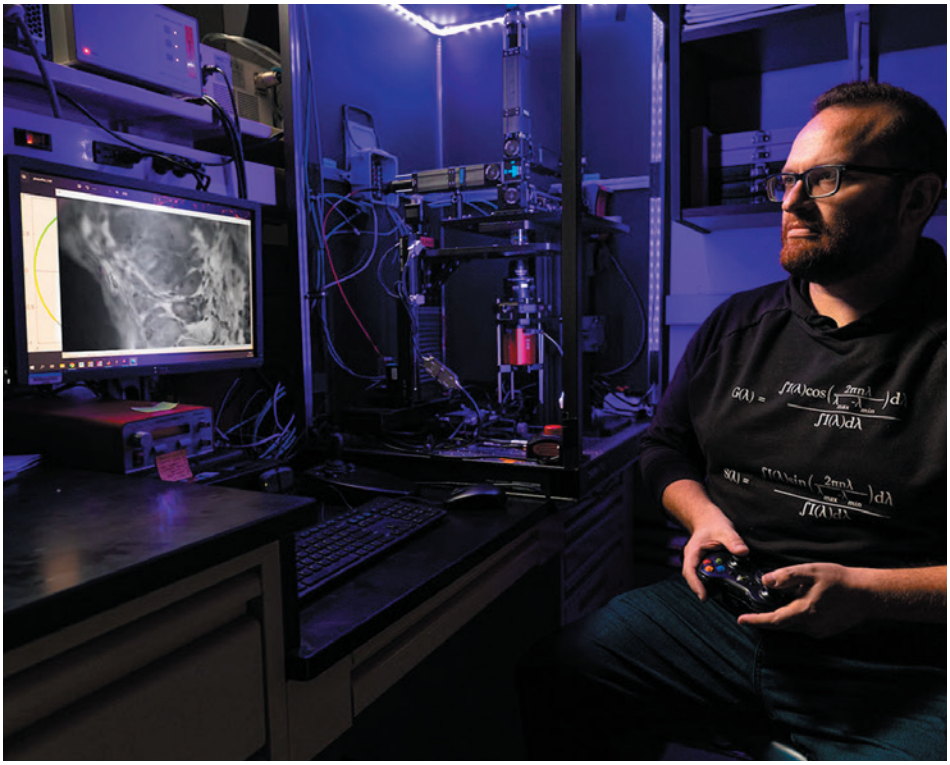
PhD Candidate, Cardiovascular Biomechanics Laboratory

Anne Pruett

PhD Candidate, Cardiovascular Biomechanics Laboratory

Novel Method for Emboli Analog Formation Towards Improved Stroke Retrieval Devices

This project focuses on developing synthetic emboli models to improve the performance and effectiveness of stroke retrieval devices (SRDs). SRDs, also referred to as mechanical thrombectomy devices, are medical instruments used to remove blood clots from blocked blood vessels during a stroke. By using these analogs, researchers can simulate real-life scenarios and optimize the design and functionality of the devices for better stroke treatment outcomes.



Doctoral student Michael Blair acquires fluorescence images from skin tissue using a custom-built hyperspectral microscope

Michael Blair

PhD Candidate, Biomedical Engineering (Advisor: Dr. Kyle Quinn): Wound Healing in Skin

Skin wounds, particularly for those who are elderly or diabetic, can quickly turn into a very challenging and expensive problem. Tens of billions of dollars are spent on wound care each year, but the medical profession lacks the necessary tools to diagnose and treat non-healing wounds. Michael utilizes multiphoton microscopy, a powerful imaging system capable of viewing biological tissue in three dimensions at the cellular level. The system allows him to generate 3D maps of wound metabolism based on the natural fluorescence of mitochondria.

"I am studying different ways of using light to study biological material with endogenous sources of contrast. My work includes increasing the efficiency with which we collect light, and decreasing the cost of current biomedical imaging modalities."

UAMS
University of Arkansas for Medical Sciences

Shuk-Mei Ho, PhD
Vice Chancellor of Research and Innovation
Professor, UAMS Department of Pharmacology and Toxicology
UAMS ABI Institutional Director

INSTITUTIONAL UPDATES

For many years, UAMS has used funds from the Arkansas Biosciences Institute (ABI) to advance biomedical, translational, and clinical research to mitigate diseases and suffering associated with tobacco smoking in Arkansas. Here we highlight some of our recent successes in translating research discoveries into new clinical practices and effective public health interventions. We employ the following strategies and guiding principles in our use of ABI funds: a) attracting and retaining the best and brightest talent in Arkansas, b) building world-class research infrastructure, c) developing the next-generation workforce, and d) unleashing the economic value of UAMS research discoveries. We are also mindful of public-private partnerships in the commercialization of our intellectual properties. We firmly believe that healthier citizens and better healthcare drive the state's economy. These strategic efforts continue to pay huge dividends in elevating UAMS to the next level of eminence as a top-tier academic health center. They have produced treatments and prevention methods that safeguard a healthier Arkansas and fostered a vibrant healthcare-driven economic sector.

SUPPORT FOR CENTERS OF EXCELLENCE AND RESEARCH INSTITUTES.

Winthrop P Rockefeller Cancer Institute (WPRCI): Each year, 50% of the ABI funds are invested in the WPRCI, Arkansas' only academic cancer treatment and research facility participating in the nation's experimental clinical trials. The institute's staff, including doctors, nurses, researchers, and other healthcare professionals, is dedicated to creating new knowledge to improve cancer care for the people of Arkansas and beyond. Over the past three years, under the leadership of Dr. Birrer, the center has recruited more than 20 research faculty and over 15 clinical researchers using ABI funds as partial support for startup funds and major equipment purchases. Together with our existing talent, the newly recruited faculty has garnered over $15 million in federal funding annually and has enrolled over 400 patients in experimental cancer trials each year. In addition to the ABI funds, the center also receives revenue from the state's medical marijuana taxes. Through these concerted, state and UAMS efforts, the center is preparing to earn a highly prestigious designation from the National Institutes of Health as a National Cancer Institute-designated comprehensive cancer center. Achieving this goal will bring new treatments and experimental cancer trials to the state, ultimately saving lives and reducing the suffering of our citizens.

Dr. Marjan Boerma

Center for Studies of Host Response to Cancer Therapy (NIH-COBRE P20 center): Led by **Dr. Marjan Boerma,** this center has received $100,000 annually from us to support its research. Leveraging the ABI funds in addition to the >$20M received from the NIH-National Institute for General Medicine, the center has been investigating the biological mechanisms underlying patients' responses to treatment and interventions, particularly those associated with oncological radiation. Researchers in the center have published new discoveries on the applications of radiation therapies and have gained insight into the side effects of these therapies on various host tissues. The center has mentored four junior faculty members to establish independent research programs, and with collaborators both inside and outside of UAMS, they have successfully obtained external funding from the National Cancer Institute and the Department of Defense. In the past five years, the center investigators have obtained more than $30 million in extramural funding and have published over 250 peer-reviewed articles on cancer research.

Dr. Charles O'Brien

Center for Musculoskeletal Disease Research (CMDR) (NIH-COBRE P20 center): ABI has been providing annual funding of $100,000 support **Dr. Charles O'Brien,** the Director of the CMDR, since 2005. The center's focus is on identifying the causes of musculoskeletal diseases and developing effective treatments for them. By mentoring junior faculty and trainees, the center examines various causes of bone loss and degeneration, such as estrogen deficiency, aging, and glucocorticoid excess, which significantly contribute to osteoporosis. With approximately 10 million Americans suffering from osteoporosis and another 44 million with low bone density, the direct annual cost of treating osteoporotic fractures is estimated to be between 5,000 and 6,500 billion USD in the US, Canada, and Europe. Therefore, the center's research has immense impacts on Arkansas and our nation. Researchers at the center utilize cell, animal, and epidemiological models to study the underlying causes and treatments of diseases affecting our skeletal and related muscular disorders. As the state and the nation's populations grow older, the center's research will become increasingly valuable. The center has secured over $22M in funding from NIH-NIGMS in support of this COBRE P20 Center. In its first 5 years, it has supported the research of four UAMS faculty who are early in their careers to become independent in their research career. The center members have secured an additional >$13M of extramural funding from NIH and DoD, and foundations for its research. They published 51 peer-reviewed publications in the past 5 years. The center's research findings, including the benefits of smoking cessation, the connection between atherosclerosis and osteoporosis, and a therapy that can target both diseases, cancer metastasis in bone, and other new discoveries, greatly benefit bone health.

Center for Microbial Pathogenesis and Host Inflammatory Responses (CMPHIR) (NIH-COBRE P20): Under the leadership of **Dr. Mark Smeltzer,** the CMPHIR receives annual funding of $100,000 from ABI. Last year, the center has successfully entered its Phase III stage and secured over $30 million in funding from NIH-NIGMS over 15 years for UAMS. The center's research focuses on studying infectious diseases, with the belief that fighting infectious disease requires a thorough understanding of microbial

Dr. Mark Smeltzer

virulence factors, how they contribute to the disease process, and their impact on the host's immunological/inflammatory response in defining clinical outcomes. The historical COVID-19 pandemic has highlighted the center's true value, with its researchers and established resources playing a critical role in the rapid response to the early stages of the pandemic. As the center moves forward, its members will continue to study mechanisms under long COVID and be prepared for other pandemics, collaborating closely with the Arkansas Health Department and other state and federal agencies on infectious disease studies. In addition to studies on coronavirus, center members are also researching persistent and opportunistic infections from other pathogens. The ABI funds have been instrumental in helping the center fulfill its central mission of building up infectious disease expertise in Arkansas and improving preparedness for future pandemics. The center has supported 23 infectious disease experts, most of whom were recruited from outside Arkansas, and its supported researchers have obtained extramural funding in the amount of $34 million.

SUPPORTING RESEARCHERS WITH ADVANCED TOOLS, ENHANCED FACILITIES, AND POWERFUL TECHNOLOGIES

Biosafety Lab Level 3 (BSL3): We are dedicated to expanding our research facilities for infectious disease research and have allocated a significant amount of ABI funds towards this goal. According to a recent study, the economic burden of infectious diseases is estimated to be $120 million, accounting for 15% of all U.S. healthcare expenditures. Unfortunately, Arkansas is ranked last in the nation for its ability to handle outbreaks of severe infectious diseases by the Trust for America's Health and the Robert Wood Johnson Foundation. To address this issue, we have committed $950,000 of ABI funds in the next five years to purchase equipment for a new BSL3 facility. This facility will be in UAMS' Central Vivarium on the ground floor of the Biomedical Building-I. **Dr. Dan Voth, PhD.,** Chair of Microbiology & Immunology, recently received a $7.9 million grant from the NIH to expand UAMS' BSL3 facility for infectious disease research by renovating the existing Central Vivarium. The UAMS system will provide $1.2 million as matching funds to support this renovation, which will add 9,900 square feet to the current facility and double the animal cage holding and breeding capacity to meet the increased research demands from our faculty. The expansion will significantly enhance our pandemic preparedness and

Dr. Dan Voth, PhD

support studies on a broad range of infectious diseases, including tuberculosis, Hepatitis C, STDs, HIV, plague, COVID-19, multi-drug resistant pathogens, Q fever, and other infectious diseases in our region, across the nation, and around the world. This new facility is a testament to UAMS's strong and strategic approach to combat infectious diseases and improve health in the state.

Alan Tackett, Ph.D.

Proteomics: The large-scale study of proteins, has the potential to lead to the development of new therapies and screening methods for a range of diseases, including cancer. **Alan Tackett, Ph.D.,** a professor in the Department of Biochemistry and Molecular Biology and deputy director of the UAMS WPRCI, has played a crucial role in advancing proteomic research with the help of over $500,000 in ABI funding over the past five years. His success in securing a $10.6 million grant from the National Institutes of Health in 2020 has allowed UAMS to significantly expand its proteomics resource, and he has brought together a team of lead proteomic faculty members, including Rick Edmondson, Ph.D.; Samuel Mackintosh, Ph.D.; and Stephanie Byrum, Ph.D. We are committed to supporting Dr. Tackett in upgrading equipment at the center to serve hundreds of investigators, particularly those in IDeA states who have limited access to such advanced instruments. It is worth noting that in 2021, Dr. Tackett was inducted into the Arkansas Research Alliance Academy as a fellow.

Illumina MiSeq Sequencer: ABI funds were utilized to facilitate an early transition of Dr. Mark Smeltzer's COBRE CMPHIR from Phase II to Phase III. This transition enables continued support for Phase I and Phase II investigators, as well as others within and outside UAMS, to conduct new pilot projects. Additionally, the Center's Genomic facility underwent an upgrade with the acquisition of the Illumina MiSeq sequencer, equipped with high function targeted and microbial genome applications, high-quality sequencing, simple data analysis, and cloud storage. Through successful deployment of ABI funds, the value of federal funding has been maximized.

