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Researchers develop new candidate vaccines against the plague

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Researchers from The University of Texas Medical Branch at Galveston have developed new potential vaccines that protect animals against the bacteria that causes the deadly plague. These findings are detailed in *NPJ Vaccines*.

The plague of Black Death infamy has had the power to strike fear in people since the Middle Ages - and for good reason. Once someone begins to show symptoms, the disease progresses very quickly and is almost 100 percent fatal without prompt treatment. The World Health Organization has categorized the bacteria responsible for plague, Yersinia pestis, as a re-emerging pathogen because of the rising number of human plague cases globally. The bacteria cause three different kinds of plague, bubonic, septicemic and pneumonic.

Unfortunately, antibiotic-resistant Y. pestis strains have been isolated from plague patients and can be engineered for use as a bioweapon, which is concerning since Y. pestis is classified by the Centers for Disease Control and Prevention as a Tier-1 select agent. Select agents are materials that have been identified by the federal government as agents with potential for use in biological terrorism or warfare. The select agents that pose the greatest threat to public health and safety are labeled as Tier 1.

"The optimal strategy for protecting people and animals against this deadly disease would be through vaccination, but there are no FDA-licensed plague vaccines available in the U.S.," said Ashok Chopra,

UTMB professor of microbiology and immunology. "We've been working to develop a vaccine that will generate long-term immunity and protection against the plague."

By deleting and modifying certain genes, the UTMB researchers constructed new versions of the Y. pestis bacteria designed to provide immunity to the plague without making them ill. They then examined several aspects of the immune response after immunization and tested how long the immunization would protect mice and rats against the plague.

Overall, all three of the new possible vaccines stimulated long-lasting immune responses capable of protecting animals from developing the pneumonic plague as late as four to five months after vaccination.

"In addition to how well a vaccine works to protect against disease, safety is another important aspect for vaccine development," said Chopra. "We have shown that our mutants (versions of the bacteria) are safe vaccine candidates as our detailed analyses showed no sign of damage to bodily tissues in the vaccinated animals."

Provided by University of Texas Medical Branch at Galveston