Abstract #28

Role of Asparagine Biosynthesis in Vaccinia Virus Replication

Anil Pant, Shuai Cao and Zhilong Yang

Division of Biology, Kansas State University, Manhattan, KS, USA

Vaccinia virus, the prototypic member of poxviruses, is a complex, enveloped, large, linear double-stranded DNA virus used as a model to study poxvirus infections; as a tool to develop novel cancer treatment strategies and recombinant vaccines against other infectious diseases. All viruses rely entirely on cellular metabolism because they do not have their own metabolic capability. A number of viral infections have been found to cause profound alterations of host cell metabolism in recent years, in concert with the resurgence of interest in the study of the role of metabolism reprogramming in various diseases. Asparagine is a non-essential amino acid for mammalian cells and its de novo biosynthesis is catalyzed by asparagine synthetase. Using primary human foreskin fibroblasts (HFFs), here we found that inhibition of asparagine synthetase by chemical or genetic approach severely impairs vaccinia virus replication. Further experiments identified the specific replication step of the vaccinia virus life cycle that is affected by asparagine synthetase inhibition. We also found that vaccinia virus infection enhanced asparagine synthetase expression. Our study establishes an important role of asparagine biosynthesis in vaccinia virus infection and sets a platform to study the underlying molecular mechanism.