Donald Johann, MD, PhD

NovaSeq 6000 Sequencer: Under the direction of **Donald Johann, MD, PhD**, the UAMS Genomic Core was able to use ABI funds to acquire the NovaSeq 6000 Sequencer for the Core. The NovaSeq produces record output per flow cell, combined with reduced on-instrument sequencing durations, dramatically improving throughput and speed compared to previous generations of sequencers.

Emulate Organ-Chips Platform: Igor Koturbash, MD, PhD, in collaboration with Ping-Ching Hsu, PhD, were awarded over ABI funds to establish the Emulate Organ-Chips Platform. This human-relevant model will be used to study the effects of drugs, dietary supplements, cannabis radiation, and environmental stressors on human organs, unraveling mechanisms underlying the complex biology and physiology of health and disease.

Igor Koturbash, MD, PhD

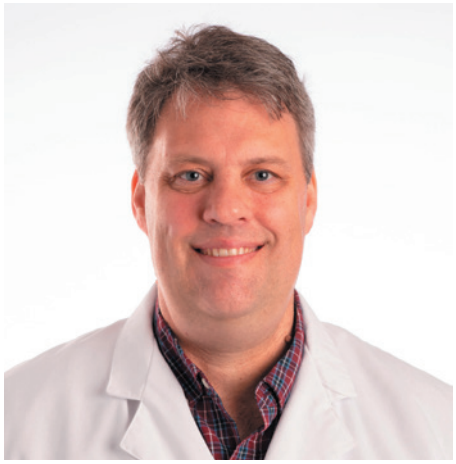
Dr. Christy Simecka, DVM

Upgrades in Division of Animal Laboratory Medicine (DLAM): Dr. Christy Simecka, DVM, director the UAMS DLAM was awarded ABI funds to upgrade the cage holding capacity and washer updates, greatly expanding the capacity and capabilities of using animal models to study human disease at UAMS.

Tissue Bank at WPRCI: Dr. Steve Post, Associate Director of Facilities of the Rockefeller Cancer Institute, utilized ABI resources to expand the WPRCI Tissue Bank, including upgrades to the automatic cataloging system and high-end multiplex fluorescent microscopy capacity.

Dr. Steve Post

Dr. Kevin Raney, PhD



Eric J. Enemark, PhD

Rock Imager: **Dr. Kevin Raney, PhD,** and **Eric J. Enemark, PhD** led the acquisition of the Rock Imager, an automated imaging system for protein crystallization. This protein crystallization imager provides an efficient pipeline enabling high-throughput analysis of protein structure in solution with small-angle X-ray scattering (SAXS), greatly expanding the capacity to visualize protein structures in solution and deduce their biological functions.

RECRUITMENT OF HIGH IMPACT SCIENTISTS TO ARKANSAS:

John Imig, PhD

John Imig, PhD: Chair of the Department of Pharmaceutical Sciences at the College of Pharmacy. Dr. Imig's research focuses on treating hypertension, stroke, heart attacks, diabetes, and kidney diseases, and he has secured over $35 million in grants and co-founded three therapeutics companies. He has five US patents and has authored over 180 articles. His recruitment demonstrates the effectiveness of ABI funds in attracting talent and has generated excitement in Arkansas, including an invitation to join the ARA Academy.

Amit Tiwari, PhD

Amit Tiwari, PhD: Professor and Associate Dean for Research and Graduate Studies in the UAMS College of Pharmacy. Dr. Tiwari is a renowned pharmacologist with extensive experience in drug design and focuses on cancer therapy, particularly in mitigating drug resistance for breast and colon cancer. He has secured active funding from prominent organizations, such as the National Cancer Institute and the National Science Foundation and has authored or co-authored 13 book chapters and over 120 articles. His recruitment affirms the effectiveness of ABI funds in attracting top talent and is expected to have a significant impact on the College of Pharmacy's research and graduate studies programs.

Tracie Harrison, PhD

Tracie Harrison, PhD: Professor and Alice An-Loh Sun Chair in Geriatric Nursing in the UAMS College of Nursing. Dr. Harrison is a renowned professor with a focus on aging with disabilities among diverse populations. The endowed chair was previously held by Pao-Feng Tsai, and it was endowed just before An-Loh Sun's death in 2002. Dr. Harrison holds a Ph.D. in Nursing and has served as the founding director of the Center for Excellence in Aging Services and Long-Term Care at The University of Texas at Austin School of Nursing. Her current research includes a mixed-methods study of aging with disabilities among seniors in central Mexico, funded through a bi-national partnership. Dr. Harrison will mentor junior faculty and doctoral students while helping to develop a cadre of nurse scientists focused on gerontology and disabilities.

Mohamed O. Elasri, PhD: Associate Vice Chancellor for Research and Innovation. Dr. Elasri's innovative research program focuses on infectious diseases, including antibiotic resistance, biofilm development, advanced material imaging, and new regulatory RNAs. Dr. Elasri also leads several interdisciplinary research

Mohamed O. Elasri, PhD

projects to address health disparities for underserved communities. He received the Multidisciplinary Research Innovation and T.W. Bennett Distinguished Professor of Microbiology awards from the University of Southern Mississippi and the Outstanding Contribution to Health Disparity and Diversity Research Award from the Mississippi Academy of Sciences. Dr. Elasri's leadership and administrative experiences will enhance support for innovative, interdisciplinary research programs across campus.

RECRUITMENT OF THE NEXT GENERATION OF YOUNG FACULTY MEMBERS

Mitigating disease and suffering from tobacco smoking/use is a priority of ABI funding usage. ABI funds have contributed to the recruitment of several new Assistant Professors.

Kari Weber, PhD

Kari Weber, PhD: Assistant Professor, Department of Epidemiology in the College of Public Health researches birth and pregnancy outcomes including structural birth defects, preterm birth, and maternal comorbidities. Her focus is on the impact of environmental exposures such as greenspace, air pollution, pesticides, and neighborhood socioeconomic factors. She also investigates issues related to environmental justice and socioeconomic disparities.

Nandini Mukherjee, PhD

Nandini Mukherjee, PhD: Assistant Professor, Department of Epidemiology in the College of Public Health studies DNA methylation and its relationship with allergic diseases. She is particularly interested in gene-environment interactions and in utero exposures that may affect DNA methylation and contribute to allergic outcomes later in life.

Kelsey Owsley, PhD

Kelsey Owsley, PhD: Assistant Professor, Department of Health Policy and Management in the College of Public Health will work closely with the master's in health administration students, develop collaborations with WPRCI faculty on projects relating to cancer and access to care, specifically for people in rural populations.

Ashley Clawson, PhD

Ashley Clawson, PhD: Assistant Professor, Department of Health Behavior and Health Education in the College of Public Health is with the college's Center for the Study of Tobacco, uses a social ecological approach to identifying tobacco-related inequities. Her research focuses on ways to reduce active and passive tobacco and cannabis exposure among families in Arkansas, particularly among rural families, lower resourced families, families of color and families of children with medical conditions.

Spyridoula Maraka, MD

Spyridoula Maraka, MD: Assistant Professor, Division of Endocrinology and Metabolism, Department of Internal Medicine in the UAMS College of Medicine. She obtained her medical degree

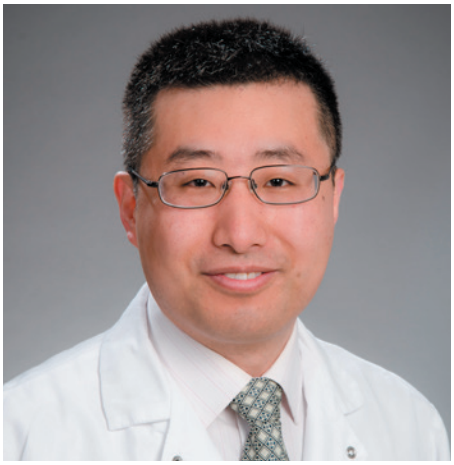
with high honors from the University of Athens School of Medicine and completed residency in Internal Medicine at the University of Connecticut. She completed a clinical fellowship in endocrinology, metabolism, and nutrition at Mayo Clinic and a research fellowship at Mayo Clinic.

Neha Dole, PhD

Neha Dole, PhD: Assistant Professor, Department of Physiology and Cell Biology in the UAMS College of Medicine. Her research interests include bone and mineral metabolism, with a focus on the molecular mechanisms regulating skeletal development and bone remodeling. Dr. Dole is funded by the National Institute of Diabetes, Digestive, and kidney diseases and is a member of several scientific societies.

Kyoung Hyun Kim, PhD

Kyoung Hyun Kim, PhD: Assistant Professor, Department of Pharmacology and Toxicology, UAMS College of Medicine, and a member of the Winthrop P. Rockefeller Cancer Institute. His lab focuses on the novel role of nuclear receptor NR2E3 in liver diseases and cancer, with the goal of developing precision medicine based on gene-oriented epigenetic therapy. He also studies the role of long noncoding RNAs and aryl hydrocarbon receptor in pancreatitis and pancreatic cancer.



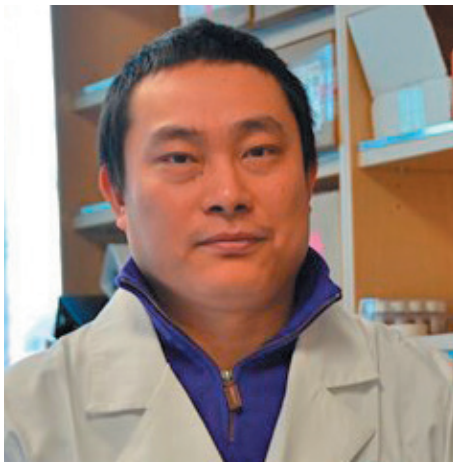
Huiliang Zhang, PhD

Huiliang Zhang, PhD: Assistant Professor, Department of Pharmacology and Toxicology, UAMS College of Medicine. His research focuses on the pathogenic role of mitochondrial proton leak in cardiac dysfunction in the aging heart and explores strategies to restore mitochondrial function and reverse cardiac dysfunction using stem cell therapies. Dr. Zhang is an American Heart Association Career Development Award recipient, study section member, and has published over 30 original papers.

Lu Huang, PhD: Assistant Professor,

Lu Huang, PhD

Department of Microbiology & Immunology, UAMS College of Medicine focuses on understanding the protective immunity against tuberculosis (TB) caused by Mycobacterium tuberculosis (Mtb) infection. His research emphasizes the role of lung macrophages, the most abundant host cells at the site of Mtb infection, in disease control and progression.



Zhiqiang Qin, MD, PhD

Zhiqiang Qin, MD, PhD: Assistant Professor, Department of Pathology, UAMS College of Medicine, and a Member of the Winthrop P. Rockefeller Cancer Institute. Dr. Qin's research focuses on cancer oncology and microbiology. He has an active NIH/NCI research award for a project entitled "Periodontal bacteria enhance oral KSHV pathogenesis and Kaposi's Sarcoma development in HIV+ patients" His laboratory also does anticancer research on common tumors, such as lung cancer and brain tumors.

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
AR Children's Research Institute									
1. Utilizing Telemedicine to Improve Monitoring and Follow-up for Children on Chronic Invasive Home Ventilator – Pilot Study to Look for Feasibility, and Impact on Health Care Resource Utilization	A. Agarwal	$0	0.08	$17,500	0.09	PCORI	5	UAMS	University of Massachusetts
2. Effect of Amino Acids on Regional Lipid Metabolism	A. Andres & E. Borsheim	$0	0.06	$6,714	0.02	NIH	4, 5	UAMS	University of Kansas
				$90,947	0.30	NIH	4, 5	UAMS	University of Kentucky
				$56,159	0.90	NIH	4, 5	UAMS	Johns Hopkins University
3. Metformin Effect on Asthma Control in Overweight/ Obese Children with Asthma	E. Ararat	$0	0.33	$0	0.00		5	UAMS	
4. Adolescent Alcohol Use Following Prenatal Opioid Exposure and Early Life Abuse	M. Berquist	$0	0.20	$0	0.00		5	UAMS	
5. Quantitative Serum Proteomic Analysis in Children with Single Ventricle Heart Disease and Pulmonary Arteriovenous Malformations: Towards Elucidating Hepatic Factor	E. Bolin	$0	0.03	$0	0.00		5	UAMS	
		$12,391	0.35	$0	0.00				
6. Investigating the use of DNA-PK(cs) Inhibitors as Immunosuppression Therapy for Organ Transplants	M. Burdine	$0	0.00	$127,014	0.50	NIH	5	UAMS	
7. Development of Systems Biology Approaches for Developmental Diseases	S. Byrum	$75,000	0.08	$33,131	0.12	NIH	5	UAMS	
				$819,718	2.60	NIH	5	UAMS	
8. Epigenomic Profiling of Hypospadias for Boys in Arkansas	S. Canon	$0	0.00	$139,800		Allergan	5	UAMS	
9. Pediatric Pulmonary Research	J. Carroll	$0	0.00	$3,751	0.01	NIH	5	UAMS	
				$53,534	0.17	Consumer Product Safety Commission	5	UAMS	Boise State University
				$31,855	0.09	Consumer Product Safety Commission	5	UAMS	Boise State University
				$30,082	0.19	Consumer Product Safety Commission	5	UAMS	Boise State University
10. Effect of lactate on myoglobin oxygenation and deoxygenation - A novel study in understanding energy deficit in failing heart conditions	S. Chintapalli	$74,413	0.08	$0	0.00		5	UAMS	
11. Pediatric Cancer Research	S. Choudhury	$63,595	1.46	$0	0.00		5	UAMS	
12. Do platelets play a role in obesity and the modulation of perivascular adipose tissue function?	A. Corken	$26,620	0.01	$0	0.00		5	UAMS	
13. Vascular Anomaly Collaborative Research Program	S. Crary	$0	0.00	$7,576		Luitpold Pharmaceuticals, Inc.	5	UAMS	

