Life Sciences Seminar

Dissecting the molecular mechanism of chikungunya virus cell-to-cell transmission

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Positive-sense RNA viruses such as coronaviruses, flaviviruses and alphaviruses pose a significant threat to public health due to their ability to rapidly spread and cause widespread disease. Chikungunya virus (CHIKV) is a mosquito-borne virus that causes a severe, debilitating arthralgic disease in humans, leading to significant morbidity and causing chronic disease in a large proportion of patients which persists long after infection. Due to climate change, the range of the CHIKV vectors is rapidly increasing, driving an accelerating incidence and emergence across the globe. CHIKV nonstructural protein 1 (NSP1) is known to induce the formation of many protrusions in host cells, allowing virions to spread to neighbouring cells efficiently, whilst avoiding immune surveillance. Despite extensive research into CHIKV, a comprehensive understanding of the structural organisation of proteins within the protrusions remains elusive. In this study, we used state-of-the-art imaging techniques including in-situ cryo-electron tomography, sub-tomogram averaging and super-resolution live-cell-imaging alongside cell signalling modulation to investigate the morphology and molecular basis of NSP1-induced protrusions. We present in-situ structures and organisation of NSP1, actin and ribosomes, the main components of these protrusions, and detail the complex interplay of the proteins involved in their formation. Our findings shed new light on the NSP1 induced mechanisms that govern viral cell-to-cell transmission and thus pave the way for new therapeutic strategies aiming to combat viral infections.

Friday, May 5, 2023 10:30am - 11:30am
Heinzel Seminar Room / OBW

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