Medical virology (450)

KING SAUD UNIVERSITY

hepatitis B virus

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Hepatitis B

Introduction

Hepatitis B is an infectious disease caused by the hepatitis B virus (HBV) which affects the liver.

The earliest record of an epidemic caused by hepatitis B virus was made by Lurman in 1885. An outbreak of smallpox occurred in Bremen in 1883 and 1,289 shipyard employees were vaccinated with lymph from other people. After several weeks, and up to eight months later, 191 of the vaccinated workers became ill with jaundice and were diagnosed as suffering from serum hepatitis. Other employees who had been inoculated with different batches of lymph remained healthy. Lurman's paper, now regarded as a classical example of an epidemiological study, proved that contaminated lymph was the source of the outbreak. Later, numerous similar outbreaks were reported following the introduction, in 1909, of hypodermic needles that were used, and, more importantly, reused, for administering Salvarsan for the treatment of syphilis. The virus was not discovered until 1966 when Baruch Blumberg, then working at the National Institutes of Health (NIH), discovered the Australia antigen (later known to be hepatitis B surface antigen, or HBsAg) in the blood of Australian aboriginal people. Although a virus had been suspected since the research published by MacCallum in 1947, D.S. Dane and others discovered the virus particle in 1970 by electron microscopy. By the early 1980s the genome of the virus had been sequenced, and the first vaccines were being tested.

In 2004, an estimated 350 million individuals were infected worldwide. National and regional prevalence ranges from over 10% in Asia to under 0.5% in the United States and northern Europe.

Routes of infection include vertical transmission (such as through childbirth), early life horizontal transmission (bites, lesions, and sanitary habits), and adult horizontal transmission (sexual contact, intravenous drug use).

The primary method of transmission reflects the prevalence of chronic HBV infection in a given area. In low prevalence areas such as the continental United States and Western Europe, injection drug abuse and unprotected sex are the primary methods, although other factors may also be important.[83] In moderate prevalence areas, which include Eastern Europe, Russia, and Japan, where 2–7% of the population is chronically infected, the disease is predominantly spread among children. In high-prevalence areas such as China and South East Asia, transmission during childbirth is most common, although in other areas of high endemicity such as Africa, transmission during childhood is a significant factor.[84] The prevalence of chronic HBV infection in areas of high endemicity is at least 8% with 10–15% prevalence in Africa/Far East.[85] As of 2010, China has 120 million infected people, followed by India and Indonesia with 40 million and 12 million, respectively. According to World Health Organization (WHO), an estimated 600,000 people die every year related to the infection.

In the United States about 19,000 new cases occurred in 2011 down nearly 90% from 1990.

Classification of the virus:

Family- Hepadnaviridae

Genra - Orthohepadnavirus and Avihepadnavirus

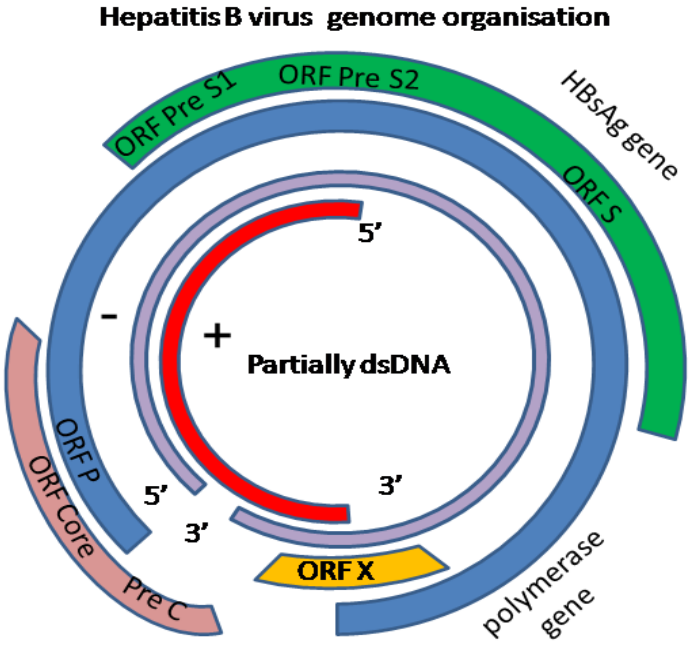
The hepatitis B virus is small DNA virus that belongs to Hepadnaviridae family of virus.Any virus belonging to the family Hepadnaviridae have small, enveloped, spherical virions (virus particles) that are about 40–48 nm (1 nm = 10−9 metre) in diameter. The genus is classified as part of the Hepadnaviridae family which contains two other genra, Orthohepadnavirus and Avihepadnavirus. Viruses in Avihepadnavirus are Enveloped, with spherical geometries and T=4 symmetry. The genome codes for 7 proteins. For this family Birds serve as natural hosts transmission routes are parental, sexual and blood. The family viruses have not

