

FUNDING PROGRAM FOR NEXT GENERATION WORLD-LEADING RESEARCHERS

Project Title: Elucidating the mechanisms for the pathogenesis of virus infection from the aspect of host lipid signaling

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1. Background of research

The recent emerging respiratory viruses such as SARS-coronavirus, H5N1 avian influenza virus, and not all but 2009 pandemic H1N1 influenza virus caused high lethality due to the development of the acute respiratory distress syndrome (ARDS) and/or multiple organ failures (MOF) in humans. The patients with such severe diseases, require critical cares in the intensive care units (ICUs) including mechanical ventilation. Considering their high lethality and the possible threats of emerging respiratory virus pandemic, it is crucial to clarify the mechanisms involved in the pathogenesis of severe disease mediated by emerging respiratory virus infection, and to identify novel therapeutic targets for them.

2. Research objectives

Virus-host interactions trigger host responses, which can activate the specific signaling pathways leading to lethal diseases including ARDS and MOF. Lipid signaling pathway has been shown to be involved in a variety of human diseases. In this study, using mouse disease model and analysis of patient samples, we aim to clarify the molecular pathogenesis of ARDS and MOF mediated by emerging respiratory virus infection from the aspect of lipid signaling pathway in the host, which can lead to identify the possible biomarkers indicative for severity of disease, and novel therapeutic targets for them.

3. Research characteristics (incl. originality and creativity)

Virus uses host cellular machinery for its replication, and thus both virus and host factors can control the pathogenesis of virus infection. So far, research has been mainly focused on viral factors, such as sequence of viral genome. This study has an originality, which is emphasized by focusing on the host signaling response responsible for the pathogenesis of virus-mediated lethal diseases. Also this study is characterized by a unique combined approach with critical care-oriented mouse and human ICU model system and virus-oriented model system.

4. Anticipated effects and future applications of research

The data from this study can contribute to our understanding of the nature of host response to viruses, and lead to identify the biomarkers, which can predict whether the infected patients develop to severe disease or not, as well as to develop the new drugs for the treatment of possible future emerging virus pandemic .