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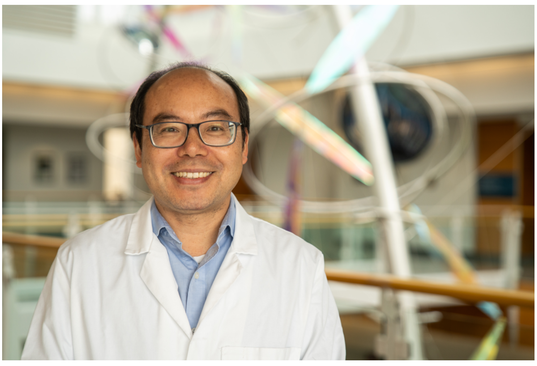
Why do some people spread the flu while others avoid infection? Mizzou researchers investigate

Backed by a $19 million NIH P01 grant, Mizzou scientists are studying how influenza spreads, with the goal of developing better ways to prevent infections.

By Brian Consiglio



Henry Wan

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Photo by Reagan Manis

University of Missouri researchers are taking a closer look at why some people infected with influenza spread the virus more efficiently than others — and why some exposed individuals become infected while others do not.

Supported by a $19 million grant from the National Institutes of Health, the team has established a new research program, the Missouri Center for Influenza Transmission and Immunity (Missouri-CITI), to investigate how immunity, temperature and humidity influence transmission, with the goal of developing better ways to prevent infection and reduce the spread of the virus.

This is Mizzou's first new NIH Program Project (P01) grant since 2010, marking a significant milestone for the university's multidisciplinary research efforts.

Led by Henry Wan, founding director of Mizzou's NextGen Center for Influenza and Emerging Infectious Diseases, the multidisciplinary team aims to understand how immunity and environmental conditions work together to determine whether influenza successfully spreads from one person to another. Wan is a Curators' Distinguished Professor in the School of Medicine, with joint appointments in the College of Engineering and College of Veterinary Medicine, and an investigator in the Bond Life Sciences Center.

Missouri-CITI is part of the National Institutes of Health's Influenza Transmission Research Consortium, a broader research initiative aimed at improving our understanding of how influenza spreads and how transmission can be prevented.

The project examines flu transmission from several angles: how infected people release the virus, what factors influence the amount of infectious virus they release, how the virus travels through the air, and what makes some people less susceptible to infection.

"Being infected with influenza does not necessarily mean someone will efficiently spread the virus to others, and being exposed does not always mean someone will become infected," Wan said. "We want to understand what determines whether the virus successfully moves from one person, through the air, to infect another person."

Previous flu infections and vaccinations can affect how much virus an infected person releases into the air, as well as how susceptible others are to infection. Temperature and humidity can also affect how respiratory particles travel through the air and how long the virus remains infectious.

The project brings together researchers from multiple disciplines across Mizzou, including Jane McElroy, Chris Sampson, Dima Dandachi and Nai-Wei Chen from the School of Medicine; John Driver, Kiho Lee and Weihong Gu from the College of Agriculture, Food and Natural Resources; Wenjun Ma from the College of Veterinary Medicine; and Binbin Wang from the College of Engineering.

External collaborators include Jane Tao of Rice University, Jacco Boon of Washington University in St. Louis, Hulin Wu of UTHealth Houston, and Alicia Olivier of Mississippi State University. Together, the team combines expertise in influenza virology, immunology, human clinical research, animal models, aerosol science, engineering and computational modeling.

Mizzou's National Swine Resource and Research Center will support animal studies using genetically engineered pigs, while MU Health Care will help researchers recruit people with influenza infections. Specialized research facilities at Mizzou will allow scientists to investigate how immunity and environmental conditions influence airborne transmission under carefully controlled conditions. By integrating findings from animal experiments with human studies, the team hopes to learn how influenza spreads among people.

"Every year, the flu is a massive problem, particularly in the fall and winter," Wan said. "Since the challenge is so huge, we need people with different areas of expertise all working together, and there is a collaborative culture at Mizzou that you don't find at many other places."

The findings could help researchers identify immune responses that reduce the amount of infectious virus people release into the air and environmental conditions that make transmission less likely. That could inform the development of future vaccines and other preventive strategies designed not only to protect individuals from influenza, but also limit the spread of flu in schools, homes, workplaces and other settings.

"If we better understand how influenza transmits, particularly airborne transmission from person to person, it can help us develop ways to not only protect you, but also protect the people around you," Wan said.

Learn more about how Mizzou is studying pigs to save and improve lives.

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