

# Trick that aids viral infection is identified

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Scientists have identified a way some viruses protect themselves from the immune system's efforts to stop infections, a finding that may make new approaches to treating viral infections possible.

Viruses have well-known strategies for slipping past the immune system. These include faking or stealing a molecular identification badge that prevents a cell from recognizing a virus.

Scientists at Washington University School of Medicine in St. Louis and elsewhere have found some viruses have another trick. They can block the [immune system](#) protein that checks for the identification badge.

The blocking structure is called a stem-loop, found at the beginning of the virus's [genetic material](#). This is the first time scientists have found an immune-fighting mechanism built directly into the genetic material of a virus. They are looking for ways to disable it and searching for similar mechanisms that may be built into the genetic material of other disease-causing microorganisms.

"When the stem-loop is in place and stable, it blocks a host cell immune protein that otherwise would bind to the virus and stop the infectious process," said senior author Michael Diamond, MD, PhD, professor of medicine. "We found that changing a single letter of the virus's genetic code can disable the stem-loop's protective effects and allow the virus to be recognized by the host immune protein. We hope to find ways to weaken the stem-loop structure with drugs or other treatments, restoring the natural virus-fighting capabilities of the cell and stopping or slowing

some [viral infections](#)."

Most life forms encode their genes in DNA. To use the instructions contained in DNA, though, cells have to translate them into a related genetic material, RNA, that can be read by a cell's protein-making machinery.

Some viruses encode their genes directly in RNA. Examples include West Nile virus and influenza virus, and the viruses that cause sudden acute respiratory syndrome (SARS), yellow fever and polio.

When a virus infects a cell, it co-opts the cell's protein-making machinery to make viral proteins. These proteins allow the virus to replicate. Copies of the [virus](#) break into other cells, repeat the process, and the infection spreads.

The researchers studied alphaviruses, a group of RNA viruses that cause fever, encephalitis and infectious arthritis. They showed that a single-letter change in the RNA of an alphavirus strengthened the stem-loop. When the structure was stable, a key [immune system protein](#) called Ifit1 was blocked from binding to the viral RNA and the infection continued unchecked. But when the stem-loop was unstable, Ifit1 would bind to the viral RNA and disable it, stopping the infectious process.

"Knowing about this built-in viral defense mechanism gives us a new opportunity to improve treatment of infection," Diamond said. "To control emergent infections, we must continue to look for ways that [viruses](#) have antagonized our natural defense mechanisms and discover how to disable them."

**More information:** Hyde JL, Gardner CL, Kimura T, White JP, Liu G, Trobaugh DW, Huang C, Tonelli M, Paessler S, Takeda K, Klimstra WB, Amarasinghe GK, Diamond MS. A viral RNA structural element

alters host recognition of non-self RNA. *Science Express*, Jan. 31, 2014.

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