Staufen1 Protein Modulates the EV71 Infection Cycle through Targeting the Viral RNA

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Background/Objective
Human enterovirus 71 (EV71) is a single-stranded and positive sense RNA virus belonging to the genus Enterovirus of the Picornaviridae family. EV71 is characterized as a highly contagious disease that mainly affects children less than 5 years old and has been among the most frequent pathogens of hand, foot and mouth disease (HFMD). Staufen1 (Stau1) is double-stranded RNA-binding protein and involves in the transport or decay of mRNAs, or the assembly of stress granules (SGs) in mammalian cells. SGs contain the stable and silent mRNA that is thought to be sites of mRNA storage and triage. In general, most viruses appear to antagonize SG formation during infection.

Method
Characterization of host staufen protein functions in EV71 infection cycle in the cell culture system

Result
Upon EV71 infection, the expression level of Stau1 is increased at the early stage, while its decreased expression phenomenon was detected at the late stage. Colocalization of Stau1 with EV71 VPs were observed using dual immunofluorescent staining. Surprisingly, the Stau1 protein interacts with VPs in the presence of viral RNA, but not viral 3D protein. Also, the recombinant Stau1 protein interacts with UTR of positive-strand, but not negative-strand, viral RNA. Moreover, the overexpression of Stau1 had no effect on the viral RNA copy number of the EV71-infected RD cells. Interestingly, both overexpression and downregulation of Stau1 result in the reduced product of VPs and 3CD proteins in the EV71-infected cells. Similarly, the overexpression of Stau1 led to reduce the host IFN-β mRNA level in the EV71-infected RD cells. Finally, we observed that Stau1 protein was recruited to the SGs upon EV71 infection.

Conclusion
Stau1 protein was recruited into stress granule upon EV71 infection, indicating this protein is playing roles involved in EV71 infection cycle