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
AR Children's Research Institute *Continued*									
				$45,771		Shire Development Inc.	5	UAMS	
				$47,248		Novartis Pharmaceuticals Corporation	5	UAMS	
				$15,509		AMAG Pharmaceuticals, Inc	5	UAMS	
				$30,440		Venthera Incorporated	5	UAMS	
				$4,250		American Thrombosis and Hemostasis Network	5	UAMS	
				$7,690		American Regent	5	UAMS	
				$2,500		NIH	5	UAMS	University of Texas
				$628		Takeda Global Research and Development	5	UAMS	
				$20,647		HRSA	5	UAMS	
				$11,668		HRSA	5	UAMS	University of Pittsburgh
				$26,085		uniQure biopharma B.V.	5	UAMS	
				$1,611		Children's Hospital of Los Angeles	5	UAMS	Children's Hospital of Los Angeles
				$10,093		Agios Pharmaceuticals, Inc	5	UAMS	
14. A compact written asthma action plan in conjunction with dedicated gear to house essential asthma inhaled medications increases overall adherence to an asthma self-management plan	K. Cobb	$5,000	0.00	$0	0.00		5		
15. Population Health Research	P. Darden	$92,870	1.00	$420,750	1.21	NIH	5	UAMS	
				$7,792	0.01	American Cancer Society	5	UAMS	Oregon Health Sciences University
16. Anti-oxidant and anti-inflammatory effects of blueberry phenolic and volatile compounds on stimulated macrophages	E. Diaz	$0	0.34	$0	0.00		5	UAMS	
17. Plasma Biomarkers in Anthracycline Cardiotoxicity	D. Douglass	$0	0.00	$2,432		Gradalis, Inc.	5	UAMS	
18. Pediatric Sedation for Ophthalmology Procedures: Evaluation of the Risk of Deep Sedation for Ophthalmology procedures in an Outpatient Setting	M. Evans	$0	0.42	$0	0.00		5		
19. Integrative Genomics in Pediatric AML	J. Farrar	$0	0.00	$20,441		Novartis Pharmaceuticals Corporation	5	UAMS	
				$293,250	0.97	NIH	5	UAMS	
20. Health Science Innovation Entrepreneurship (HSIE) Training Program	K. Fawcett	$100,265	0.55		0.00		5	UAMS	

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
AR Children's Research Institute *Continued*									
21. Pediatric Nutrition and Obesity Research	M. Ferruzzi	$100,000	0.00	$9,695,334	66.52	USDA	4, 5	UAMS	
				$41,329	0.12	UAMS	4, 5	UAMS	
				$10,236	0.00	USAID	4, 5	UAMS	Purdue University
				$64,736	1.00	NIH	4, 5	UAMS	
				$223,592	1.14	Else Nutrition	4, 5	UAMS	
				$43,808	0.02	NIH	4, 5	UAMS	Mount Sinai
				$21,713	0.04	Pepsico	4, 5	UAMS	
				$24,743	0.19	Pepsico	4, 5	UAMS	
22. Prevention of Adolescent Obesity-Associated Liver Steatosis via Metformin-Induced Alteration in the Gut Microbiota	R. Hakkak	$0	0.28	$166,666	1.28	USDA	4, 5	UAMS	
23. Epilepsy Care Experiences in the Complex Epilepsy Clinic	M. Hoyt	$0	0.10	$0	0.00		5		
24. Biomarkers of Acetaminophen Toxicity	L. James	$0	0.00	$2,497		Cumberland Pharmaceuticals Inc.	5	UAMS	
				$2,713		GlaxoSmith-Kline	5	UAMS	
				$84,827		NIH	5	UAMS	Duke
25. Pediatric Asthma Research	A. Jefferson	$125,189	0.00	$0	0.00		5		
26. Virtual Reality for Implantable Port Access in Adolescents with Cancer	D. Jeffs	$0	0.01	$0	0.00		5		
27. Implementation and Quantification of the General Movement Assessment for Early Detection of Neurodevelopmental Disabilities in Infants	T. Johnson	$0	0.03	$0	0.00		5	UAMS	
28. Food Allergy Research	S. Jones	$0	0.00	$3,181		DBV Technologies	5	UAMS	
				$27,539		DBV Technologies	5	UAMS	
				$69,597		Regeneron Pharmaceuticals, Inc.	5	UAMS	
				$52,022		Astellas Pharma Global Development, Inc	5	UAMS	
				$235,000	1.80	NIH	5	UAMS	
				$50,072		DBV Technologies	5	UAMS	
				$2,836		DBV Technologies	5	UAMS	
				$528,422	2.95	NIH	5	UAMS	Johns Hopkins University
				$293,114	1.85	NIH	5	UAMS	Johns Hopkins University
				$312,623		Genentech, Inc.	5	UAMS	
				$21,513		DBV Technologies	5	UAMS	
				$431,052	0.00	NIH	5	UAMS	BRI

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
AR Children's Research Institute *Continued*									
				$272	0.00	The Food Allergy & Anaphylaxis Network	5	UAMS	
					6.60				
29. Identifying Critical Pathways for Therapeutic Development in Pediatric Diffuse Large B-cell Lymphoma	S. Kendrick	$0	0.00	$260,800	1.83	NIH	5	UAMS	
30. Enhancing SARS-CoV-2 Sequencing Efforts for Variants in the State of Arkansas	J. Kennedy	$100,000	1.80	$227,405	0.20	NIH	5	UAMS	
				$37,202	0.10	NIH	5	UAMS	University of New Mexico
				$770,000	0.00	NIH	5	UAMS	
31. Regulation of mucosal permeability by inflammatory mechanisms activated in food allergy and eosinophilic esophagitis (EoE)	R. Kurten	$0	0.00	$68,070	1.35	NIH	5	UAMS	UCSD
				$24,833	0.20	NIH	5	UAMS	UCSD
				$24,721	0.10	NIH	5	UAMS	UCSD
				$16,294	0.15	NIH	5	UAMS	UCSD
				$34,927	0.10	NIH	5	UAMS	La Jolla Institute for Allergy and Immunology
				$69,058	0.27	NIH	5	UAMS	Rutgers
32. Pupillometry Changes to Detect Pain and Analgesic Response in Vaso-Occlusive Pediatric Sickle Cell Disease Patients.	J. Mack	$0	0.05	$94,151		Genentech, Inc.	5	UAMS	
33. Automated Seizure Detection in Neonatal Intensive Care Units	M. McManis	$74,489	0.10	$0	0.00		5	UAMS	
34. Biomarkers Discovery to Detect Metabolic Subtypes within the Autism Spectrum Disorder	S. Melnyk	$0	0.00	$10,000	0.38	USDVA	5		
35. The Role of Musashi, a Leptin Target, In Neonatal Pituitary Function	T. Miles	$30,000	0.00	$0	0.00		5	UAMS	
36. Delivery of Inhaled Nitric Oxide via Heated Flow Nasal Cannula and Non-Invasive Ventilation in in-vitro Models of Spontaneously Breathing Children	M. Moore	$5,000	0.00	$0	0.00		5		
37. Pediatric Critical Care Research	P. Mourani	$0	0.00	$35,152	0.11	NIH	5	UAMS	University of Utah
				$311,390	1.70	NIH	5	UAMS	
				$1,500	0.00	FDA	5	UAMS	I-ACT
				$41,158	0.12	NIH	5	UAMS	UCSF
				$1,667		NIH	5	UAMS	Children's Hospital of Philadelphia
38. Safe Sleep Research Program	R. Nabaweesi	$0	0.00	$6,000	0.04	RWJF	5	UAMS	
39. Assessing Racial/Ethnic Differences in the Adherence to Obesity Prevention Guidelines among Adolescents	M.R. Narcisse-Jean Louis	$0	0.20	$0	0.00		5	UAMS	

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
AR Children's Research Institute *Continued*									
40. Effects of C-section delivery on offspring brain development	X. Ou	$0	0.00	$637,393	0.30	NIH	5	UAMS	
				$86,200	0.93	NIH	5	UAMS	UCSD
				$911,400	0.19	NIH	5	UAMS	
				$52,542	1.40	NIH	5	UAMS	
41. Measuring Actual Percent Oxygen Delivered via Nasal CPAP in Neonates	S. Perez	$0	0.03	$0	0.00		5	UAMS	
42. Telehealth Enhanced Asthma Management (TEAM)	T. Perry	$0	0.30	$307,113	0.15	NIH	5	UAMS	
				$7,153	0.02	NIH	5	UAMS	University of Rochester
				$6,796	0.02	NIH	5	UAMS	University of Rochester
				$15,759	0.20	NIH	5	UAMS	
43. Comparison between Telemedicine and In-Home Assessments for Identification and Reduction of Asthma Trigger	R. Pesek	$0	0.33	$90,311		AstraZeneca	5	UAMS	
				$22,109		Regeneron Pharmaceuticals, Inc.	5	UAMS	
				$2,580		Danone Research	5	UAMS	
				$75,979		Regeneron Pharmaceuticals, Inc.	5	UAMS	
				$14,696	0.62	NIH	5	UAMS	Cincinnati Children's Hospital
44. Metabolilc and Bioenergetics Research Program	C. Porter	$0	0.60	$6,773	0.38	NIH	5	UAMS	
				$385,000	2.01	NIH	5	UAMS	
45. Epidemiologic and Clinical Features of COVID-19 in Pediatric Patients and Healthcare Workers in the Pediatric Emergency Department: A Prospective, Observational Analysis	L. Quang	$0	0.19	$62,729	0.03	NIH	5	UAMS	Quandrant Biosciences
46. Towards optimal diffusion MRI acquisition and processing protocols for infant brain studies via development of a generic and robust framework.	R. Raja	$29,196	0.11	$0	0.00		5	UAMS	
47. Evaluation of Obstructive Sleep Apnea in Children with Migraine Headaches Using an Electronic Health Record Alert	P. Ramani	$0	0.01	$0	0.00		5	UAMS	
48. Finding Treatments for Arteriovenous Malformations Through Sequencing and Data Mining	G. Richter	$0	0.00	$30,390		Palvella Therapeutics	5	UAMS	
				$1,071	0.00	Arkansas Children's Hospital Foundation	5	UAMS	

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
AR Children's Research Institute *Continued*									
				$81,029	0.02	DOD	5	UAMS	Columbia University
49. Establishing the presence of mitochondrial dysfunction and oxidative stress and the relationships with resting energy expenditure and fatty acid oxidation in childhood obesity	S. Rose	$0	0.30	$27,065		GW Pharmaceuticals	5	UAMS	
				$217,521	1.08	NIH	5	UAMS	
				$11,440		GW Pharmaceuticals	5	UAMS	
				$13,150	0.20	United States - Isreal Binational Science Foundation	5	UAMS	
50. Metabolic and Immunologic Networks in Peanut Allergy	A. Scurlock	$0	0.00	$165,246		Novartis Pharmaceuticals Corporation	5	UAMS	
				$46,531		Aimmune Therapeutics, Inc.	5	UAMS	
				$24,644		Siolta Therapeutics	5	UAMS	
				$50,001	0.45	Food Allergy Research & Education	5	UAMS	
				$148,557		Aimmune Therapeutics, Inc.	5	UAMS	
				$46,143		Aimmune Therapeutics, Inc.	5	UAMS	
51. Promoting and Supporting Exclusive Breastfeeding Among Hispanic Women in Community Pediatric Clinics	S. Sobik	$64,000	0.21	$0	0.00		5	UAMS	
52. Pediatric Infectious Disease Research	W. Steinbach	$150,000	0.00	$13,622	0.33	NIH	5	UAMS	
				$47,663	0.70	NIH	5	UAMS	Univ. of Illinois
				$495,718	0.53	NIH	5	UAMS	
				$531,320	0.51	NIH	5	UAMS	
53. PlexinA2 Forward Signaling in Persistent Pain (ABI/ Tackett COBRE support)	K Stephens	$75,000	0.75	$819,718	0.91	NIH	5	UAMS	
54. Program for Bleeding Disorders and Thrombosis in Arkansas	K. Stine	$0	0.00	$5,067	0.06	Centers for Disease Control	5	UAMS	Univ. of Texas
				$15,202	0.06	Centers for Disease Control	5	UAMS	Univ. of Texas
				$2,075		Ultragenyx Pharmaceutical, Inc	5	UAMS	
				$32,218		Bayer Inc.	5	UAMS	
				$18,390		ASC Therapeutics	5	UAMS	
				$15,382		Pfizer	5	UAMS	

