

# Highly lethal Ebola virus has diagnostic Achilles' heel for bioterror detection, scientists say

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By screening a library of a billion llama antibodies on live Ebola viruses in the Texas Biomedical Research Institute's highest biocontainment laboratory, scientists in San Antonio have identified a potential weakness in the make-up of these deadly agents that can immediately yield a sensitive test.

"Detecting single viral [protein components](#) can be challenging, especially at very low levels. However, most viruses are repetitive assemblies of a few components, called antigens, with some existing as polymers which present highly 'avid' targets for antibodies," said Texas Biomed [virologist](#) Andrew Hayhurst, Ph.D.

"Think of one pair of microscopic Velcro hooks where one hook is the viral antigen and the other is the antibody and it is a [weak interaction](#). Have a thousand pairs of hooks and it makes a very powerful interaction... just like Velcro fasteners on hiking gear," Hayhurst explained.

The screening performed by Hayhurst and assistant Laura Jo Sherwood guided the selection of llama antibodies recognizing a polymer hiding within Ebola called nucleoprotein (NP). Remarkably, each antibody could be used in its own right to form a sensitive test for the Ebola NP, whereas most tests would require two different antibodies driving up costs and characterization times.

This research—funded by National Institutes of Health (NIH), Defense Threat Reduction Agency Basic Science Program/Office of Naval Research and the Texas Biomedical Research Institute—was published today in the journal *PLOS ONE*.

"[Ebola](#) NP is rather like a cob of corn displaying hundreds of kernels linked in a repetitive polymer, giving us the perfect molecular magnet to attract llama antibodies that can be assembled into highly avid assays based on a single antibody," Hayhurst said.

"Intriguingly, while using one antibody to polymers and aggregates has been put to use in neurodegenerative disease diagnostics for Parkinson's, Alzheimer's and other disorders, it has lagged behind in emerging viral diagnostics. We showcase its simplicity and effectiveness for viral threat detection here and it may well be useful for detecting other emerging viruses."

**More information:** [dx.plos.org/10.1371/journal.pone.0061232](https://dx.plos.org/10.1371/journal.pone.0061232)

Provided by Texas Biomedical Research Institute

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