K-State virologists publish new findings on SARS-CoV-2 treatment option

A recent study by Kansas State University virologists demonstrates successful postinfection treatment for SARS-CoV-2, the virus that causes COVID-19.

College of Veterinary Medicine researchers Yunjeong Kim and Kyeong-Ok "KC" Chang published the study in the prestigious journal Proceedings of the National Academy of Sciences of the United States of America, or PNAS. They found that animal models infected with SARS-CoV-2 and treated with a deuterated protease inhibitor had significantly increased survival and decreased lung viral load.

The results suggest that postinfection treatment with inhibitors of proteases that are essential for viral replication may be an effective treatment against SARS-CoV-2. These protease inhibitors are a class of antiviral drugs that prevent viral replication by selectively binding to viral proteases and blocking the activation of proteins that are necessary for the production of infectious viral particles.

"We developed the protease inhibitor GC376 for treating a fatal coronavirus infection in cats, which is now under commercial development as an investigational new animal drug," said Kim, associate professor of diagnostic medicine and pathobiology. "After COVID-19 emerged, many research groups reported that this inhibitor is also effective against the coronavirus that causes COVID-19, and many are currently pursuing the development of protease inhibitors as a treatment."

Kim and Chang modified GC376 using a tool called deuteration to test its efficacy against SARS-CoV-2.

"Treating SARS-CoV-2-infected mice with deuterated GC376 significantly improved survival, viral replication in lungs and weight losses, which shows the efficacy of the antiviral compound," said Chang, professor of diagnostic medicine and pathobiology. "The results suggest deuterated GC376 has a potential for further development, and this deuteration method can be utilized to other antiviral compounds to generate potent inhibitors."

The virologists are continuing to develop improved inhibitors using various methods. Deuterated GC376 is currently being evaluated for further potential development.

Previous work done by Kim and Chang is continuing development through licensing agreements with industry partners.

Grain scientist receives Early Career Engineer of the Year Award

Kaliramesh Siliveru, assistant professor of grain science in the College of Agriculture, has been awarded the 2021 Early Career Engineer of the Year Award by the American Society of Agricultural and Biological Engineers' Association of Agricultural, Biological, and Food Engineers of Indian Origin. This award
recognizes the outstanding engineering achievements in design, research, development, or management made by young professional agricultural, biological and food engineers in the past three years.

"Since joining the grain science and industry department in January 2018, Siliveru has established a very active research, teaching and outreach program in the areas of grain processing, materials handling and mathematical modeling that has caught the attention of the grain-based food and feed industry and attracted substantial funding in support of his efforts and program establishment," said Gordon Smith, grain science and industry department head.

Most cereal grains undergo different unit operations before reaching out to the consumer. Understanding the postharvest processes and processing characteristics of these granular materials is important to deliver a uniform and safe product to the growing population. To achieve the goal of delivering a uniform and safe product, Siliveru conducts research in milling technologies, food safety, process automation and simulation, particle technology, and materials handling. Most of Siliveru’s research work is conducted collaboratively with faculty in the grain science and industry or biological and agricultural engineering departments, and with scientists from the USDA-ARS Center for Grain and Animal Health Research, as well as with other universities.

Siliveru’s current research topics include the modeling the fumigation in grain storage structures to predict the fumigant transfer to enable the safe storage of grains; the development of novel milling methods for processing sorghum, with the aim of bringing back the ancient grain to the dinner table; the development of process kill steps for resolving the outbreaks of E. coli and Salmonella in wheat flours; and the flow characterization of food and feed materials.

Earlier this year, Siliveru was awarded the 2021 Andersons Early-in-Career Award of Excellence, by NC-213-the U.S Quality Grains Research Consortium, as well as the 2021 Gamma Sigma Delta Early Career Award, by Gamma Sigma Delta, the Honor Society of Agriculture, ETA Chapter, for his early-in-career achievements in the field of grain processing and storage.

**K-State Polytechnic selected to lead NIST contract for UAS prize competition**

*Kansas State University Polytechnic Campus* has been selected to lead the third unmanned aircraft systems, prize competition by the U.S. Department of Commerce’s National Institute of Standards and Technology, or NIST.

Named the **First Responder UAS Triple Challenge**, this prize competition will focus on the advancement of UAS technology to support first responders and help speed the time to save lives. The competition is comprised of three challenges where participants will use their UAS ingenuity to deliver creative solutions to advance first responder operations.

In partnership with Mississippi State University, K-State Polytechnic will coordinate the UAS Triple Challenge beginning in August, with live competitions in Starkville, Mississippi, and Salina in spring/summer 2022.

*This project has been a long time in the making for

**Legislative redistricting town hall meetings held at two K-State campuses**

Kansas State University was honored to host the first two stops of the House Committee on Redistricting and the Senate Committee on Redistricting joint listening tour on August 9, 2021. Legislators heard public comments concerning the redistricting process at meetings held on the Manhattan campus and at K-State Polytechnic in Salina.

**Improving immunotherapy treatment for cancer patients the goal for engineering research team**

Immunotherapy can leverage the body’s immune system to fight cancer. While excellent responses have been observed for some patients, a considerably larger number have received little benefit.

A team at Kansas State University, led by Punit Prakash, associate professor in the Mike Wiegers Department of Electrical and Computer Engineering,
our team at K-State," said Kurt Barnhart, professor of aviation and lead of the K-State grant team. "We are privileged to partner with the challenge team at NIST in its ongoing effort to push innovative technologies forward for all first responders, providing life-saving help when needed the most. We’re also excited to be working with the excellent team at Mississippi State University's Raspet Flight Laboratory to jointly develop and deliver this competition."

