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UAMS, UA and Arkansas Children's Research Institute Collaborate to Support Women's Health Research in Arkansas

LITTLE ROCK — The University of Arkansas for Medical Sciences (UAMS), the University of Arkansas at Fayetteville and the Arkansas Children's Research Institute (ACRI) are collaborating on a yearlong project to make decades of maternal health research readily available for future researchers.

The project is funded by a $310,000 grant from the National Institutes of Health (NIH), in the form of a supplemental award to Lawrence E. Cornett, Ph.D., a distinguished professor in the UAMS College of Medicine Department of Physiology and Cell Biology.

Cornett directs the Arkansas IDeA Networks of Biomedical Research Excellence (INBRE) program, which since 2001 has been building a biomedical research infrastructure across the state that includes programs for undergraduate students and faculty.

The $310,000 award is a supplement to the five-year $18.4 million NIH Institutional Development Award (IDeA) grant that continues the Arkansas INBRE program. The grant supplement will allow scientists at UA Fayetteville and ACRI to collaborate on the development of software tools and analytical processes to streamline the production and analysis of a large maternal health dataset that ACRI has been collecting.

"It's a tremendously rich data set," Cornett said. "It isn't replicated anywhere else. The beauty of this supplement is that it shows the NIH recognizes it's important to support this research being done in Arkansas."

The data "is right now kind of tucked away, but this will help it become more available to more investigators, in a form where it's useful."

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"The infrastructure will support research studies of mother and child health at the Arkansas Children's Nutrition Center and clinical research programs within Arkansas Children's Hospital," said Colin Kay, Ph.D., a professor of pediatrics at UAMS who directs Precision Health Research at ACRI and is overseeing the project. "We're using machine learning and artificial intelligence to help us make connections between these rich datasets. It's really next level in helping us generate new hypotheses and studies."

Kay, a nutritional biochemist and expert in interpreting and organizing nutrition health data, will work with experts at UA Fayetteville who specialize in complex databases.

Xintao Wu, Ph.D., professor of Electrical Engineering and Computer Science, will lead efforts to build the software applications, data infrastructure and dashboards in collaboration with Kay and researchers at ACRI. Wu is the director of the Data Science Core within the Arkansas Integrative Metabolic Research Center (AIMRC), an NIH-designated Center of Biomedical Research Excellence (COBRE) on the UA Fayetteville campus. As part of the AIMRC, Wu and the Data Science Core specialize in artificial intelligence (AI)-based approaches to elucidate relationships between large imaging, bioenergetics, genomic and proteomic data sets.

Wu's expertise in developing novel AI algorithms and tools for complex data, especially those with challenging attributes like noise and imbalance, will be pivotal.

"Our team will develop an integrated data and cloud infrastructure, an integrative knowledge database, and an interactive dashboard to support storage, management, integration, analysis and visualization of multi-omics and phenotypic data from this project and existing databases, for women's precision health," Wu said. "We are excited to conduct this collaborative project which potentially brings modern AI and computing to biomedical research."

Kyle Quinn, Ph.D., professor of Biomedical Engineering and director of the AIMRC, brings additional experience with AI solutions for biomedical problems. He will collaborate closely with Wu to identify data science solutions through the AIMRC Data Science Core and support the development of training modules for the analysis tools.

This collaboration among UAMS, ACRI, and UA Fayetteville grew from conversations following an invited talk by Kay as part of the AIMRC's seminar series during the fall of 2023. Kay and Alan Tackett, Ph.D., distinguished professor of Biochemistry and Molecular Biology at UAMS, discussed collaborative data science opportunities with Quinn.

"We quickly realized that we should bring Larry Cornett and Xintao Wu into the fold," said Quinn. "Leveraging the expertise of our AIMRC Data Science Core to help interpret the rich dataset from ACRI is a great example of natural synergy between two NIH IDeA programs here in Arkansas — the Arkansas INBRE and AIMRC COBRE."

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"It really is collaborative science — team science," said Kay. "We have the data and domain expertise, and they have the expertise to build tools to connect the data and analyze it."

"We've had clinical studies going on for more than 13 years that are all related to women's maternal health and the effects on the imprinting of the child and continued development," Kay said, referring to ACRI. "We've had more than 30 or 40 people involved in the collection and processing of the data. My goal is how to better utilize the data to get the most use out of it."

"In building the platform, we're using some of our internal data, but once built, the platform could be used to integrate data that has been collected from others," Kay said, citing data from "precision nutrition" and "precision medicine" initiatives that ACRI is involved in. Precision medicine refers to a highly personalized approach to prevention and treatment that encompasses individual variables such as genetics and lifestyles.