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
AR Children's Research Institute *Continued*									
				$36,860		Baxalta US Inc.	5	UAMS	
				$16,777		Bayer Inc.	5	UAMS	
				$23,980		Sanofi Pharmaceuticals, Inc.	5	UAMS	
				$20,385	0.01	Maternal Child Health Bureau	5	UAMS	University of Texas Health Sciences Center at Houston
				$611		Histiocytosis Association	5	UAMS	St. Jude's
55. Identification of MicroRNA Networks Driving Vascular Malformation Growth	G. Strub	$0	0.00	$267,750	0.40	NIH	5	UAMS	
				$10,000	0.10	American Society of Pediatric Otolaryngology (ASPO)	5	UAMS	
56. Nutritional Stimulation of Growth in Children with Short Stature without Growth Hormone Deficiency	E. Tas	$0	0.19	$221,938	1.24	NIH	4, 5	UAMS	
57. "Does your child still stutter?" Clinical application of evidence-based prognostic indicators for persistent stuttering and the role of timely speech therapy	A. Thomason	$0	0.03	$0	0.00		5	UAMS	
58. Parental programming of offspring physiology and metabolism	U. Wankhade	$0	0.11	$12,938	0.70	NIH	4, 5	UAMS	Univ. of Utah
59. Health Impact Assessment of Farm to School on Childhood Obesity Rates in Arkansas	J. Weber	$0	0.00	$1,402,541	17.62	NIH	4, 5	UAMS, University of Arkansas	UNLV
				$247,200	7.05	NIH	4, 5	UAMS	
				$236,552	1.51	NIH	4, 5	UAMS	
				$220,609	0.05	NIH	4, 5	UAMS	
60. Equipment/Infrastructure		$217,025							
Total for ACRI			$1,420,053	10.71	$25,092,181	139.94			
Arkansas State University									
1. Development of Novel Thiazolo-Androstenone as Antimelanoma Agents	Alam, Mohammad Abrar	$34,343	0.75				1		
2. MRI: Role of Orexin System in Hepatic FMRI: Acquisition of a 400 MHz Nuclear Magnetic Resonance (NMR) for Research at Arkansas State University	Alam, Mohammad Abrar			$346,000	0.00	NSF	1		
3. Antibiofilm Activities of Novel Pyrazole Derivatives - Travel Funds	Alam, Mohammad Abrar			$3,284	0.00	NIH-INBRE	5		
4. Development of Novel Thiazolo-Androstenone as Antimelanoma Agents Year 2	Alam, Mohammad Abrar			$77,124	0.50	INBRE	1		

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
Arkansas State University *Continued*									
5. Startup Funding - Predicting phenotype using machine learning	Bellis, Emily	$18,822	0.10				1		
6. Forecasting high-impact insect invasions by integrating probability models with i-Tree from urban to continental scales	Bellis, Emily; Marsico, Travis			$193,776	0.00	USDA Forest Service	1,5		
7. AgAdapt: An evolutionarily- informed algorithm for genomic prediction of crop performance in novel environments	Bellis, Emily			$89,296	0.00	AR NSF EPSCoR	1,5		
8. Shelby McCormick: DART Summer Undergraduate Research Experience (SURE)	Bellis, Emily			$5,400	0.00	AR NSF EPSCoR	1		
9. Startup Funding - Bioinformatics and depression	Bhattacharyya, S.	$21,021	0.10				1,5		
10. Alzheimer's Gut Microbiome Project	Bhattacharyya, S.			$41,918	0.25	NIH	1,4,5		
11. Loggerhead Shrike Pesticide Monitoring	Boves, Than			$112,000	0.50	USFWS/ AGFC	1		
12. Emily Donahue: Comparative Analysis of the Gut Microbiome in Loggerhead Shrikes: Assessing the Effects of Agricultural Toxin Exposure	Boves, Than			$2,480	0.00	American Ornithological Society (AOS)	1		
13. Fundamental Studies of Soiling and Cementation of PV Cover Glass Materials	Fleming, Robert (Drew)			$183,740	1.00	DOE	5		
14. Low Friction and Durable Graphite Coatings for Reducing Energy Consumption in Conveyor Systems	Fleming, Robert (Drew)			$56,517	1.00	NSF	5		
15. PFI-RP: Low-friction and Durable Graphite Coatings for Reducing Energy Consumption in Conveyor Systems	Fleming, Robert (Drew)			$123,008		NSF	5		
16. Dislocation Dynamics in Confined Volumes	Fleming, Robert (Drew)			$10,000	1.00	NSF	5		
17. SURF_Benjamin Whitfield: Investigation of Semiconductor and Oxide Surfaces Using Computational Materials Science	Fleming, Robert (Drew)			$2,750	0.25	AR DHE	5		
18. Exploring Causative Relationship Between Agricultural Burning And Negative Public Health Outcomes In The Arkansas Delta	Ford, Michael (Joe); Camarata, Troy	$31,410	0.15				1		
19. Dyslexia and AI: The Use of Artificial Intelligence to Identify and Create Font to Improve Reading Ability of Individuals with Dyslexia	Gilbert, Beverly	$29,587	0.50				1,5		
20. Early Childhood Alternative Preparation Pre-K Teacher Academy	Gilbert, Beverly			$426,300	2.75	US Dept of Education, Office of Elementary & Secondary Ed	5		

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
Arkansas State University *Continued*									
21. AI Summer Camp 2022	Gilbert, Beverly			$5,400	0.00	NSF	5		
22. Startup Funding - Disease in Nature	Gustafson, Kyle	$5,000	0.00				1,5		
23. The Ghost of Arkansas' Red Wolf: Genomic and Morphometric Assessment of Remnant Red Wolves and Admixed Coyotes	Gustafson, Kyle	$33,813	0.25				1,5		
24. INBRE Startup Funds for Kyle Gustafson's Host–Parasite Lab Amendment 02	Gustafson, Kyle			$48,906	0.50	NIH INBRE	1,5		
25. Improving Modeling of the Agroecosystem in the Lower Mississippi River Basin	Hashem, Ahmed	$12,905	0.25	$291,690	0.50	USDA	1,5		
26. Rice yield and milling quality prediction using machine learning and remote sensing imagery	Hashem, Ahmed			$70,000	0.25	UAF	1,5		
27. TRC2102: Effect of Aggregate-Binder Compatibility on Performance of Asphalt Mixtures in Arkansas Year 2	Hossain, Zahid			$115,984	0.50	AR Dept of Transportation	5		
28. A New Generation of Dense-Graded Asphalt Mixtures with Superior Performance Against Stripping and Moisture Damage	Hossain, Zahid			$30,000	0.25	US Dept of Transportation	5		
29. Using of Rice Husk Ash (RHA) as Stabilizing Agent for Poor Subgrade Soils and Embankments	Hossain, Zahid			$44,500	0.50	US Dept of Transportation	5		
30. Seismic Hazard Analysis for the City of Jonesboro and Surrounding Counties within Northeast Arkansas (NEA)	Hossain, Zahid			$45,000	0.00	US Dept of Transportation	5		
31. Dissemination and Technology Transfer Through 2021 TranSET Conference	Hossain, Zahid			$20,000	0.00	US Dept of Transportation	5		
33. Environmental Friendly Applications of Ground Tire Ruber (GTR) in Producing Concrete (22CASU01)	Hossain, Zahid			$60,000	0.50	US Dept of Transportation	5		
34. Prediction of Moisture Resistance of Polymeric Asphalt Binders Through the Atomic Force Microscopy (AFM) Technique (22BASU02)	Hossain, Zahid			$59,500	0.50	US Dept of Transportation	5		
35. Technology Transfer on Innovative Transportation Materials (22TTASU04)	Hossain, Zahid			$10,000	0.00	US Dept of Transportation	5		
36. TRC2102: Effect of Aggregate-Binder Compatibility on Performance of Asphalt Mixtures in Arkansas FY 23	Hossain, Zahid			$45,086	0.00	US Dept of Transportation	5		
37. NIH Arkansas INBRE fund for AI Workshop with No-Boundary Thinking	Huang, Xiuzhen			$10,000	0.00	NIH UAMS	5		
38. Develop Novel Informatics Algorithms for Lung Cancer Early Screening with CT Scans	Huang, Xiuzhen	$56,069	0.25				1,5		

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
Arkansas State University *Continued*									
39. NSF SCH: EAGER: New Approach: Early diagnosis of Alzheimer's disease based on MRI neuroimaging via high-dimensional image feature identification	Huang, Xiuzhen			$257,785	1.00	NSF	5		
40. Arkansas Research Alliance Fellowship	Huang, Xiuzhen			$75,000	0.00	ARA	5		
41. NSF Arkansas TrackI DART subaward	Huang, Xiuzhen			$41,000	1.00	NSF Arkansas Track I	5		
42. Develop new algorithm for disease prediction with features of multiple types of data	Huang, Xiuzhen			$25,000	1.00	ARA impact	5		
43. An Amperometric Glucose Sensor Using Recombinant Mn Peroxidase and Glucose Oxidase	Izadyar, Anahita; Hood, Elizabeth	$33,564	1.25				1,5		
44. Estimating Musical Appreciation for Digital Forensics Applications Using Neural Network	Kher, Shubhalaxmi	$34,842	0.50				5		
45. Developing Raspberry Pi-Powered Imaging System	Lorence, Argelia	$37,929	0.75				5		
46. Constitutive Expression of GNL in Soybean to Enhance Vitamin C Content, Resilience to Stresses, and Seed Yield	Lorence, Argelia			$37,500	1.00	ARA	1, 5		
47. Arabidopsis high throughput phenotyping	Lorence, Argelia			$138,375	2.00	Google X	1		
48. Diversifying our curing community: A program to increase the number of minority physicians in Arkansas	Boyd L (PI), Lorence A (Collaborator), Medina-Bolivar F (Collaborator); Ali H (Collaborator); Newman-Lee L (Collaborator			$128,720	0.10	Blue & You Foundation	5		
49. Startup Funding - Plant-Symbiont Interaction	Mangan, Scott	$9,923	0.00						
50. Estimating invasive plant propagule pressure and modeled establishment risk to southern agroforestry.	Marsico, Travis			$150,000	2.00	UADA-USFS	5		
51. Collaborative Research: Upper Delta Region Biodiversity Scholarship (Y2)	Marisco, Travis			$53,070	1.00	NSF	5		
52. Understanding Invasion and Disease Ecology and Evolution through Computational Data Education (NRT-URoL: UandI-DEECoDE)	Marsico, Travis; Qualls, Jake; Bellis, Emily; Wijeratne, Asela; Gustafson, Kyle			$1,999,484	6.00	NSF	5		
53. Expanding the network of natural history collections clubs through workshops to broaden participation of students in biodiversity collections	Marsico, Travis (Co-PI)			$12,492	0.00	NSF	5		

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
Arkansas State University *Continued*									
54. Tailoring Plant Metabolism for the Production of Acachidin-2: A Bioactive with Multiple Applications in Human Health	Medina-Bolivar, Fabricio	$35,080					1,2,4		
55. Summer Manuscript Support	Medina-Bolivar, Fabricio			$15,402	0.10	INBRE	4		
56. Revamping agricultural biotechnology education in Puerto Rico by empowering K-14 Teachers	Arun A (PI), Joshee N (Collaborator), Medina-Bolivar, Fabricio (Collaborator), Reddy U (Collaborator)					USDA	5		
57. Correlating environmental microbial diversity to prevalence and severity of an emerging vertebrate disease	Neuman-Lee	$34,737	1.25				1, 2 , 3		
58. Characterization of Snake Immunity for a Novel Animal Model (Y1)	Neuman-Lee			$28,523	0.00	INBRE	1, 2 3		
59. Health and Demographics of Freshwater Turtles within the Memphis Zoo	Neuman-Lee			$3,912	0.00	Memphis Zoo	5		
60. Study the Challenge of ER Patient Stratification with Image and Clinical Data	Qualls, Jake	$28,831	0.25						
61. Long Noncoding RNAs in Heart Failure Related to Impared Thyroid Hormone Function	Rajagopalan, Viswanathan	$35,100	0.25				2,5		
62. RII Track-1: Data Analytics that are Robust and Trusted (DART): From Smart Curation to Socially Aware Decision Making Year 2	Risch, Thomas			$42,637	0.25	National Science Foundation	1,5		
63. 58-6024-1-007 Acquisition of Goods and Services	Risch, Thomas			$51,040	0.00	USDA-ARS	1		
64. ASU Graduate Research Assistant Fellowship Program for EPSCoR DART Project YR 2	Risch, Thomas			$43,503	0.75	AR Economic Development Commission	1,5		
65. ASU Undergraduate Research Assistant Program for EPSCoR DART Project YR 2	Risch, Thomas			$32,851	3.00	AR Economic Development Commission	1,5		
66. American Red Wolf Conservation and Research Center-Jonesboro A&P Commission	Risch, Thomas			$300,000	0.00	Jonesboro Advertising & Promotion Commission	5		
67. Endangered Red Wolf Project	Risch, Thomas	$2,124	0.10				5		
68. Acquisition of a Microfluidics 3D printer to enhance biomedical research and training at Arkansas State University	Seok, Ilwoo	$495	0.00	$15,489	0.00	NIH-INBRE	5		
69. Startup Funding - Data Analytics	Stubblefield, Jonathan	$10,532	0.20				5		
70. Startup Funding - Disease in Nature	Sweet, Andrew	$10,979	0.00				5		