The three competitions composing the UAS Triple Challenge cover various areas of UAS technology. FastFind: UAS Search Optimized is focused on search and rescue using optical sensors and data analysis to improve image detection and location. LifeLink: UAS Data Relay is centered around supporting continuous delivery of broadband data in a degraded cellular area, and ShieldsUP!: Securing UAS Navigation and Control requires participants to identify cybersecurity threats and countermeasures in three specific attack areas.

"Unmanned Aerial Vehicles are a critical resource for addressing public safety and aiding first responders," said Sen. Jerry Moran, Kansas. "I was pleased to support this initiative through my leadership role on the Commerce, Justice and Science Appropriations Subcommittee and look forward to the talent and hard work Kansas State University’s expertise will bring polytechnic.k-state.edu to the challenge."

More than $700,000 will be awarded in prizes throughout the three competitions. Prize recipients will be determined by a panel of judges, assisted by a team of subject matter experts, throughout each stage of the competitions.

All UAS enthusiasts are encouraged to compete in the First Responder UAS Triple Challenge. For more information on the competition and to register, visit uastriplechallenge.com.

The National Institute of Standards and Technology promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards and technology in ways that enhance economic security and improve our quality of life. To learn more about NIST, visit NIST.gov.

Kansas State University's Polytechnic Campus is home to the university's unmanned aircraft systems program, which is a national leader in the unmanned aviation field and provides many engagement and education opportunities. Learn more at polytechnic.k-state.edu.

**Geographers awarded NSF grant to study effects of rural wildfires**

Audrey Joslin and Marcellus Caldas, both from the College of Arts and Sciences' geography and geospatial sciences department, have received a $446,000 National Science Foundation grant that began on July 1 and runs through Dec. 31, 2024.

The project aims to understand the effects of wildfire in rural landscapes and how perceived wildfire risks shape agricultural land management and landowner decisions to participate in conservation programs and practices. Studying the interactions between wildfires, rural conservation efforts, and responses of farmers and landowners provides a critical foundation for understanding how environmental changes and has been funded by the National Science Foundation to research monitoring of a cancerous tumor's immune state in order to assess immunotherapy interventions that will drive more tumors to a favorable state.

"As the team works toward development of this experimental platform for closed-loop monitoring and modulation of tumor immune states, the outcomes may ultimately contribute to improvement of cancer immunotherapy treatment," said Prakash, designee of the Paul L. Spainhour professorship in electrical and computer engineering at Kansas State University.

With an additional $500,000 in funding through the NSF Cyber-Physical Systems Program, collaborating on the project will be Rahul Sheth, a physician and associate professor in the interventional radiology department at the University of Texas MD Anderson Cancer Center.

While immunotherapy has revolutionized the landscape of cancer care over the past decade, numerous barriers to immunotherapies hinder their efficacy in the majority of cancer patients. The team's research through this funding will seek to both uncover the mechanisms of resistance and rationally deliver targeted therapies to overcome these hurdles.

"Modeling the tumor as an 'in-body cyber-physical system,' our project will explore development of a microneedle platform that includes a sensor array for measuring biophysical parameters of the tumor microenvironment," Kim said.

"Sensor measurements will drive novel model-informed machine-learning techniques and enable estimation of the tumor's immune state," Natarajan said, "which will then guide delivery of interventions through the same microneedle platform."

**Team receives USDA grant to maximize profitability for Kansas small beef producers**

A team of K-State researchers has received a $500,000 grant from the U.S. Department of Agriculture to develop resources that will help small and medium-sized business-to-consumer beef producers in Kansas maximize their profitability.

The team is comprised of researchers from hospitality management, agricultural economics and animal sciences. Junehee Kwon, professor of hospitality management is the director of the project alongside co-directors Gregory Ibendahl, agricultural economics, Travis O’Quinn, animal sciences, and Yue Teng-Vaughan, hospitality management.
Extreme events may influence incentives to pursue conservation on the land.

The project works closely with local stakeholders and supports the education and training of graduate and undergraduate students in interdisciplinary research and methods.

Joslin is the principal investigator for the grant and Caldas is a co-principal investigator. They are joined by Jason Bergtold, agricultural economics, and Ignacio Ciampitti, agronomy, who are also co-principal investigators.

The National Science Foundation is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..."

Visit the geography and geospatial sciences department website to learn more about the program.

**DID YOU KNOW?**

Kansas State University has been named a 2021 Top Employer by DiversityJobs.com for a second consecutive year.

Demands for local beef have increased over the years but surged during the COVID-19 pandemic. Kwon noted that, "as more direct transactions occurred among producers, processors and customers of local beef, challenges surfaced due to uncertainties and lack of communication among stakeholders." A preliminary survey also showed beef producers did not fully utilize standardized farm financial management techniques to maximize profitability.

To address these challenges, the project team will partner with small and medium-sized beef producers in Kansas to develop and assess financial management, cost control, benchmarking and marketing resources for producers. Consumer-focused resources will also be developed to help improve communication between producers, processors, and customers. These resources will help eliminate misunderstandings that lead to dissatisfaction with the business-to-consumer transaction and include information about beef yield and quality, purchasing considerations and an interactive decision-making tool to determine beef cut orders with the processor.

"Once developed, these free resources will be made available to all Kansas beef producers who wish to establish or improve their direct-to-consumer sales," Kwon said. "In the end, we hope to help producers better manage and benchmark their data, effectively communicate with their consumers about the quality local beef and strengthen the Kansas economy by enhancing the business-to-consumer network."