Three-dimensional study of the interaction between viral filament and adjacent cell plasma membrane during respiratory syncytial virus assembly

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Respiratory syncytial viruses have the characteristic of fuse neighboring infected host cells during multiplication process and also known to produce characteristic features such as ribonucleoparticle, inclusion bodies and viral filament within the infected host cell[1]. Even in the form of a rod between 80 ~ 150 nanometers in diameter, viral filament has components that are carried by mature viruses such as envelope protein, F-protein and ribonucleoparticle[2]. It is somewhat known from previous studies that virus filaments may be involved in cell fusion. We also think that the viral filament plays a major role in cell fusion, and in this study we examined the electron tomography method to fuse the membranes in neighboring cells. In this study, we infected the RSV virus into the host cells, confirmed that host cell to membrane cell fusion was observed in the optical microscope 72 hours later, and analyzed the ultrastructure with TEM.

We have identified an increase in the ribonucleoparticle expression in host cells induced by RSV infection, structural modification of the endoplasmic reticulum, and the formation of viral filament around the plasma cell membrane. Furthermore, the insertion of the viral filament contact with the plasma membrane of the adjacent cell was observed through an electron tomography analysis. It is a group of paramyxovirus that are likely to breed more efficiently through the fusion of neighboring cells, as compared to other viruses that spread and multiply to other cells through budding out. We think these results will help the virus multiply more effectively and believe that this is a key mechanism to cell fusion.

References

1. Giuffre, R. M. *et al*, *J. Virol.* 42 (1982), p.963 - 968
2. Anuradha Radhakrishnan *et al*, *Molecular & Cellular Proteomics* 9 (2010), p.1829 - 1848

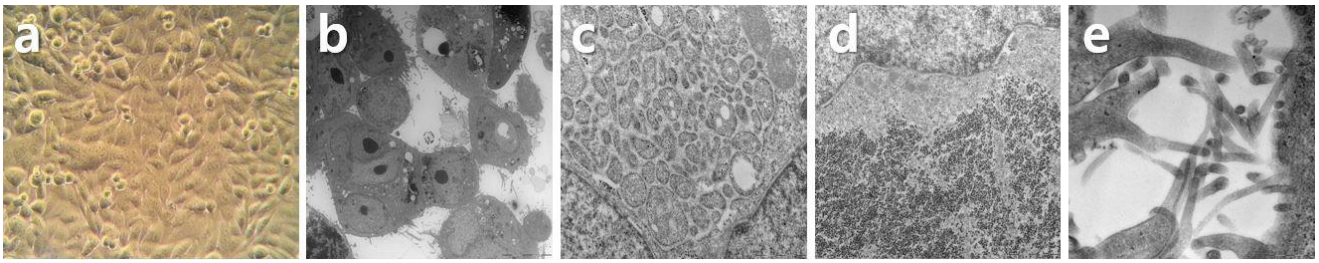

Fig 1. LM and TEM images of RSV infected host cell after 72 hours. These micrograph shows typical RSV infection patterns such as plasma cell membrane fusion(a,b), ER modification(c), RNP(d) and viral filaments.

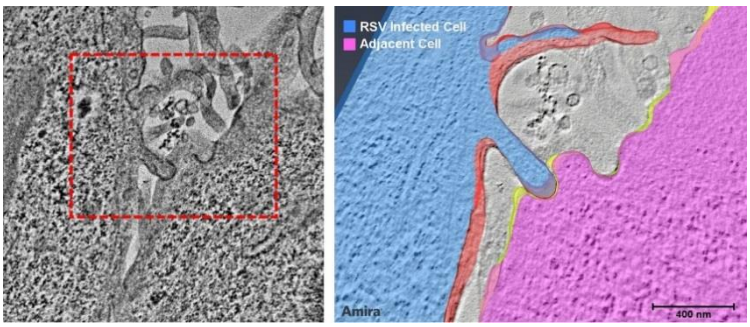

Fig 2. TEM tomography of viral filament on the RSV infected host cell and adjacent cell. The viral filament was insertion into contact with the plasma membrane of the adjacent cell.