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
Arkansas State University *Continued*									
71. Abundance and dispersal of an ectoparasite across different landscapes in Arkansas	Sweet, Andrew	$33,189	0.25				5		
72. SURF_Paige Brewer: Bird Lice Database and Collection	Sweet, Andrew			$2,125	0.10	AR DHE	5		
73. Acquisition of Equipment to Enhance Genomic Infrastructure at Arkansas State University	Sweet, Andrew			$26,395	0.00	NIH-INBRE	5		
74. Improving the Health and Economic Outcomes for Arkansas Children	Tew, Philip	$19,070	0.50				4,5		
75. Elucidating defense signaling pathway in soybean against Phytophthora sojae	Wijeratne, Asela	$48,504	0.50				1		
76. Investigating Functional Changes in Soybean Root Microbiome During Phytophthora Sojae Colonization	Wijeratne, Asela; Medina-Bolivar, Fabricio (Collaborator)			$300,000		USDA -NIFA	1		
77. Effect of DNA Methylation on Soybean-Phytopthora Sojae Interaction	Wijeratne, Asela			$297,950		USDA -NIFA	1		
78. Mechanistic assessment of osteopathic manipulation in relieving migraine headache using a novel translational rodent model	Xie, Yanhua (Jennifer)			$428,400		NIH (NCCIH)	4,5		
79. Plant cell-produced designer biomolecules as edible vaccines for poultry	Xu, Jianfeng (Jay)	$36,449	0.00				1,2		
80. Oral delivery of plant cell-encapsulated biopharmaceuticals for treatment of IBD	Xu, Jianfeng (Jay)			$85,375	1.00	NIH/INBRE	1,2		
81. Engineering novel designer biologics in plant cells for oral treatment of ulcerative colitis	Xu, Jianfeng (Jay)			$395,242	1.00	NIH	1,2		
82. An Innovative Technology for Cost-Effective Enzymatic Lignocellulose Deconstruction using In-Planta Enzyme Engineering	Xu, Jianfeng (Jay)			$82,181	0.50	DOE	1,2		
83. Phosphor-regulation of CAP1 functions in cell adhesion and migration	Zhou, Guolei (Jason)			$139,700	0.00	NIH	1,5		
Recovery Funding Reinvested in Research				$409,870	0.00	External Usage Revenue	5		
Animal Care Core		$120,264	1.25						
Capital Purchases for Research		$80,417	0.00						
Greenhouse/Growth Chamber/Infiltration Core		$69,753	1.00						
Research Salary Support and Internships		$979,310	10.60						
Outreach		$67,012	1.00						
ABI Administration		$481,114	6.50						
Utilities, Custodial, Building Repairs, and Equipment Service Contracts		$1,123,299	4.00						
Total for ASU		$3,575,487	32.50	$8,148,680	32.55				

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
University of Arkansas - Division of Agriculture									
1. Printing, protein, and personalized nutrition	J. Baum, A. Ubeyitogullari, W. Zhou, H. Seo, A. Shi	$116,737	0.74				1, 4		
2. A novel zebrafish larvae model to study human norovirus infection and control	K. Gibson, G. Ramena	$85,378	0.35				5	UAPB	
3. Nanocellulose-based hydrogel nano-delivery systems for controlled release of anti-cancer drugs	J. Kim, J. Sakon	$101,290	0.35				2, 3	UAF	
4. An updated stereotaxix atlas of the chick brain	W. Kuenzel, A. Jurkevich	$83,518	0.47	$4,977,500	0.10	USDA/Cornell	5	Univ of Missouri, Columbia	
				$84,661	0.10	UAF Chancellor Innovation Fund			
5. Automatic artificial intelligence system for early detection of autism spectrum disorders in children	H. Seo, K. Luu	$83,747	0.37				1, 2, 5	UAF	
6. Unraveling the role of SnRK1 signaling in rice grain yield and quality	V. Srivastava	$99,644	0.46	$162,232	0.20	NSF-EPSCoR	5		
				$304,910	0.10	NSF			
7. Developing effective vaccines and monoclonal antibodies to prevent and treat campylobacter jejuni infection in chickens and humans	X. Sun	$81,609	0.36	$6,000	0.05	USDA-NIFA	1, 5		
				$110,000	0.20	USDA-NIFA			
8. Novel vaccine development and phytochemical dietary supplementation	B. Hargis, G. Tellez-Isaias	$166,250	0.78				1, 4	UAF	
9. A portable biosensor based on aptamer-capped and dye-loaded nanocages	Y. Li, J. Chen	$127,930	0.47	$650,000	0.15	Wal-Mart Foundation	1	UAF	
10. A novel, robust and inexpensive CD40-targeted aptamer adjuvant platform to immunize chickens against salmonella and improve human food safety	Y. Kwon, C. Vuong	$77,106	0.26	$148,589	0.10	USDA-AFRI	1, 2		
11. The regulation of appetite and energy intake by skeletal muscle: The role of amino acids and dietary protein	J. Baum, E. Borsheim, Y. Huang, S. Dridi	$66,400	0.42				1, 4	UAMS/ ACNC, UAF	
12. Unraveling the molecular regulation of aflatoxin biosynthesis with a novel genetic approach	B. Bluhm, J. Lay, G. Wiley, W. Shim	$111,013	0.53	$40,000	0.10	Arkansas Corn and Grain Sorghum	1, 2, 4, 5	UAF, Oklahoma Medical Research Foundation, Texas A&M Univ.	
13. Developing scalable tools for production of agriculturally useful peptides	F. Goggin, B. Beitle, H. Liao, A. Lorence	$114,477	0.54	$171,935	0.10	USDA-NIFA	1, 3	ASU, UAF	
14. The role of neonatal non-shivering thermogenesis in preventing childhood obesity	Y. Huang, J. Baum, C. Maxwell, S. Dridi	$151,978	0.85				1, 2, 4		

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
University of Arkansas - Division of Agriculture *Continued*									
15. A highly effective probiotic for pre-harvest control of campylobacter in chickens	J. Acuff (previously S. Ricke)	$79,940	0.36				1, 2	UAF	
16. Monitoring of azole resistance in agricultural ecosystems and its implications for food security and human health	A. Rojas	$70,444	0.38	$7,000	0.20	Cotton Inc.	1		
				$57,692	0.10	United Soybean Board			
				$5,000	0.10	United Soybean Board			
General Support (Administrative fee and misc. operating expenditures)	All PI's	$75,445					5		
Total for UA-Div. of Ag.		$1,692,906	7.69	$7,206,640	1.70				
University of Arkansas - Fayetteville									
1. The effects of acute vs repeated CBD administration on trauma-relevant emotional reactivity	Ellen W. Leen-Feldner	$0	0.00	$99,325		private	1	UAF	
2. The effects of repeated CBD administration on worry among high trait worriers. (Canopy Growth Corporation)									
3. Identifying hMSC interaction pathways in soluble interferon-gamma and stratified collagen/ heparin coatings for the manufacturing of therapeutic cells.	Jorge Almodovar	$36,689	0.53	$536,442		NSF, NIFA	1,2,5	UAMS, UAF	
4. Managing pain in cattle undergoing castration using a biodegradable microneedle patch containing meloxicam.									
5. ICorps: Polyelectrolyte multilayered surfaces for use in hMSC manufacturing									
6. EAGER: Decompose COVID-19 virus using the dual action of microwaves and plasma.	Yuchun Du	$0	0.00	$430,721		NIH, NSH	2,5	UAF	
7. Medicinal chemistry and biomedical studies of open-chain mimics of Ipomoeassin natural glycoresins.									
8. Protein Targeting to the Chloroplast Thylakoid Membrane: Structure and Function of a Targeting Complex.	Colin Heyes	$0	0.00	$571,244		DOE, NSF	2,5	UAF	
9. Small-Scale, Loop-Based Chemical Separations and In-line Sampling Employing Magnetoelectrochemical Methods.									
10. Arkansas Integrative Metabolic Research Center. NIGMS/ NIH (P20)	Kyle Quinn (as COBRE Dir.)	$550,000	0.00	$3,211,134		NSF, NIH	2,5	UAF	

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
University of Arkansas - Fayetteville *Continued*									
11. Non-invasive automated wound analysis via deep learning neural networks. NIBIB/NIH (R01)				$392,800					
12. Validation of a SNP panel for breeding against ascites in broilers.	Douglas Rhoads	$1,139	0.00	$687,011		NIFA, UAF, private	1,2	UAF	
13. Understanding the mechanisms of spatial protein quality control in a model filamentous fungus.	Yong Wang	$34,523	0.50	$602,607		NIH, NSF, NIFA, UAF	2,5	UAF, UAMS	
14. Associations between heavy drinker's alcohol-related social media exposures and personal beliefs and attitudes regarding alcohol treatment	Alex Russell	$6,000	0.00					UAF	
15. Developing Novel Pupillometric Data Analysis Methods for Locus Coeruleus Activity Characterization	Mohammad Haghighi	$32,041	0.50					UAF	
16. Multifunctional Nanoparticle Hyperthermia with Enhanced Tumor Cellular Efficacy through Exosome Encapsulation and Delivery	David Huitink	$0	0.00						
17. Monetary rewards alter appearance	Josiah Leong	$14,163	0.00						
18. Deep Ultraviolet Laser Source for Biomedical Applications	Hiro Nakamura	$0	0.00						
19. Unraveling effects of senescence modulation on mesenchymal stem cell potency for cranial repair	Rebekah Margaret Samsonraj	$48,320	0.28					UAMS, UAF	
20. Genetic architecture of carbohydrate metabolism disorders in a fly model of diabetes Awarding Organization.	Xuan Zhuang	$44,575	0.50	$48,252		NIH	5		
21. PFI-RP: Low-Friction Durable Coatings for Improving Energy Efficiency in Conveyor System.	Min Zou	$49,943	1.01	$1,071,749		NSF, UAF, private	5	UAMS, ASU	
22. Non-Viral Delivery of CRISPR/Cas9 for Targeted Gene Replacement.	Christopher Nelson	$30,569	0.25	$24,722		NIH, UAF	2,5	UAF	
23. Myo-SNAP: A versatile synthetic biology platform for skeletal muscle biology and gene therapy.									
24. CAREER: Riemannian Reformulation of Collective Variable Based Free Energy Calculation Methods.	Mahmoud Moradi	$0	0.00	$644,190		NSF, NIH	2,5	UAF	
25. Thinking About Future Personally Relevant Events as a Way to Reduce Smoking Behavior: An Ecological Momentary Assessment Study.	Darya Zabelina	$6,538	0.00						
26. BII: Host-Virus Evolutionary Dynamics Institute.	Ruben Michael Ceballos	$44,395	0.92	$1,499,949		NSF	1,5		

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
University of Arkansas - Fayetteville *Continued*									
27. CAREER: Teasing apart the tempo and mode of environmental adaptation with a defined ecological context and evolutionary replication across multiple timescales	Andrew Alverson	$44,888	0.00	$113,529		NSF		UAF	
28. Discovery and characterization of bat-borne viruses in east Africa	Kristian Forbes	$0	0.00						
29. Understanding macronutrient-driven effects on immune-related gene expression and disease severity	Sarah DuRant	$24,953	0.00				1,5		
30. Deciphering the novel link between sulfur assimilation and nitrogen fixation in methanogenic archaea.	Daniel J. Lessner	$0	0.00	$1,084,042		NSF, DOE	1,5		
31. Unveiling the evolution of neural differentiation mechanisms in animals: a study of the structure and function of the POU-IV/Brn-3 gene regulatory network in Cnidaria.	Nagayasu Nakanishi	$46,752	0.46	$506,624		NSF	2,5		
32. Development of Targeted Approaches in Prevention of Cancer-Cachexia	Nicholas P. Greene	$47,131	0.50	$322,114		NIH	2,4,5	UAMS	
33. Development of a system for detecting levels of pathogen in air samples: demonstration using agricultural systems	Adnan Alrubaye	$54,560	0.50						
34. Sex Differences and Leucine Supplementation's Impact on Force Output During Cancer Cachexia	Tyrone Washington	$25,462	0.00						
35. Neural Mechanisms underlying Cognitive Control and how they relate to Stress, Impulsivity and Smoking Behavior: An EEG Study	Connie Lamm	$1,990	0.00						
36. Feasibility Testing a Randomized Controlled Trial of an Exercise Program to Improve Cognition for T2DM Patients	Tingting Liu	$2,820	0.00						
37. The role of phosphorylation of isocitrate dehydrogenase in breast cancer	Chenguang Fan	$33,305	0.50	$213,574		NIH	2,3,5	UAF	
38. The Evaluation of the Effects of Diet Induced Obesity on the Racial Differences in Triple Negative Breast Cancer Tumorigenesis and Metastases	Tameka Bailey	$7,408	0.00						
39. Small-Scale, Loop-Based Chemical Separations and In-line Sampling Employing Magnetoelectrochemical Methods	Ingrid Fritsch	$6,439	0.17	$451,244		NSF	2,5		
40. CAREER: Tomographic microendoscopy for characterization of epithelial tissue structure and function	Timothy Muldoon	$29,069	0.67	$919,383		NSF,NIH	2,5	UAF	

