A novel defense mechanism for SARS-CoV-2 discovered
21 May 2021

Scientists from Hokkaido University have discovered a novel defensive response to SARS-CoV-2 that involves the viral pattern recognition receptor RIG-I. Upregulating expression of this protein could strengthen the immune response in COPD patients.

In the 18 months since the first report of COVID-19 and the spread of the pandemic, there has been a large amount of research into understanding it and developing menas to treat it. COVID-19 does not affect all infected individuals equally. Many individuals are asymptomatic; of those who are symptomatic, the large majority have mild symptoms, and only a small number have severe cases. The reasons for this are not fully understood and are an important area of ongoing research.

A single previous study has shown that RIG-I expression is downregulated in pulmonary cells of COPD patients. Using primary pulmonary cells from
two COPD patients, the scientists showed that this downregulation of RIG-I resulted in the detection of viral replication after 5 days. They also demonstrated that treatment of these COPD cells with all-trans retinoic acid (ATRA), which upregulates the expression of RIG-I, significantly reduced viral titres in the cells. Furthermore, using RIG-I mutants, they were able to elucidate the mechanisms by which RIG-I suppressed SARS-CoV-2 replication: The helicase domain, a structural element in RIG-I, interacts with the viral RNA, blocking a virus-derived enzyme responsible for replication.

This study has demonstrated a unique viral recognition mode of RIG-I, termed the RIG-I-mediated signaling-abortive anti-SARS-CoV-2 defense mechanism. It has also indicated that RIG-I expression levels are one of the potential parameters for the prediction of COVID-19 patient outcomes. Further work must be done to uncover factors or conditions that modulate RIG-I expression levels, and may lead to new strategies to control SARS-CoV-2 infection.


Provided by Hokkaido University