

Mechanisms of Rotavirus Factory Formation and Intra-particle RNA Synthesis

Sarah McDonald Esstman, Ph.D.
Associate Professor of Biology
Wake Forest University

Rotaviruses are segmented, double-stranded RNA viruses and important causes of acute gastroenteritis in the young of many animal species. Like many other viruses, rotaviruses induce the formation of cytoplasmic replication factories, wherein the viral genome is transcribed and replicated in close connection with virion particle assembly. Two rotavirus non-structural proteins (NSP2 and NSP5) nucleate factory formation via a process involving liquid-liquid phase separation (LLPS). Once factories are formed, two other viral proteins, the polymerase (VP1) and core shell protein (VP2), come together within them to mediate intra-particle viral RNA synthesis. In this seminar, I will describe my lab's recent work that (i) identified a flexible region of the NSP2 protein that mediates efficient factory formation by LLPS, (ii) mapped VP1 and VP2 sites critical for intra-particle RNA synthesis, and (iii) discovered a novel uridylyltransferase activity of the rotavirus VP1 polymerase. These results inform our textbook understanding of how rotaviruses replicate inside of host cells, and they may provide a scientific platform for future antiviral drug design.