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
University of Arkansas - Fayetteville *Continued*									
41. DSFAS-AI: Development of Convolutional Neural Networks that Connect Molecular Signatures to Rapid Optical Readouts on the Health of Chickens	Kartik Nayani	$30,256	0.72	$299,944		USDA	1,5	UADA	
42. Chromatin remodeling complexes and genome integrity	Ines Pinto	$9,500	0.00					UAF, UADA	
43. Engineering novel in vitro test beds to study fibrotic scar after spinal cord injury.	Young Hye Song	$39,014	0.14	$646,078		NIH, UAMS, UAF, PhRMA	2.5	UAF, UADA	
44. Creating Next Generation Microdialysis Probes via 3D Printing with 2-Photon Lithography	Julie Stenken	$40,577	0.92						
45. Momentary emotion-related impulsivity and health-impairing behavior	Jenn Veilleux	$10,490	0.00						
46. Testing of an matrix gel for the treatment of fatty infiltration	Jeff Wolchok	$14,000	0.00	$216,234		NSF, NIH	2, 5	UAMS, UAF	
Total for UA-F		$1,367,509	9.07	$14,592,912	0.00				
University of Arkansas for Medical Sciences									
1. Endo Clinical Scientist Recruitment package	Spyridoula Maraka	$35,000	0.79	$187,484	0.98	VA	3		
2. Start-Up Package for Assistant Professor Weber	Kari Weber	$35,000	1.24						
3. Start Up Package for Assistant Professor Koss	Brian Koss	$100,000	0.76	$1,883,059	2.45	NIH		ACHRI	
				$111,108		NIH Cancer			
4. Start-up package for Assistant Professor Fairman	Brian Fairman	$30,000	0.53						
5. Start-up package for Assistant Professor Dole	Neha Dole	$50,000	2.25						
6. Tissue Bank Open Specimen Software	Steve Post	$26,450	0.00	$612,400	0.97	NIH/Nat cancer Institute			
7. Year Four COBRE Support	Catherine O'Brien	$75,000	0.38						
8. Year Two COBRE Support	Marjan Boerma	$100,000	0.03	$600,000	0.29	NASA			
				$2,280,000		NIH			
				$300,000		NIAID			
				$457,553	2.23	NIAID			
				$370,000		NASA			
				$588,105		NIAID			
				$180,143		US Defence			
9. Year Five COBRE Support	Mark Smeltzer	$100,000	0.25	$2,098,315	5.70	NIH			
				$1,140,000		NIH			
				$451,808		NIH			
				$635,315		US. Army medical research		UA	
10. Year Five T32 Support	Paul Prather	$32,000	2.31	$555,072		NIH	5		
				$155,100		NIH			

Project	Principal Investigator(s)	ABI $ Allocated	ABI FTE Employment	Related Extramural $	Related FTE Employment	Extramural Source	ABI Research Areas*	ABI Partners	Other Partners
University of Arkansas for Medical Sciences *Continued*									
11. Year Four T32 Support	Clint Kilts	$40,000	0.05	$428,576	0.66	NIH	3		
				$860,080		NIH			
12. Support Package for P50 Grant	Carol Cornell	$70,000		$600,000	0.30	Arkansas Department of Health			
				$3,864,520		NIH/NIMHD			
				$1,406,358		NIH/NHLBI			
				$551,812		NIH/NIDA			
				$1,286,036	3.25	NIH/NIMHD			
				$500,000		NIH/NIMH			
13. Mass Spec for Proteomics Core	Alan Tackett	$67,500	0.20	$1,927,802	1.73	NIH		UAF	
				$347,918		NIH Cancer			
				$296,958		NIH			
				$358,608		DOD			
14. Associate Dean of Research for the College of Nursing	Judith Weber	$50,000	0.00	$499,701	1.03	PCORI	4,5	UAF	
				$468,986		NIH			
				$908,541		NIH			
15. Start Up Package to Jr Faculty	Judith Weber	$25,000	0.43						
16. Conference expenses SOT	Mitch McGill	$1,500							
17. Post Doc Training Plan	Nickolas Zaller	$31,710	0.47	$50,000	5.90	NIH/NIMH	3,4,5		
18. Covid Testing support	Nickolas Zaller	$5,500							
19. Start-up package for Assistant Professor Zhang	Xuming Zhang	$130,106							
20. MicStart-up package for Assistant Professor Huangrob/ Immunol	Lu Huang	$25,000	0.04	$100,000	0.83	American Lung Association			
21. ABI funding supporting the Genomics Core.	Donald Johann	$136,410	0.21	$386,329	0.50	U.S. Food and Drug Administration Arkansas Research Alliance	4,5		
22. Tissue Bank Open Specimen Software	Steve Post	$211,600	0.10						
23. NovaSeq 6000 Sequencing for Genomic Core	Donald Johann/Gentry	$446,936	1.67						
24. Microbiota and Ovarian Cancer Research-Yeruva	Michael Birrer	$36,055	1.01	$678,221	3.10	US Department of Defense	5		
				$797,440	1.67	US Department of Defense			
				$172,808		NIH/Nat. Cancer Institute			
25. Confocal Microscope for Assistant Professor Koss	Brian Koss	$450,000	1.57						
26. UbS power supply - Equipment grant	Alan Tackett	$52,195	0.06						
27. Mass Spec for Proteomics Core	Alan Tackett	$135,000	0.05						
Total for UAMS		$2,497,962	14.40	$28,471,540	31.59				
ALL INSTITUTIONS - FY22		$10,553,917	74.36	$83,511,953	205.78				

Patent Activity – Patents filed or awarded July 1, 2021, to June 30, 2022

A. **Patent Applications and Provisional Patents:**

Burcham L, **Johnson T**, Meza R, Scott J, Strasser T. (Filed 2/16/2022). Powered Orthotic Device for Hand Extension and Methods of Use Thereof. U.S. Utility Patent Application No.: 17/673,323.

McManis MH, Perkins FF. Machine Learning Cortical Dysplasia Lesion Detection Software. Provisional Patent Filed 09/2021.

Bhattacharyya S. U.S. Patent Application No.: 17/438,156 Title: Methods and Compositions for Diagnosing Depression BV Reference No.: 2021-23 US-NAT

Xie, J. BIOMIMETIC 3D SCAFFOLDS FOR SPINAL CORD INJURY REPAIR, AND APPLICATIONS OF SAME Attorney Docket No.: 0115942.113US0 EFS ID: 45856416. Filing date: 6/2/2022

Acuff J, Rubinelli P. An invention disclosure has been submitted to the University of Arkansas, and United States Provisional Patent Application No. 63/239,230 was filed August 31, 2021 (Atty. File No. 169946.00631).

Kim J-W, Batta-Mpouma J, Sakon J. Crosslinked colloidal cellulose nanocrystals and methods of preparation and use thereof. US patent application No 17/479,053 (September 20, 2021).

Kong B, Casy Hanning CO, **Kuenzel WJ**. Licensing Agreement: PCT Application, International, Number: Patent Title: Plasma biomarkers for chicken woody breast disease. U.S. Patent # to be supplied date of patent.

Kwon MK. Title: CD40 Specific DNA Aptamers as Vaccine Adjuvants:

- International Patent Application No.: PCT/US2020/027970
- Mexican Patent Application No. MX/a/2021/012471
- Chinese Patent Application No.: 202080038140.1
- U.S. Patent Application No.: 17/602,951
- Brazilian Patent Application No.: BR 11 2021 020411 3

Rojas, C., Rojas, J. A., Lay, JO. Pseudomonas protegens and products thereof to control bacterial panicle blight of rice. US-2021-0388374-A1.

Harris N, **Zou M**, Xie JY, Sharma KD. Biomimetic 3D Scaffolds for Spinal Cord Injury Repair, and Applications of Same. Provisional Patent 63/348,058 filed on June 2, 2022.

B. **Patents Received:**

Yactayo-Chang JP, Lorence A Method of improving chloroplast function and increasing seed yield. Patent # 11124800.

Jeong, K., "Air Cooled Condensing Heat Exchanger System with Acid Condensate Neutralizer", US Utility Patent No. 11,135,547 B1.

James P. Anti- Acetaminophen Antibodies and Acetaminophen Protein Adducts. Patent No. 7072022.

Zou M, Borges RA. Fabrication of PCU/UHMW/PE Polymeric Blends and 3D printing of Same. Serial numbers 62/628,746, 16/273,115.

Kumar TS, Agarwa S, Gindampati RK, Jayanthi S, Wang T, Jones J, Kolenc O, Lam N, Niyonshuti I, Balachandran K, Quinn K, Chen Jingyi. Engineered FGF1 AND FGF2 Compositions and Methods of Use Thereof. Provisional U.S. Patent No. 11,267,855.

Smeltzer M. Linear lipopeptide paenipeptins as antibiotics and potentiators, US Patent No. 11,364,275

Smeltzer M. Device and method for the *in vivo* photoacoustic diagnosis and photothermal purging of infected blood, US Patent No. 11,259,705.

Publications, including journal articles, book chapters, and books; ABI-supported investigators in bold.

A. Journal Articles

Acosta-Gamboa LM, Nepal N, **Medina-Jiménez K**, **Campbell ZC**, Cunningham S, Lee JA, **Lorence A.** (2021) Myo-inositol Oxygenase Overexpression Compensates Decreased Function of Other Ascorbate Pathways in vtc Mutants. Journal of Experimental Botany; 2021.02.24.432757

Adams S, Wright R, Piccolo B, Moody B, Sikes J, Avaritt N, Chintapalli S, **Ou X***. C-section Increases Cecal Abundance of the Archetypal Bile Acid and Glucocorticoid Modifying Lachnoclostridium Scindens in Mice, Physiological Reports (2022), in press

Adepu KK, Bhandari D, Anishkin A, Adams SH, Chintapalli SV. (2022) Myoglobin Interaction with Lactate Rapidly Releases Oxygen: Studies on Binding Thermodynamics, Spectroscopy, and Oxygen Kinetics. Int J Mol Sci; 26;23(9)

Ahn JH, Davis ES, Daugird TA, Zhao S, Quiroga IY, Li J, Storey AJ, Tsai Y, Keeley DP, Mackintosh SG, Edmondson RD, Byrum SD, **Tackett AJ**, Zheng D, Legant WR, Phanstiel DH, & Wang GG. (2021) Phase separation drives aberrant chromatin looping and cancer development, Nature, 595(7868): 591-595.

Agrawal S, Govind Kumar V, Kumar Gundampati R, **Moradi M**, **Suresh Kumar TK**. (2021) Characterization of the Structural Forces Governing the Reversibility of the Thermal Unfolding of the Human Acidic Fibroblast Growth Factor. Sci Rep; 11:15579.

Ahmed, H, Amin U, **Sun X,** Pitts D, Li Y, Zhu H, Jia Z. (2022) Triterpenoid CDDO-IM protects against lipopolysaccharide-induced inflammatory response and cytotoxicity in macrophages: The involvement of the NF-κB signaling pathway. Exp Biol Med.

Ahn JH, Davis ES, Daugird TA, Zhao S, Quiroga IY, Uryu H, Li J, Storey AJ, Tsai YH, Keeley DP, Mackintosh SG, Edmondson RD, Byrum SD, Cai L, Tackett AJ, Zheng D, Legant WR, Phanstiel DH, Wang GG. (2021) Phase separation drives aberrant chromatin looping and cancer development. Nature; 595(7868):591-595.

Albashaireh A, **Maraka S**. (2022) Thyroid Function Classification in Early Pregnancy Varies Considerably Across Repeated Testing Within an Interval of a Few Weeks. Clinical Thyroidology; 34.153-156.

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B. Books, Book Chapters

Acosta-Gamboa LM, **Campbell ZC**, Gao F, Babst B, **Lorence A** (2022) A novel high-throughput phenotyping system for nitrogen deficiency studies in *Arabidopsis thaliana*. *In* "High Throughput Plant Phenotyping: Reviews and Protocols" Springer, New York. 978-1-0716-2537-8_1.

Afshar-Mohajer, M, Yang X, Long R, and **Zou M.** (2022) Understanding the Friction and Deformation Behavior of Micro/Nano-Hierarchical Textures through In-situ SEM Observation and Mechanics

Modeling, Tribology International, Vol. 165, 107271.

