Scientists discover natural flu-fighting proteins

(Reuters) - U.S. researchers have discovered antiviral proteins in cells that naturally fight off influenza infections, a finding that may lead to better ways to make vaccines and protect people against the flu.

They said a family of genes act as cell sentries that guard cells from an invading influenza virus, the team reported on Thursday in the journal Cell. "This prevents the virus from even getting into the cell," said Stephen Elledge of Harvard Medical School and a Howard Hughes Investigator at Brigham & Women's Hospital.

"It is out there fighting the flu all of the time," Elledge said in a telephone interview. Elledge and colleagues used a new research technique called RNA interference in which they systematically turned off individual genes and then exposed cells to the flu virus.

Using this method, they discovered a small family of flu-fighting proteins called interferon-indicible transmembrane proteins that boost the body's natural resistance to viral infection. "If you get rid of it (the protein), the virus can replicate 5 to 10 times faster. What that means is your cells have a mechanism that can block 80 to 90 percent of the virus that gets in," Elledge said.

They also showed that if they make the cell overproduce the protein, they become more resistant to the flu. "If you crank it up, it really shuts down the flu," he said. The team showed that a specific protein in the family -- IFITM3 -- protected against several viruses, including strains of influenza A now found in seasonal flu, the West Nile virus and dengue virus.

The proteins did not offer any protection against HIV or the hepatitis C virus, but lab tests suggested they may defend against other viruses, including yellow fever virus. The team showed that if the virus evades this first-line protein defense and makes it inside the cell, this activates an alarm system called the interferon immune response that gets pumped out of cells and alerts the rest of the body to make more of the natural antiviral proteins.

The findings offer new insights into the body's natural defenses against influenza and other viruses, Elledge said. "We really did not know how our bodies were stopping the flu." They also may lead to better ways to protect people from influenza and other viral infections.

"By making this protein be expressed in poultry or pigs, we can make them resistant to the flu. That can help protect people by protecting animals from the flu," he said. It also may lead to more reliable vaccine production by creating a more friendly environment for the virus to grow in chicken eggs, he said.

"If we take our gene away from the cells in which the virus is growing, it will grow much faster. You can actually produce vaccines much faster," he said.