UNIVERSITY of MARYLAND
SCHOOL OF MEDICINE

UM School of Medicine Researchers Help Identify Potent Antibody Cocktail with Potential to Treat COVID-19

June 15, 2020 | Deborah Kotz

Publication Highlights Process for Yielding Array of Human Antibodies That Target Protein on Virus

Researchers at the University of Maryland School of Medicine (UMSOM) evaluated several human antibodies to determine the most potent combination to be mixed in a cocktail and used as a promising anti-viral therapy against the virus that causes COVID-19. Their research, conducted in collaboration with scientists at Regeneron Pharmaceuticals, was published today in the journal Science. The study demonstrates the rapid process of isolating, testing and mass-producing antibody therapies against any infectious disease by using both genetically engineered mice and plasma from recovered COVID-19 patients.

The antibody cocktail evaluated by UMSOM researchers will be used to treat COVID-19 patients in a clinical trial that was launched last week. The study was funded by Regeneron, a biotechnology company based in Tarrytown, New York.

Antibodies are proteins the immune system naturally makes in response to foreign invaders like viruses and bacteria. Antibody therapies were first tried in the late 19th century when researchers used a serum derived from the blood of infected animals to treat diphtheria.

To produce the so-called monoclonal antibodies for an antibody cocktail to fight COVID-19, the researchers first needed to identify which antibodies fight the novel coronavirus most effectively.

This involved determining which antibodies could bind most effectively to the spike protein found on the surface of SARS-CoV-2, the virus that causes COVID-19. The Regeneron team evaluated thousands of human antibodies from plasma donations from recovered COVID-19 patients. They also generated antibodies from mice genetically engineered to produce human antibodies when infected with the virus.

“The ability of the research team to rapidly derive antibodies using these two methods enabled us screen their selected antibodies against live virus to determine which had the strongest anti-viral effects,” said study co-author Matthew Frieman, PhD, Associate Professor of Microbiology and Immunology at the University of Maryland School of Medicine. He has been studying coronaviruses for the past 16 years and has been carefully studying SARS-CoV-2 in his secure laboratory since February.

Dr. Frieman and his UMSOM colleagues evaluated four of the most potent antibodies for to determine the potential of each one to neutralize the SARS-CoV-2 virus. They identified the two that would form the most powerful mix when used in combination.

"An important goal of this research was to evaluate the most potent antibodies that bind to different molecules in the spike protein so they could be mixed together as a treatment," said study co-author Stuart Weston, PhD, a post-doctoral research fellow in the Department of Microbiology and Immunology.

The cocktail containing the two antibodies is now being tested in a new clinical trial sponsored by Regeneron that will investigate whether the therapy can improve the outcomes of COVID-19 patients (both those who are hospitalized and those who are not). It will also be tested as a preventive therapy in those who are healthy but at high risk of getting sick because they work in a healthcare setting or have been exposed to an infected person.

"Our School of Medicine researchers continue to provide vital advances on all fronts to help fight the COVID-19 pandemic and ultimately save lives," said Dean E. Albert Reece, MD, PhD, MBA, who is also Executive Vice President for Medical Affairs, UM Baltimore, and the John Z. and Akiko K. Bowers Distinguished Professor, University of Maryland School of Medicine. "This particular research not only contributes to a potential new therapy against COVID-19 but could have broader implications in terms of the development of monoclonal antibody therapies for other diseases."

About the University of Maryland School of Medicine

Now in its third century, the University of Maryland School of Medicine was chartered in 1807 as the first public medical school in the United States. It continues today as one of the fastest growing, top-tier biomedical research enterprises in the world -- with 45 academic departments, centers, institutes, and programs; and a faculty of more than 3,000 physicians, scientists, and allied health professionals, including members of the National Academy of Medicine and the National Academy of Sciences, and a distinguished two-time winner of the Albert E. Lasker Award in Medical Research. With an operating budget of more than $1.2 billion, the School of Medicine works closely in partnership with the University of Maryland Medical Center and Medical System to provide research-intensive, academic and clinically based care for nearly 2 million patients each year. The School of Medicine has more than $540 million in extramural funding, with most of its academic departments highly ranked among all medical schools in the nation in research funding. As one of the seven professional schools that make up the University of Maryland, Baltimore campus, the School of Medicine has a total population of nearly 9,000 faculty and staff, including 2,500 student trainees, residents, and fellows. The combined School of Medicine and Medical System ("University of Maryland Medicine") has an annual budget of nearly $6 billion and an economic impact more than $15 billion on the state and local community. The School of Medicine faculty, which ranks as the 8th highest among public medical schools in research productivity, is an innovator in translational medicine, with 600 active patents and 24 start-up companies. The School of Medicine works locally, nationally, and globally, with research and treatment facilities in 36 countries around the world. Visit medschool.umaryland.edu

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Related stories

Tuesday, June 16, 2020

UM School of Medicine Researchers Receive Federal Funding to Rapidly Test New Treatments for COVID-19

Researchers at the University of Maryland School of Medicine (UMSOM) will be partnering on an agreement funded by the federal government's Defense Advanced Research Projects Agency (DARPA) to rapidly test hundreds of drugs, approved and marketed for other conditions, to see whether any can be repurposed to prevent or treat COVID-19. The compounds will be tested in studies using state-of-the-art technologies in the laboratory of coronavirus researcher Matthew Frieman, PhD., Associate Professor of Microbiology and Immunology at the University of Maryland School of Medicine. UMSOM will receive up to $3.6 million over the next year to fund this effort.