Boerma M, Young LR and Sutton JP. (2021): Space Radiation Effects on the Cardiovascular System. In: Encyclopedia of Bioastronautics, First edition (Ed) Springer, Berlin/Heidelberg, Germany.

Boerma M. (2021) Role of endothelial cells in normal tissue radiation injury. In: Endothelial Signaling in Vascular Dysfunction and Disease from Bench to Bedside, First edition. Shampa C. (Ed), Academic Press.

Boerma M, Sridharan V, Krager KJ, Pawar SA. (2021) Small animal models of localized heart irradiation. In: Experimental Models of Infection, Inflammation, and Injury Vol 168, First edition.

Fu Y, Alenezi T, Almansour A, Wang H, Jia Z, Sun X. (2021) The Role of Immune Response and Microbiota on Campylobacteriosis. In: Campylobacter. (Eds. G. Téllez and S. El-Ashram). IntechOpen. DOI: 10.5772/intechopen.96755**.**

Patel ZS, Gibson CR, Mader TH, Whitmire AM, Norcross JR, Thompson MS, Nemec-Bakk AS, Boerma M, Huff JL. (2022) Human Health Risks Relevant to Deep Space Mars Exploration Missions. In: Mission Planning and Execution for Interplanetary Travel, First edition. American Institute of Aeronautics and Astronautics, Reston, VA.

Santhapurama R, Phelan C, Zou M, Nair A. (2021) The Effect of Dimensional Parameters of Multi-asperity Surfaces on Friction at the Nanoscale, *Computational Materials Science*, Vol. 191, No. 15, pp. 110276, 2021.

Wang J, Siddicky SF, **Johnson T**, Kapil N, Majmudar B, Mannen EM. (2022) Supine lying center of pressure characteristics as a predictor of developmental stages in early infancy. Technology and Healthcare. vol. 30, no. 1, pp. 43-49, 2022.

Clinical Research Trials

Borsheim E. Substrate Utilization in Pre-pubertal children during submaximal Exercise and Rest (SUPER kids). 2020-2023

Borsheim E. MI Energy. 2020-2022

Borsheim E. Measurement of dietary lipid oxidation in toddlers - a method study (Palmitate Study). 2020-2022

Borsheim E. Arkansas Active Kids – Objective 3. 2017-2023

Borsheim E. Mitochondrial function in circulating cells and muscle tissue. 2019-2022

Borsheim E. Total energy expenditure and fat oxidation in 2-year-old children. 2015-2023

Borsheim E. Pilot study for determination of total energy expenditure and fat oxidation in children. 2015-2023

Borsheim E. Effects of amino acids on regional lipid metabolism. 2013-2023

Douglass D. Biomarkers in Anthracycline Cardiotoxicity. 2017 - current.

All bio samples have been analyzed and data turned over to statistician for analysis. It is a large dataset that will require him to develop an AI tool to properly analyze. We hope to have statistical analysis back by year's end and to begin on manuscript preparation.

James L. Pharmacokinetics, Pharmacodynamics, and Safety Profile of Understudied Drugs Administered to Children per Standard of Care / (POPS) Phase: NA, Beginning: 3/27/2020, End: Ongoing

Jones S, **Co-I- Perry T.** A double-blind, placebo-controlled, randomized Phase 3 Trial to Assess the Safety and Efficacy of Viaskin® Peanut in Peanut- Allergic Young Children 1-3 Years of Age (EPITOPE) 3/07/2017-10/30/2022.

Jones S, **Co-I- Perry T.** A Phase 3, EPITOPE Open-label Extension Study to Evaluate the Long-term Clinical Benefit and Safety of DBV712 in Peanut-Allergic Children (EPOPEX) 12/01/2018-11/31/23.

Jones S. DBV Technologies, Inc. Long-term Assessment of Safety and Therapeutic Benefit of Viaskin Peanut Epicutaneous Treatment in Peanut-Allergic Children: A 6 month Randomized, Double-blind, Placebo-Controlled Phase III Study Followed by An Open Label Active Treatment (REALISE Study). Phase 3, 1/2017-12/2021.

Jones S. DBV Technologies. A double-blind, placebo-controlled, randomized Phase 3 Trial to Assess the Safety and Efficacy of Viaskin® Peanut in Peanut-Allergic Young Children 1-3 Years of Age (EPITOPE), 3/07/2017-10/30/2022.

Jones S. DBV Technologies. EPITOPE Open-label Extension Study to Evaluate the Long-term Clinical Benefit and Safety of DBV712 in Peanut-Allergic Children (EPOPEX), 12/01/2018-11/31/23.

Jones S. Regeneron Pharmaceuticals, Inc. A Phase 2, Multicenter, Randomized, Double-Blind, Placebo-Controlled, Study in Pediatric Subjects with Peanut Allergy to Evaluate the Efficacy and Safety of Dupilumab as Adjunct to AR101-CODIT (Peanut Oral Immunotherapy (OIT), 2/01/18-12/31/22.

Jones S. Randomized, Placebo Controlled Study to Evaluate Safety, Tolerability and Immune Response in Adolescents Allergic to Peanut after Receiving Intradermal or Intramuscular Administration of ASP0892 (ARA LAMP vax), a Single Multivalent Peanut (Ara h1, h2, h3) Lysosomal Associated Membrane Protein DNA Plasmin Vaccine MATRIX 1002, 11/2018-8/2021

Jones S, Pesek RD. Regeneron Pharmaceuticals, Inc. A Phase 3, Randomized, 3-Part Study to Investigate the Efficacy and Safety Of Dupilumab In Adult And Adolescent Patients With Eosinophilic Esophagitis (EOE), 11/01/2018-10/31/2023.

Jones S, Scurlock A. Aimmune Therapeutics, Inc., Peanut Oral Immunotherapy Study of Early Intervention for Desensitization (POSEIDON) (ARC005), 10/01/2018-09/30/2021.

Jones S, Scurlock A. Aimmune Therapeutics, Inc Phase 2 Study of AR201 Oral Immunotherapy for Desensitization in Children, Adolescents, and Young Adults with Hen Egg Allergy (AIME01), 10/01/19 – 10/31/21.

Jones S, Pesek RD. Regeneron Pharmaceuticals, Inc. A randomized, double-blind, placebo-controlled study in investigate the efficacy and safety of dupilumab in pediatric patients with active eosinophilic esophagitis. 7/20-7/22.

Jones S, Pesek RD. AstraZeneca; A multi-center, randomized, double-blind, parallel-group, placebo-controlled study to investigate the use of benralizumab for eosinophilic esophagitis (MESSINA), 8/20-8/22.

Jones S, **Scurlock A.** Novartis, Inc; A 52-week, multi-center, randomized, double-blind, placebo-controlled study to assess the clinical efficacy and safety of ligelizumab (QGE031) in decreasing the sensitivity to peanuts in patients with peanut allergy. 6/2/22-5/1/24

Jones S, **Scurlock A**. Siolta Therapeutics, Inc. A Phase 1/2, randomized, double-blind, placebo-controlled, multi-center study of STMC-103H in neonates and infants at risk for developing allergic disease. 3/18/22-3/17/24.

Perez S. Measuring Actual Percent Oxygen Delivered via Nasal CPAP in Neonates; July 1, 2020 – June 30, 2022

Perry T, Scurlock A. A Phase 1/2, randomized, double-blind, placebo-controlled, multi-center study of STMC-103H in neonates and infants at risk for developing allergic disease. 3/18/22-3/17/24.

Pesek RD. "A Phase 3, Randomized, 3-Part study to investigate the efficacy and safety of dupilumab in adult and adolescent patients with eosinophilic esophagitis (EoE)". 11/2018-11/2022

Pesek RD. "A Phase 3, randomized, placebo-controlled study to investigate the efficacy and safety of dupilumab in pediatric patients with active eosinophilic esophagitis". 2/2020-6/2023

Pesek RD. "A multicenter, randomized, double-blind, parallel-group, placebo-controlled study to investigate the use of benralizumab for eosinophilic esophagitis (MESSINA)". 7/2020-7/2023

Pesek R, **Co-I- Perry T,** A Phase 3, Randomized, 3-Part Study to Investigate The Efficacy And Safety Of Dupilumab In Adult And Adolescent Patients With Eosinophilic Esophagitis (EOE) 11/2018-10/2023.

Pesek R, **Co-I- Perry T,** A Phase 3, A Randomized, Double-blind, Placebo-Controlled Study to Investigate the Efficacy and Safety of Dupilumab in Pediatric Patients with Active EoE 04/2020-03/2022.

Pesek R, **Co-I- Perry T**, A Phase 3, Randomized, 3-Part Study to Investigate The Efficacy And Safety Of Dupilumab In Adult And Adolescent Patients With Eosinophilic Esophagitis (EOE) 11/01/2018-10/31/2023

Pesek R, **Co-I- Perry T**. A Phase 3, A multi-center, randomized, double-blind, parallel-group, placebo-controlled study to investigate the use of benralizumab for eosinophilic esophagitis (MESSINA), 8/20-8/22

Scurlock A, **Co-I- Perry T.** A Phase 3, Peanut Oral Immunotherapy Study of Early Intervention for Desensitization (POSEIDON) (ARC005) 10/2018-09/30/2022.

Scurlock A, **Co-I- Perry T**. A Phase 3, A 52-week, multi-center, randomized, double-blind, placebo-controlled study to assess the clinical efficacy and safety of ligelizumab (QGE031) in decreasing the sensitivity to peanuts in patients with peanut allergy. 6/2/22-5/1/24

Sims C. A Dietary Intervention to Modify Breast Milk Content in Obese Lactating Women. AKA: The Nourish Study. Phase: N/A (dietary intervention). Beginning Date: April 16, 2019 (Actual). End Date: September 2022 (Anticipated)

Spyridoula M. Title: Discontinuation of levothyroxine therapy for patients with subclinical hypothyroidism: a pilot randomized, double-blinded, placebo-controlled study

Phase: Recruitment, data collection. Beginning date: 03/01/2021. End date: 12/31/2022

Steinbach B, Fisher, Non-invasive diagnosis of pediatric invasive mold infections NIAID; Observational/Year 2018-2023

Steinbach B. Herold,Tuomanen/Englund. Multi-center evaluation of the threat of established and emerging respiratory viral infections in pediatric transplant recipients, NIAD; Observational/ Year 1, 2021-2026

Tas E. Title of the Study: Nutritional stimulation of growth in Children with Short Stature without Growth Hormone Deficiency

Tas E. Nutritional stimulation of growth in Children with Short Stature without Growth Hormone Deficiency. 2020-2022

Thomason A. Study Title: "Does your child still stutter?" Clinical application of evidence-based prognostic indicators for persistent stuttering and the role of timely speech therapy

Phase: recruitment, data collection. Beginning date: 3/1/2021, Ending date: 2/28/23

New Research Awards, July 1, 2021, to June 30, 2022

Alam M, Ali H, **Medina-Bolivar F**,

Hershberger J, Ontko A.

Acquisition of a 400 MHz nuclear magnetic resonance (NMR) for research at Arkansas State University; NSF MRI: 2021-2024; $345,935.

Almodovar J. Polyelectrolyte multilayered surfaces for use in hMSC manufacturing. NSF $50,000.

Andres A, Borsheim E. Phenotypic and Metabolic Characteristics in Infancy and Early Childhood Leading to Obesity. $225,000/yr.

Andres A, Darden P. Arkansas ECHO ISPCTN.

Andres A, Everson/Pearson.Growth and metabolic programming from prenatal PFAS exposure: examining the roles of placental functional genomics and protection by maternal exercise.

Arthur JM, **Borsheim E,** Greene C. Institutional Career Development (KL2 grant; UAMS-Translational Research Institute). $425,064/yr.

Arun A, Joshee N, **Medina-Bolivar F**, Reddy U. Revamping agricultural biotechnology education in Puerto Rico by empowering K-14 Teachers. USDA; 2021-2025; $500,000 (note – not direct funding to A-State).

Bai M. Self-Affirmation Intervention for People Newly Diagnosed with Advanced Cancer: A Feasibility and Preliminary Efficacy Trial Internal ABI funds/UAMS Winthrop Rockefeller Cancer Institute. 2021-2022; $50,000**.**

Boves T, Neuman-Lee L. Geographic variation in egg composition in Prothonotary Warblers (Protonotaria citrea)**.** $8,600.

Burdine L. Interventional Radiologic Targeting of the Splenic PALS for in vivo Immune Cell Programing in Pigs. Provost Award.

Cannon M. Proteogenomic Analysis of Responders Versus Nonresponders in a Phase 1 Trial of Th17-Inducing Dendritic Cell Vaccination for Advanced-Stage Ovarian Cancer. 2021-2023.

Ceballos. National Science Foundation Biology Integration Institutes 5-year award $6,100,000

Coridan R, He M, Churchill H, Zou M. MRI: Acquisition of a Sputtering-Evaporation System for Thin Film Deposition. $367,823.

Cornell C, Fagan P. The Center for Research, Health, and Social Justice. 2021-2026 $3,864,520**.**

Delhom, C. Improving Modeling of the Agroecosystem in the Lower Mississippi River Basin. USDA; $541,637.

