

Human Cytomegalovirus-induced cytoplasmic remodelling: a 3D perspective

Background

Human Cytomegalovirus (HCMV) is a significant cause of disability in congenitally infected children and immunocompromised patients. HCMV infection induces large-scale remodelling of the cell's secretory apparatus to form the cytoplasmic virion assembly compartment (cVAC). Understanding the process of HCMV virion assembly in the cVAC may identify new targets for antiviral development.

How did Volocity help researchers to achieve their research goals?

Most published images of the cVAC show single confocal sections, however, in this study researchers wanted to fully understand the 3D arrangement of its various substructures. Therefore, [Volocity®](#) was used to examine the 3D distribution, in and around the cVAC, of host protein markers specifically associated with different components of the secretory apparatus. Figure 1 shows the enhanced perspective on spatial relationships that Volocity provided. The 3D reconstructions allowed researchers to observe different properties of organelle staining in infected vs. uninfected cells, as well as visualization of interior features (Figure 2). Volocity was also used to perform quantitative colocalization analyses of markers, and to measure organelle volumes and sizes. For colocalization analyses, thresholded Pearson's correlation coefficients were determined for pairs of markers and a map of the colocalization network was generated.

How does this study contribute to scientific knowledge?

Each of the organelle markers investigated was shown to have a 3D structural identity and colocalization network that differ significantly between HCMV-infected and uninfected cells. This study sheds new light on the cell biology of membrane transport machinery.

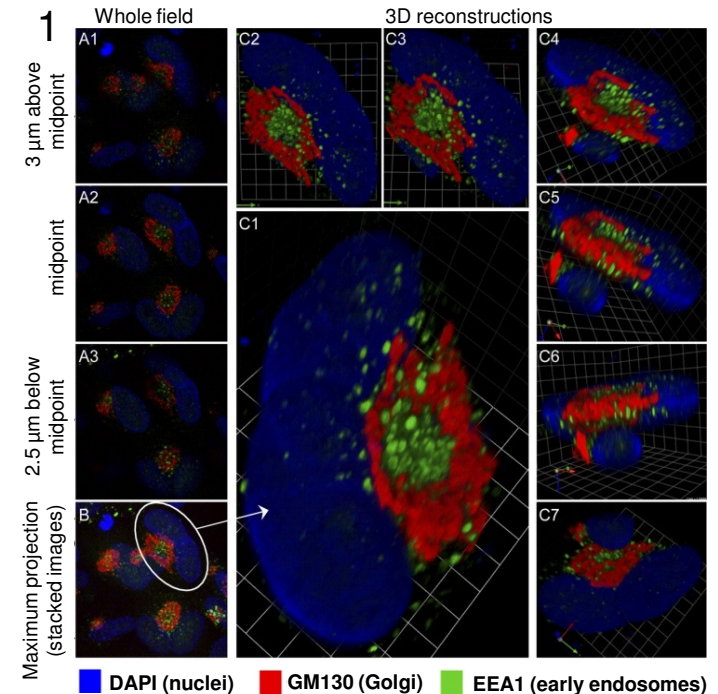


Figure 1: Relationships between images from single confocal planes and reconstructed 3D images. HCMV-infected lung fibroblasts were stained for the indicated markers at 120 hours post infection. [Movies](#) made from Z stack images in Volocity were also central to the results presented in this study.

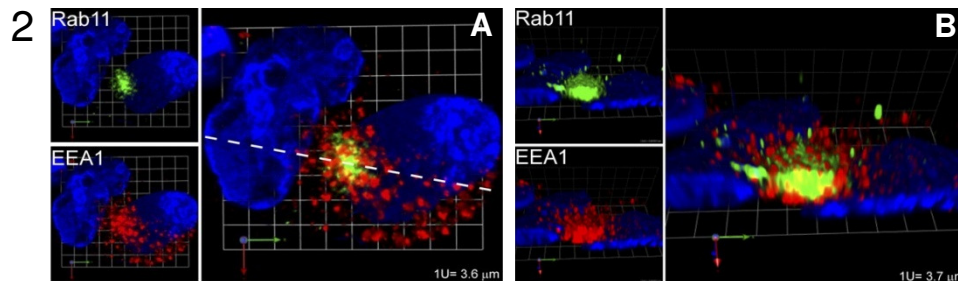


Figure 2: Regions of high levels of colocalization of early (EEA1) and recycling (Rab11) endosome markers at the cVAC centre. Part B shows a vertical cross section taken along the white dotted line shown in A.