Deciphering the Cell-Invading Molecular Machinery of Porcine Deltacoronavirus

Coronavirus spike proteins, which guide viral entry into cells, diverge among coronavirus genera. Shang et al. (e01556-17) and Xiong et al. (e01628-17) solved the cryo-electron microscopy (cryo-EM) structure of porcine deltacoronavirus spike proteins, which are closely related to those from the alphacoronavirus genus. Spike protein structural features facilitate evasion of host immune surveillance mechanisms. Shang et al. discovered that the spikes mediate receptor recognition and membrane fusion. Xiong et al. found that the protein is adapted to enteric infection and resistant to premature activation from enteric proteases. These studies elucidate new features of coronavirus structure, function, and evolution.

Host-Specific Glycans Are Correlated with Susceptibility to Infection by Lagoviruses but Not with Virulence

Lagoviruses cause fatal diseases in rabbits and hares. Infection of rabbits by highly virulent strains requires histo-blood group antigen-dependent glycan attachment, but the molecular mechanisms behind host shifts and the emergence of virulence are not well understood. Lopes et al. (e01759-17) found that emergent strains, recently discovered nonpathogenic strains, and older strains share similar glycan-binding specificities, thus excluding glycan attachment as a virulence factor. Species-specific patterns associated with host range are expressed in glycan motifs of three lagomorph species, suggesting that species-specific glycan expression is a main contributor to the host range of lagoviruses. These data elucidate the evolution of lagovirus emergence.

Identification of Host Factors Required for Junin Virus Infection

Z, an arenavirus matrix protein, is multifunctional and required for virus budding. Little is known about the host proteins that are incorporated into arenavirus particles or that associate with the Z protein. Ziegler et al. (e01565-17) charted the first large-scale map of human proteins that are incorporated into bona fide Junin mammarenavirus (JUNV) particles or interact with the JUNV matrix protein inside cells or within virus-like particles (VLPs). Several host proteins are required for JUNV propagation, including ATP5B and IMPDH2, which are essential for virus release. This data set is a resource for studying virus-host interactions and antiviral target discovery.

Respiratory Syncytial Virus Infection and Transmission in a Ferret Model

Studies of human respiratory syncytial virus (hRSV) lack a well-characterized ferret model. Chan et al. (e01322-17) assessed pathogenesis, immunity, and transmission following intra-nasal infection of adult ferrets with the Long or A2 strain of hRSV. Virus replication and cytokine induction occur in the upper and lower airways of infected animals, and virus-specific humoral responses develop. hRSV transmits from experimentally infected donor ferrets to cohoused naive recipients, which is not observed with other small animal models. These findings highlight the potential of this animal model to study serological responses and examine interventions that limit transmission of hRSV.