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Understanding influenza filament formation through multi-modal imaging strategies

Content

Wild type influenza A viruses (IAVs) typically form a pleomorphic population of viral particles, ranging from filaments that can be several microns in length to 0.1 micron diameter spheres. However, spherical particles predominate in laboratory-adapted strains, filamentous particles are present in a high proportion of clinical isolates. Despite the wealth of knowledge about the virus life cycle derived from laboratory-adapted spherical strains, the basics of elongated and filamentous virus particle formation and their functions remain poorly understood. A particular challenge is linking ultrastructural details of membrane and protein trafficking to the formation of elongated and fully filamentous structures that can be microns in length.

In order to unravel the mechanism of filament formation we used a multi-modal imaging approach, combining high-resolution cryo-EM tomography, traditional scanning and transmission electron microscopy, and super-resolution light microscopy. To this end, we have optimized a system by which we can analyze filament budding using a filamentous IAV, cells thin enough at the viral budding site for electron beam penetration, and multiple viral protein antibodies for immunofluorescence. This has allowed us to obtain quantitative data on the viral budding site, as well as to generate high resolution images of filament formation. Using these methods, we are characterizing membrane trafficking during viral budding in detail, as well as identifying global patterns in viral and host protein localization. This will allow us to generate an accurate picture of the co-option of cellular processes into the influenza budding site, thereby providing fundamental information about the formation of the biologically normal and clinically-relevant influenza virions.

Choose primary session

Visualising Flu

Choose secondary Session

Virus host cell interaction

Contribution Type : Paper presentation