



Analysis and Importance of Hepatitis B Hepadnavirus

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DESCRIPTION

Hepadnaviruses are spherical, sometimes pleomorphic, 42–50 nm in diameter, and have no apparent surface protrusions after negative staining. The outer, detergent-sensitive shell contains surface proteins and surrounds an icosahedral nucleocapsid core composed of one of the major proteins, the core protein. The nucleocapsid surrounds the viral genome (DNA), viral DNA polymerase, and associated cellular proteins, such as protein kinases and chaperones, which appear to play a role in initiating viral DNA synthesis. For Hepatitis B Virus (HBV), the majority of the nucleocapsid core is approximately 36 nm in diameter and contains 240 core protein subunits.

HBV infection is a major global public health problem with over 350 million chronically infected patients worldwide. Chronic HBV infection increases the risk of developing serious liver diseases such as cirrhosis and liver cancer, which kill one million people each year. HBV infection is endemic in Northeast Asia, including China and South Korea, where more than 5% of people are chronically infected and is the leading cause of liver disease in this region. HBV is blood-borne and typically transmitted by blood transfusion, although neonatal transmission is common in endemic areas. HBV vaccine is safe and effective in prevention. Hepadnaviruses have a narrow host range. HBV infects humans, chimpanzees, and other great apes, but not monkeys or lower species.

Woodchuck Hepatitis Virus (WHV) can infect woodchucks, but not squirrels, rodents, where other tested species infects both beechy squirrels and woodchucks, but not other rodents. HBV infects several species of ducks and geese, but not chickens, other birds or mammals. Only readily infects cultured cells (primary duck hepatocyte cultures only). Mammalian hepadnaviruses have not been shown to readily or reproducibly infect any cell type in culture. All hepadnaviruses tend to be silent early in life, leading

to viral persistence. Hepatocellular Carcinoma (HCC) is also positively associated with long-term persistent infections in humans, woodchucks, and ground squirrels. Viral DNA has been found to be integrated into the cellular DNA of many HCCs of humans, woodchucks, and ground squirrels, but the exact role of the virus in tumorigenesis has not been defined. Hepadnaviruses have interesting molecular structures and replication mechanisms and appear to share certain key features with the retroviruses described here. To define the similarities and differences between hepadnaviruses and retroviruses to understand their evolutionary relatedness and to understand their commonality as infection by members of both virus families is associated with neoplastic disease. It will be interesting to determine whether they share oncogenic mechanisms.

Humans and other animals infected with the hepatitis B virus can develop a severe, long-lasting liver disease known as hepatitis. In 10% of cases it becomes chronic and can lead to permanent liver damage. Usually, he develops symptoms from 40 days to 6 months after he has been infected with the virus. People most at risk of developing hepatitis B include intravenous drug users, sexual partners of people with the disease, inadequately immunized health care workers, and recipients of organ or blood transfusions. A safe and effective vaccine against the virus is available and provides protection for at least five years.

CONCLUSION

Hepatitis B-like viruses are increasingly identified in a variety of hosts, but are largely restricted to the hosts of interest as animal models of HBV, and thus our understanding of their pathogenic potential is lagging. Of these, infection of eastern woodchucks (*Marmota monax*) with Woodchuck Hepatitis Virus (WHV) is the most likely cause of chronic disease.

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