Tuesday, June 02, 2020

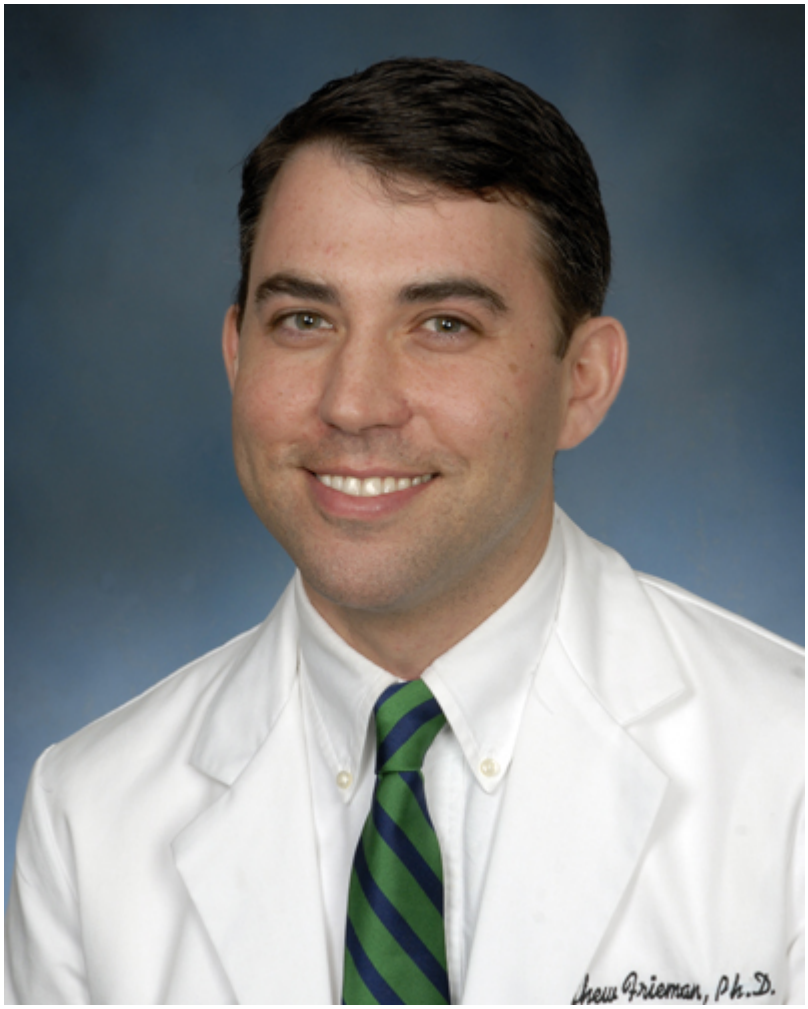
UM School of Medicine's Institute of Human Virology Awarded Grants to Strengthen COVID-19 Response in Sub-Saharan Africa

The Center for International Health, Education and Biosecurity (Ciheb) at the University of Maryland School of Medicine's Institute of Human Virology was awarded $4 million from the U.S. Centers for Disease Control and Prevention (CDC) to support coronavirus disease 2019 (COVID-19) response activities in Botswana, Nigeria, Malawi, and Mozambique.

Friday, October 18, 2019

Diabetes Worsens Respiratory Illness Due to Abnormal Immune Response, UM School of Medicine Study Finds

Since the Middle East respiratory syndrome coronavirus (MERS-CoV) first emerged in Saudi Arabia in 2012, there have been more than 2,400 confirmed cases of the infection, resulting in greater than 800 deaths – an alarming fatality rate of 35 percent. For this reason, researchers have been eager to identify any risk factors that contribute to the development of severe or lethal disease. Current clinical evidence points to diabetes as a major risk factor in addition to other comorbidities including kidney disease, heart disease, and lung disease.



Tuesday, December 06, 2016

Researchers Combine MERS and Rabies Viruses to Create Innovative 2-For-1 Vaccine

In a new study, University of Maryland School of Medicine (UM SOM) researchers have modified a rabies virus, so that it has a protein from the MERS virus; this altered virus works as a 2-for-1 vaccine that protects mice against both Middle East Respiratory Syndrome (MERS) and rabies.

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