"Our primary goal is to develop the data informatics scaffold in order to establish a searchable women's health dashboard that supports precision nutrition and health initiatives in IDeA states and beyond," according to an abstract outlining the aims of the project.

"This is the first step," Kay said, "to build this tool to be available for researchers. But once it's developed, I see it having utility beyond research. People and their physicians could use it to make informed choices for their diet and health."

He said precision medicine combined with precision nutrition equals precision health, which "is a very hot topic right now in science."

"In the field of nutrition that we're studying now," Kay said, "the mother's diet can have a profound effect on the fetus. If we can make mothers healthier and find ways to remove complications, we can put their children on a trajectory for success."

"The need to improve maternal health care in Arkansas is clear, and this has been highlighted by many state leaders and health care professionals this year," said Quinn. "Our NIH-funded collaboration is an opportunity to apply state-of-the-art data science approaches to gain a better understanding of how we can improve the health of mothers and their children in Arkansas."

Cornett said that in 1990, the NIH established the Office of Research on Women's Health, and it came up with the idea for the supplements to include more women in NIH-supported clinical trials, which is necessary to improve women's health outcomes.

The supplement brings the total that Arkansas INBRE has received from the NIH to date to $78.8 million.

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About Arkansas Children's — Arkansas Children's is the only health care system in the state solely dedicated to caring for Arkansas' nearly 700,000 children. The private, non-profit organization includes two pediatric hospitals, a pediatric research institute and USDA nutrition center, a philanthropic foundation, a nursery alliance, statewide clinics, and many education and outreach programs — all focused on fulfilling a promise to define and deliver unprecedented child health. Arkansas Children's Hospital (ACH) is a 336-bed, Magnet-recognized facility in Little Rock operating the state's only Level I pediatric trauma center; the state's only burn center; the state's only Level IV neonatal intensive care unit; the state's only pediatric intensive care unit; the state's only pediatric surgery program with Level 1 verification from the American College of Surgeons (ACS); and the state's only nationally recognized pediatric transport program. Arkansas Children's is nationally ranked by U.S. News & World Report in seven pediatric subspecialties (2023—2024): Cancer, Cardiology & Heart Surgery, Diabetes & Endocrinology, Nephrology, Orthopedics, Pulmonology & Lung Surgery and Urology. Arkansas Children's Northwest (ACNW), the first and only pediatric hospital in the northwest Arkansas region, is a level IV pediatric trauma center. ACNW operates a 24-bed inpatient unit; a surgical unit with five operating rooms; outpatient clinics offering over 20 subspecialties; diagnostic services; imaging capabilities; occupational therapy services; and northwest Arkansas' only pediatric emergency department, equipped with 30 exam rooms. Generous philanthropic and volunteer engagement has sustained Arkansas Children's since it began as an orphanage in 1912, and today ensures the system can deliver on its promise of unprecedented child health. To learn more, visit archildrens.org.

About AIMRC — The Arkansas Integrative Metabolic Research Center (AIMRC) is a Phase I COBRE at the University of Arkansas at Fayetteville (04/01/2021-02/28/2026; PI: Dr. Kyle P. Quinn). The scientific theme of the AIMRC is to understand the role of cell and tissue metabolism in disease, development, and repair through research involving advanced imaging, bioenergetics, and data science. Visit us at https://aimrc.uark.edu/.

About UAMS — UAMS is the state's only health sciences university, with colleges of Medicine, Nursing, Pharmacy, Health Professions and Public Health; a graduate school; a hospital; a main campus in Little Rock; a Northwest Arkansas regional campus in Fayetteville; a statewide network of regional campuses; and eight institutes: the Winthrop P. Rockefeller Cancer Institute, Jackson T. Stephens Spine & Neurosciences Institute, Harvey & Bernice Jones Eye Institute, Psychiatric Research Institute, Donald W. Reynolds Institute on Aging, Translational Research Institute, Institute for Digital Health & Innovation and the Institute for Community Health Innovation. UAMS includes UAMS Health, a statewide health system that encompasses all of UAMS' clinical enterprise. UAMS is the only adult Level 1 trauma center in the state. UAMS has 3,275 students, 890 medical residents and fellows, and five dental residents. It is the state's largest public employer with more than 12,000 employees, including 1,200 physicians who provide care to patients at UAMS, its regional campuses, Arkansas Children's, the VA Medical Center and Baptist Health. Visit www.uams.edu or www.uamshealth.com. Find us on Facebook, X (formerly Twitter), YouTube or Instagram.

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