MedicalXpress

# Researchers recreate SARS virus, open door for potential defenses against future strains

November 25 2008

Researchers at the University of North Carolina at Chapel Hill and Vanderbilt University Medical Center have synthetically reconstructed the bat variant of the SARS coronavirus (CoV) that caused the SARS epidemic of 2003.

The scientists say designing and synthesizing the virus is a major step forward in their ability to find effective vaccines and treatments for any strain of SARS virus that might affect humans in the future.

A report of the work is due to appear in the latest *Proceedings of the National Academy of Sciences* Early Edition, which publishes papers online and later in print.

"Only three other teams of researchers have synthetically reconstructed a virus. In this case we reconstructed the likely progenitor of the SARS-CoV epidemic," said Ralph Baric, Ph.D., epidemiology professor at the UNC Gillings School of Global Public Health and one of the leaders on the project. "The bat SARS virus is about four times larger than any other virus that has been synthesized to date. It will allow us to test the pathways in which the virus emerges and understand the ways that animal coronaviruses move from one species to another."

Baric and his team of epidemiology researchers worked with counterparts at Vanderbilt University Medical Center led by Mark Denison, M.D., professor of microbiology and pediatrics. The two teams collaborated closely to review the existing sequences of all bat SARS

viruses; predict the actual sequence of the bat SARS-CoV that would be able to grow; design the synthesis of the genome; and recover and characterize the viruses that were synthetically reconstructed and rescued in the laboratory. They also studied the pathogenesis and the ability of therapeutics targeting epidemic strains to cure bat SARS-CoV infection.

SARS (severe acute respiratory syndrome) is believed to have first emerged humans in Asia in late 2002. Over the next several months, the illness spread to more than two dozen countries in North America, South America, Europe and Asia before the global outbreak was contained. Of the more than 8,000 people worldwide who were diagnosed with SARS in 2003, 774 died.

Baric said SARS is believed to have originated in bats, and "jumped" to humans either directly or through raccoon dogs and palm civets, both considered delicacies for humans in China.

"Although the strains associated with the 2002-2003 epidemic no longer circulate in humans, the animal precursor strains are common and will likely re-emerge in the future," he said. "The key problem is that many of the vaccines and therapeutics targeting the 2002-2003 epidemic strains may not work against future emergent strains."

Baric said synthesizing the SARS co-variant that infects bats and then modifying it so that it can grow well in laboratory animals will allow researchers to search for vaccines and treatments that would be effective against any strain of SARS that might infect humans in the future. Viruses that start in animals and mutate to infect humans tend to be slightly different each year. An example is the influenza virus, which is different each year and requires a different vaccine each year to provide immunity.

"By reconstructing the synthetic bat SARS virus, we have a model that

will allow us to design better vaccines and drugs that will treat any strain of this virus that infects humans," Baric said.

The value of the research goes beyond SARS, he added.

"Potentially, we can apply this technology to many other emerging viruses," he said. "Then, perhaps we wouldn't have to develop a new therapy each year, but can find treatments that will be effective against all of the root viruses."

Source: University of North Carolina at Chapel Hill