

## Tulane School of Medicine rises to COVID-19 challenges

Compiled by Inside Tulane Med staff  
inidetulanemed@tulane.edu



The Centers for Disease Control awarded \$700,000 for COVID-19 research to a Tulane University team of researchers including Assistant Professor of Medicine Dahlene Fusco, MD, PhD. (Photo by Paula Burch-Celentano)

When COVID-19 began to spread across the United States last spring, Tulane University School of Medicine was prepared to fight the virus on many different levels. From researchers in labs, to students who orchestrated PPE drives — Tulane University accepted the challenge to address the pandemic.

Early on in the pandemic, the university announced that its investigators were beginning to receive grants and gifts related to COVID-19 research and testing capability.

In April, the National Institutes of Health, National Institute of Allergy and Infectious Diseases (NIH/NIAID) awarded [Tulane National Primate Research Center](#) (TNPRC) [a contract of up to \\$10.3 million](#) to evaluate the nation's most promising vaccines and treatments to combat COVID-19.

The three-year NIH/NIAID award will initially study three species of nonhuman primates to determine which most closely mimics COVID-19 infection and transmission as experienced by humans. A nonhuman primate model will provide key information about the characteristics of the disease and will help researchers determine which candidate COVID-19 vaccines and treatments are safe and effective.

"The range of biological responses to COVID-19 is incredibly wide," said lead investigator Chad Roy, PhD, professor of microbiology and immunology in the Tulane University School of Medicine and director of infectious disease aerobiology at the TNPRC. "We know relatively little about the intricacies of the disease — like why some infections result in mild disease, while others experience severe complications or death."

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In May, [three Tulane University researchers received new Fast Grants](#), awards designed to quickly fund COVID-19 related projects. Mairi Noverr, Monica Vaccari and Tracy Fischer received a total of \$350,000 for their proposals, all of which progressed from mere proposals to fully funded projects in just 48 hours.

Mairi Noverr, PhD, a professor at Tulane University School of Medicine, received a \$200,000 Fast Grant for her proposal to use the existing live-attenuated vaccines for measles-mumps-rubella and tuberculosis in a nonhuman primate model.

Monica Vaccari, PhD, who joined the Division of Immunology at TNPRC earlier this year as an associate professor, received a Fast Grant award of \$100,000 to study early host immune responses to SARS-CoV-2 in a relevant nonhuman primate model.

An award of \$50,000 went to Tracy Fischer, PhD, an associate professor in the Division of Comparative Pathology at TNPRC. Her research team hopes to better understand how the SARS-CoV-2 virus affects the body.

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*Read more about the activities and contributions of Tulane students and staff during the pandemic:*

[BRACE'd to reopen: Med students help businesses operate safely](#)

[School of Medicine faculty, staff stayed on the job for COVID-19 crisis](#)

[Going viral: Tulane staffer shifts roles into COVID-19 science whisperer](#)

[New podcast focuses on COVID immunity](#)

[Tulane medical students coordinate donations of protective gear for hospitals](#)

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COVID-19 can affect individuals in a number of different ways, from an absence of symptoms to major complications and death. [The Centers for Disease Control awarded \\$700,000 to a Tulane University team of researchers](#) who are studying how the virus works and where and when it is shed.

Assistant Professor of Medicine Dahlene Fusco, MD, PhD, and her team are tracking patients from hospitals and clinics around Greater New Orleans. They are collecting clinical, virus and serologic (antibody and cytokine) data from people diagnosed with COVID-19, which will allow a real-time comparison of the course of the illness and how the patient's immune system responds. The researchers plan to follow patients for a year after their treatment for the virus.

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As pharmaceutical firms race to bring the first COVID-19 vaccines to market, some scientists are already working on version 2.0. [Two Tulane University researchers were awarded a \\$150,000 Fast Grant](#) for a project to make next-generation COVID-19 vaccines more effective.

Microbiologist Lisa Morici, PhD, and immunologist James McLachlan, PhD, will test whether they can elicit a better immune response in tissues most vulnerable to SARS-CoV-2 infection — the lungs and gut — by adding two bacteria-based adjuvants to COVID-19 vaccines in development. Adjuvants are ingredients used in

vaccines to trigger an immune response.

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Investigators at Tulane made significant findings that shed light on how COVID-19 is transmitted and how it affects infected individuals. [One Tulane study found that patients hospitalized with COVID-19](#) who had a combination of high blood pressure, obesity and diabetes were over three times more likely to die from the disease.

The [study](#), published in the journal *Diabetes Care*, was the first to look at the impact of metabolic syndrome — a cluster of at least three of five conditions: hypertension, high blood sugar, obesity, high triglycerides and low HDL cholesterol — on outcomes for COVID-19 patients.

“Together, obesity, diabetes and pre-diabetes, high blood pressure and abnormal cholesterol levels are all predictive of higher incidents of death in these patients. The more of these diagnoses that you have, the worse the outcomes,” said lead author Joshua Denson, MD, MS, assistant professor of medicine and pulmonary and critical care medicine physician.

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[SARS-CoV-2, the virus that causes COVID-19, can remain infective in aerosol for up to 16 hours](#) according to a Tulane [study](#) published in [Emerging Infectious Diseases](#).

The researchers also found that the virus can survive in the air much longer than other similar coronaviruses, such as SARS or MERS.

Lead investigator Chad Roy’s research was conducted in an artificial, laboratory-type setting that didn’t factor in real-world conditions like UV light or wind, but said he believes that the findings still have practical implications.

“This is just one more piece of the puzzle in understanding how people are getting sick and how we can best protect ourselves and each other. If anything, this research should serve as a warning light that this virus is more resilient than similar viruses, and that public health measures should be heeded.”

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Scientists working to develop drugs against COVID-19 are focused on interrupting its interaction with ACE2, an enzyme the spike protein on the surface of the coronavirus

latches onto, like a key, to enter and infect healthy cells.

[Researchers at Tulane University School of Medicine have designed a synthetic protein that acts as a decoy to intercept and neutralize the virus](#) before it can attach to ACE2 to cause infection. The protein, MDR504, effectively blocked the SARS-COV-2 virus in cell cultures, according to early research published on [bioRxiv](#).

“Unlike other agents in development against the virus, this protein is engineered to go to the lungs to neutralize the virus before it can infect lung cells,” said lead study author Jay Kolls, MD, the John W. Deming Endowed Chair in Internal Medicine at Tulane.

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Over the summer, Tulane received [an anonymous \\$1 million gift](#) to establish a fund for Emerging Research in Infectious Disease.

The fund will be used to support Tulane’s research in infectious disease, providing an immediate impact in the race for treatments and a vaccine for COVID-19. It will address all aspects of the crisis, from detection to treatment to prevention by supporting Tulane’s promising research and clinical enterprise.

“We will be able to analyze the genome of emerging infections in broader detail, so that we can simultaneously track the evolution of pathogens and identify weaknesses that can be used to develop vaccines or treatment strategies,” said Lee Hamm, MD, senior vice president and dean of the Tulane School of Medicine. “These funds will both support our ongoing work and establish new lines of COVID-19 research for novel treatments and antivirals, vaccines, antibody testing, and give us a better understanding of the impact of health disparities.”