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Research provides unprecedented insight into fighting viral infections

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Researchers at Rutgers and UMDNJ-Robert Wood Johnson Medical School have determined the structure of a protein that is the first line of defense in fighting viral infections including influenza, hepatitis C, West Nile, rabies, and measles.

Principal investigators of the study, "Structural basis of RNA recognition and activation by innate immune receptor RIG-I," chosen for advanced online publication in *Nature*, say the research is key in the development of broad-based drug therapies to combat viral infections.

"Understanding innate immunity to viral infections is crucial to developing drugs that can fight viruses or control inflammation," said Joseph Marcotrigiano, assistant professor of chemistry and chemical biology at Rutgers who along with Smita Patel, professor of biochemistry at Robert Wood Johnson Medical School, are principal investigators on the newly released study. "Having this foundation is extremely important."

RIG-I is a receptor protein that recognizes differences in molecular patterns in order to differentiate viral RNA – the process during which virus particles makes new copies of themselves within a host cell and can then infect other cells – -- from cellular RNA. What researchers discovered is that viral RNA, as opposed to single-stranded cellular RNA, is a double-stranded structure. This double-stranded difference is the reason the RIG-I protein recognizes it and initiates a signal to induce anti-immune and anti-inflammatory defenses within the cell.

Prior to this research, there was little information on how RIG-I protein recognized the viral infections, said Patel. "A failure of RIG-I to identify viral RNA can lead to alterations of the cell, including cell death, inflammation, autoimmune diseases, and cancer," he said.

This is a first step, the scientists say, in helping to develop therapies that interfere with a broad variety of viral infections – a major breakthrough for millions of people who get sick from viral infections which cannot be treated effectively by current medication.

"This work provides unprecedented insights on the molecular mechanism of viral RNA recognition by RIG-I," said Barbara Gerratana, who oversees enzyme catalysis grants at the National Institute of General Medical Sciences of the National Institutes of Health. "As a result, we have a deeper understanding of how the human body fights viral infections a structural basis of the development of new anti-viral therapeutics."

Provided by Rutgers University

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