

Manufacturing genes to attack flu virus

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An international research team has manufactured a new protein that can combat deadly flu epidemics. Credit: MSU photographer, Kurt Stepnitz

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The paper, featured on the cover of the current issue of *Nature Biotechnology*, demonstrates ways to use manufactured genes as antivirals, which disable key functions of the [flu virus](#), said Tim Whitehead, assistant professor of chemical engineering and materials science at Michigan State University.

"Our most potent design has proven effective on the vulnerable sites on many [pandemic influenza](#) viruses, including several H1N1 (Spanish flu, [Swine flu](#)) and H5N1 (Avian flu) subtypes," said Whitehead, the paper's co-lead author. "These new therapeutics are urgently needed, so we were

especially pleased to see that it neutralizes H1N1 viruses with potency."

From its earlier research, the team used computer-aided design to engineer proteins that targeted vulnerable sites on the highly adaptable virus. From there, researchers optimized their designer proteins by comprehensively mapping the mutations that gave the proteins a strong advantage when attacking the viruses' targeted areas.

The team improved their proteins through a process called "DNA deep sequencing." This allowed Whitehead and his colleagues to simultaneously sequence millions of variants of their manufactured proteins, identify and keep the beneficial mutations and optimize the proteins' performance.

"By taking only the best mutations, we can reprogram our proteins to burrow into viruses at key locations and render them harmless," he said. "Our work demonstrates a new approach to construct [therapeutic proteins](#), which we hope will spur development of new [protein drugs](#) by the biopharmaceutical industry."

This research also laid the groundwork for future treatments of all flu viruses as well as other diseases such as smallpox, Whitehead added.

Whitehead's co-authors included researchers from the University of Washington, the Scripps Research Institute (La Jolla, Calif.), Naval Health Research Center (San Diego) and the Weizmann Institute of Science (Rehovot, Israel).

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Provided by Michigan State University

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