Characterizing HBV Viral Particles Propagated by 5 Different Host Methods

Tiong, Annabel (School: Northwood High School)

Chronic infection with the Hepatitis B virus (HBV) often results in the development of cirrhosis and liver cancer, serving as one of the leading indications for liver transplantation. To date, there exists no therapeutic intervention that eliminates the viral genome from infected hepatocytes. Therefore, furthering our understanding of the molecular virology of HBV is critical for the development of novel antiviral strategies that mitigate the disease burden and control clinical outcomes in patients. For other viruses, experiments using mutants with gene deletions have been used to compare particle density, but no such studies exist for HBV. Thus, this study aims to better understand replication efficiency, characteristics, and infectivity of HBV virions by comparing particles secreted by 5 different host methods with standard complete and incomplete particle densities. My project evaluates particle physiology from humanized liver chimeric mice (PXB mice), transgenic mice, and the Hepatoma G2 cell line through density gradient ultracentrifugation, cell fractionation, quantification of DNA levels, and analysis of immunostained cells. The results indicated that viral particles propagated with in vivo infection of PXB mice had the highest infectivity around 1.6 × 107 copies/mL, while particles propagated in vitro with the HepG2 cell line exhibited the lowest, around 5.6 × 10^3 copies/mL. Infectious particles fractionated between 1.25-1.37 g/cm^3 and displayed differential degrees of infectivity based on the propagation method. These findings support my hypothesis that PXB mice are strong candidates for modeling viral infection, and that the propagation method affects particle characteristics.

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