Ferruzzi M. Pediatric Physical Activity: Mechanisms Impacting Health and Development. Director Physical Activity Core; $8,600,000/yr.

Ferruzzi M. The overarching goal of the Arkansas Children's Nutrition Center is to understand the role of nutrition on maternal-fetal health. Sub project to determine the importance of early childhood physical activity in health and future disease prevention. USDA/ARS; $40,708,000.

Fleming R, Zou M. Low Friction and Durable Graphite Coatings for Reducing Energy Consumption in Conveyor Systems. $56,517.

Fleming R, Keller T, Bonham B. Low-Friction Durable Coatings for Improving Energy Efficiency in Conveyor System. $565,985.

Gilbert B, Buckley C, Ford J, Hays A, Pait A, Qualls J, Stubblefield J, Yanowitz K.

Dyslexia and AI: The use of artificial intelligence to identify and create fonts to improve the reading ability of individuals with dyslexia. $35,000.

Green S. Economic Analysis of East Arkansas Farms Managed for Soil**.** USDA; $264,505.

Gournay, LR, Leen-Feldner, EW. The effects of repeated CBD administration on worry among high trait worriers. $85,000.

Hargis BM, Young MK, Controlling Salmonella through enhanced understanding of horizontal transmission and a novel and scalable vaccination strategy in broilers. USDA-AFRI; $622,656.

Hargis BM, Graham D, Tellez G. Investigations of Histomonosis Prophylaxis and Treatment. Congressional Pass-Through Funding, $900,000 per year to USDA/ARS Beltsville, UADA; $440,000 per year for 5 years.

Huang L. Deciphering trained immunity in lung resident macrophages to combat tuberculosis. American Lung Association; 2021-2023; $50,000

Huang X. Develop new algorithm for disease prediction with features of multiple types of data, ARA Impact grant, 2020-2021.

Izadyar A, Hood E. An Amperometric Glucose Sensor Using Recombinant Mn Peroxidase and Glucose Oxidase. 2021 - 2022**;** $34,992**.**

Izadyar A, Hood E. USDA Capacity Building Grants for Non-Land Grant Colleges of Agriculture. Development of a Nano-biosensor to Detect Glucose for Diabetics, using Recombinant Manganese Peroxidase from Corn Grain.$149,318; 2021-2022; $75,000.

Jun J. Lipolysis during Sleep and Cardiometabolic Consequences of Sleep Apnea. $54,921/yr (Sub-contract)

Koss B. Discovering T cell proteome turnover dynamics to overcome the solid tumor microenvironment. ***NIH;*** $1,883,059.

Kuenzel WJ, Jurkevich A. An updated stereotaxic atlas of the chick brain. $39,300 year 1, $50,000 year 2.

Lorence A. Google X; Arabidopsis high throughput phenotyping. 2022-2023;

$138,375.02.

Lupu F. Discovery and Characterization of Novel Sepsis Proteome Biomarkers. NIH/NIGMS, 2021-2025

Marsico TD, Bellis ES, Lucardi RD. Estimating invasive plant propagule pressure and modeled establishment risk to southern agroforestry. 2021-2026; USDA Forest Service, Southern Research Station; **$193,776**; Current year budget: $38,755.

McElfish, P. Community-Engagement Alliance Against COVID-19 in Disproportionately Affected Communities (CEAL). $1,406,358.

McManis M, Automated Seizure Detection in Neonatal Intensive Care Units; $75,000.

McManis M, AI model development MRIs. $50,000.

McManis M, Technology Development Program – Arkansas Economic Development Center; AI model development for identifying seizure causing lesions. $100,000.

Medina-Bolivar. INBRE Summer Manuscript Support. 5/1/22-7/31/22; $15,402.

Mengiste T, **Bluhm B**. Whole genome resequencing of 400 sorghum core subset germplasm collection. US DOE Joint Genome Institute – Community Sequencing Program. Budget is undefined.

Moore M, Delivery of inhaled nitric oxide via heated flow nasal cannula and noninvasive ventilation in in vitro models of spontaneously breathing children. $2500.

Nakanishi, N. CAREER**:** Neuropeptidergic control of life cycle transition in Cnidaria. $253,023.

Nelson CE, Nic Greene. Myo-SNAP: A versatile synthetic biology platform for skeletal muscle biology and gene therapy. $140,640.

Neuman-Lee L, **Poo S.** Influence of Microhabitat on Tortoise Physiology. Memphis Zoo $1,300.

Neuman-Lee L, Bellis E. Correlating environmental microbial diversity to prevalence and severity of an emerging vertebrate disease. $69,609.

Neuman-Lee L, McDermott D, Chamberlain J. Characterization of Snake Immunity for a Novel Animal Model. $53,030.

Ou, Acheson, McKelvey. 1/6 HBCD Prenatal Experience and Longitudinal Development (PRELUDE) Consortium, NIH; $7,259,045.

Porter, The Role of the Mitochondrion in the Metabolic Stress Response to Burn Trauma NIH/NIGMS; $1,925,000.

Prewitt E, Fagan P. Reducing COVID-19 and Food Insecurity Disparities in Arkansas Rural Delta Counties; Arkansas Department of Health; 2022-2023 $600,000.

Quinn K, Zhan J. Tomic-Canic M, Veves A. Non-invasive automated wound analysis via deep learning neural networks; $1,597,849.

Rajagopalan V. ABI Biotechnology Undergraduate Summer Research Internship award**;** $1,000.

Rhoads A. Evaluation of Feeding the Availa-ZMC to a selected parent breeder line and identifying the incidence of BCO lameness in broiler offspring; $83,546.

Rhoads A. Evaluation of Selected Nuproxa Feed Additives for protection against lameness and improving the well-being of broilers in a lameness challenge model. Nuproxa; $48,730.

Rhoads A, Pummill. Whole Genome Resequencing in Broilers to Map the Genetics for

Resistance to Bacterial Chondronecrosis with Osteomyelitis Leading to Lameness; $54,735.

Rice yield and milling quality prediction using machine learning and remote sensing imagery; Univ of AR Div of Agriculture; 2021-2023; $70,000.

Rojas JA, Rupe JC. Developing and Disseminating a Comprehensive and Sustainable Management Program for Foliar Diseases of Soybean, USB.

Rojas JA, Rupe JC. Seedling diseases of soybean: Management and education, USB

Rojas JA. Seed Treatment Efficacy and Cotton Seedling Disease Prevalence in Arkansas, Cotton Inc.

Rojas, C Lead PI. coPIs: **Goggin**, Egan M, Zhao J, Srivastava V, Rojas, JA, Savin M. Imaging Technologies for Plant, Animal and Soil Health and Productivity; USDA AFRI Equipment Grant Program 2021-2024; $499,992.

Rumpel JA, Bona J, Nagel C, Crawford B, Marion B. Lyon New Scientist Development Award; $37,500.

Rumpel, JA. KL2 Mentored Research Career Development Scholar Awards; $120,000.

Rumpel JA, **Nagel C.** A Risk Stratification Tool for Mortality Prediction in the Setting of Neonatal Acute Kidney Injury Using a Machine Learning Approach. Arkansas Children's Research Institute Marion B. Lyon New Scientist Development Award; 2022-2024; $25,529.

Quinoñes, **Nagel C.** Clarifying Multimorbidity Measurement and Relationships with Geriatric Syndromes among Vulnerable Older Adults (CLIMBED). National Institute on Aging $2,466,584. Submitted 07/01/2021.

Sakon J, **Kim J-W**. Nanocellulose-based Formulation for Reducing Herbicide Drift. Chancellor's Gap Fund/Commercialization Fund; $64,995.

Smeltzer M. COBRE Center for Microbial Pathogenesis and Host Inflammatory Responses. NIH NIGMS; 2022-2027; $1,140,000.

Smeltzer M. Defining the role of post-translational regulation by extracellular proteases in the pathogenesis of Staphylococcus aureus osteomyelitis. NIH/NIAID; 2021-2026.

Srivastava V. Pereira A. RII Track-2 FEC: Systems Genetics Studies on Rice Genomes for Analysis of Grain Yield and Quality Under Heat Stress. $304,910.

Steinbach B. McClain M, Giraldo R, Xiao R, Non-invasive diagnosis of pediatric invasive mold infections. Fisher; $520,483.

Steinbach W, Herold, Tuomanen, Englund. Multi-center evaluation of the threat of established and emerging respiratory viral infections in pediatric transplant recipients. NIAID; $412,592.

Steinbach B, Bobay JB, Moseley M, Soderblom E. Calcineurin regulatory network control of Aspergillus fumigatus hyphal septation. NIAID; $13,622.

Stenken J, Zou M. Multi-Material 3D Nanoprinting of Biodegradable and Electrically Conductive Scaffolds for Spinal Cord Regeneration. $58,418.

Stenken J, Zou M. Creating Next Generation Microdialysis Probes via 3D Printing with 2-Photon Lithography. $49,523.

Strub G. Histological Evaluation of aberrant microRNA Expression in Vascular Anomaly Tissue Specimens. University of Arkansas for Medical Sciences, Equipment Award Request Program. $11,414.05.

Strub G, Identification of microRNA networks driving vascular malformation growth American Academy of Pediatric Otolaryngology. Career Development Award; $40,000.

Stumhofer J. Evaluating the regulation of IL-10-producing CD4 T cells during malaria Infection. NIH-NIAID; 2022-2026; $1,892,205.

Sweet A, **Wijeratne A, Gustafson K, Mangan S**. Acquisition of equipment to enhance genomic infrastructure at Arkansas State University. Arkansas IDeA Network of Biomedical Research Excellence Current year budget; 01/01/2022 - 6/30/2022; $26,395.00.

Swindle. Testing an Adaptive Implementation Strategy to Optimize Delivery of Obesity Prevention Practices in Early Care and Education Settings. NIH; $3,109,216.00.

Tackett AJ. Mechanisms of micro-RNA mediated regulation of cellular proliferation in vascular malformations. NIH $175,000.

Tackett AJ. Center for Translational Pediatric Research. Admin Supplement NIH; $500,000.

Tas E. Nutritional stimulation of growth in Children with Short Stature without Growth Hormone Deficiency Award; $73,300.

Tas E, Weber J. Effects of High-Intensity Interval Training in Adolescents with Hepatosteatosis. NIH/NIGMS**;** $11,500,000.

Thomason A. Nursing and Allied Health Grant. ACRI; $2,877.

Wang Y. Corps: Development of Bent DNA Molecules as Amplifying Sensors. National Science Foundation; $50,000.

Weber J. Center for Childhood Obesity Prevention; $1,485,207/yr.

Weber J. Center for Childhood Obesity Prevention**.** NIH/NIGMS; $11,693,500.

Weber J. Center for Childhood Obesity Prevention**,** administrative supplement to purchase a rodent metabolic and behavioral phenotyping system to increase the access of Center for Childhood Obesity Prevention investigators at Arkansas Children's Research Institute to state-of-the-art instrumentation platforms. NIH/NIGMS; $242,670.

Weber J. Immune responses of THP-1 cells treated with plasma of children receiving blueberry vs. placebo containing products. NIH/NIGMS; $47,000.

Weber J. Effects of High-Intensity Interval Training in Adolescents with Hepatosteatosis. Center for Childhood Obesity Prevention**;** $11,500,000.

Weber J. Center for Childhood Obesity Prevention, Administrative Equipment Supplement. NIGMS; $242,670.00.

Wijeratne A. CoPI: Robertson A, investigating functional changes in soybean root microbiome during Phytophthora sojae colonization. USDA-NIFA; 2022 – 2023. $167,115.

Wijeratne A. CoPI: Brown E. Unraveling functional changes in soil microbiome affecting the development of Sudden Death Syndrome in soybean. Kays Foundation; $16,168.00.

Wijeratne A. CoPI: Robertson A, **Medina-Bolivar F**. Capacity Building Grants for Non-Land Grant Colleges of Agriculture: Effect of DNA methylation on soybean-Phytopthora sojae interactions. USDA-NIFA; 2022-2024; $157,782.

Wijeratne A, Robertson A, **Medina-Bolivar F**. Efect of DNA methylation on soybean-Phytopthora sojae interactions. USDA; 5/1/22-4/30/25 $300,000.

Wyrick. Evaluation of Povidone-iodine Irrigation and Subsequent Intra-abdominal Abscess Formation in a Perforated Appendicitis Murine Model. I-Corps: Physics-Based Binding Affinity Estimator National Science Foundation; $50,000.

Xu, J. Engineering novel designer biologics in plant cells for oral treatment of ulcerative colitis. **NIH/NIGMS** 2021-2024; Subaward direct cost: $50,230 (total subaward $71,730; full proposal direct cost $300,000).

Zou M. Developing Low-Friction and Durable Graphite Coatings for Reducing Energy Consumption in Belt Conveyor Systems; $30,000.

Zou M. Acceleration of neuroregeneration and inhibition of neuropathic pain using stem cell- derived exosomes encapsulated in cellulose films following nerve injury; $70,000.

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