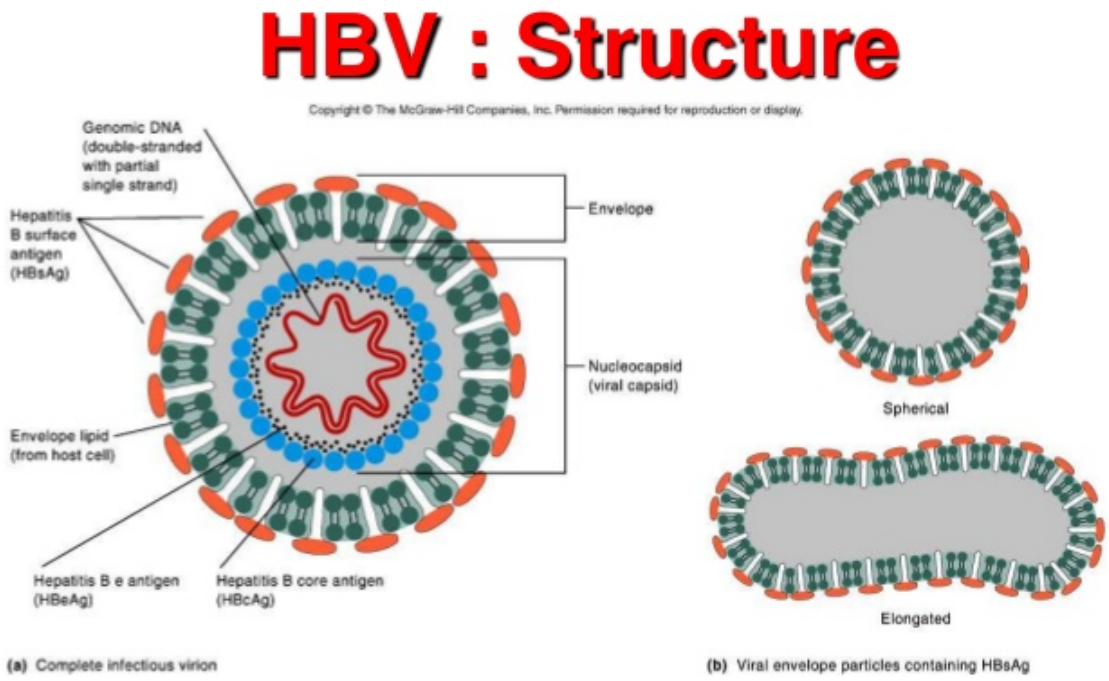
been assigned to viral order. The hepatitis B is classified as the type species of the orthohepadnavirus.There are two recognized genera, Orthohepadnavirus and Avihepadnavirus, Ortho (mammalian) hepadnaviruses have been found in humans (hepatitis B virus [HBV]) and great apes, woolly monkeys (woolly monkey HBV), woodchucks (woodchuck hepatitis virus), ground squirrels (ground squirrel hepatitis virus), arctic squirrels (arctic squirrel hepatitis virus), and Richardson ground squirrels.

Structure and genome:

Is approximately 42 nm in diameter and consists of an inner protein core and an outer protein envelope. Unlike other envelope proteins, HBs span the lipid bilayer multiple times. There are three different size proteins based on the reading frame, yielding small, medium, and large HBs.

The viral genome is made of circular DNA around 3.2 kb in length, but it is unusual because the DNA is not fully double-stranded. One end of the full length strand is linked to the viral DNA polymerase. The genome is 3020–3320 nucleotides long (for the full length strand) and 1700–2800 nucleotides long (for the short length strand)



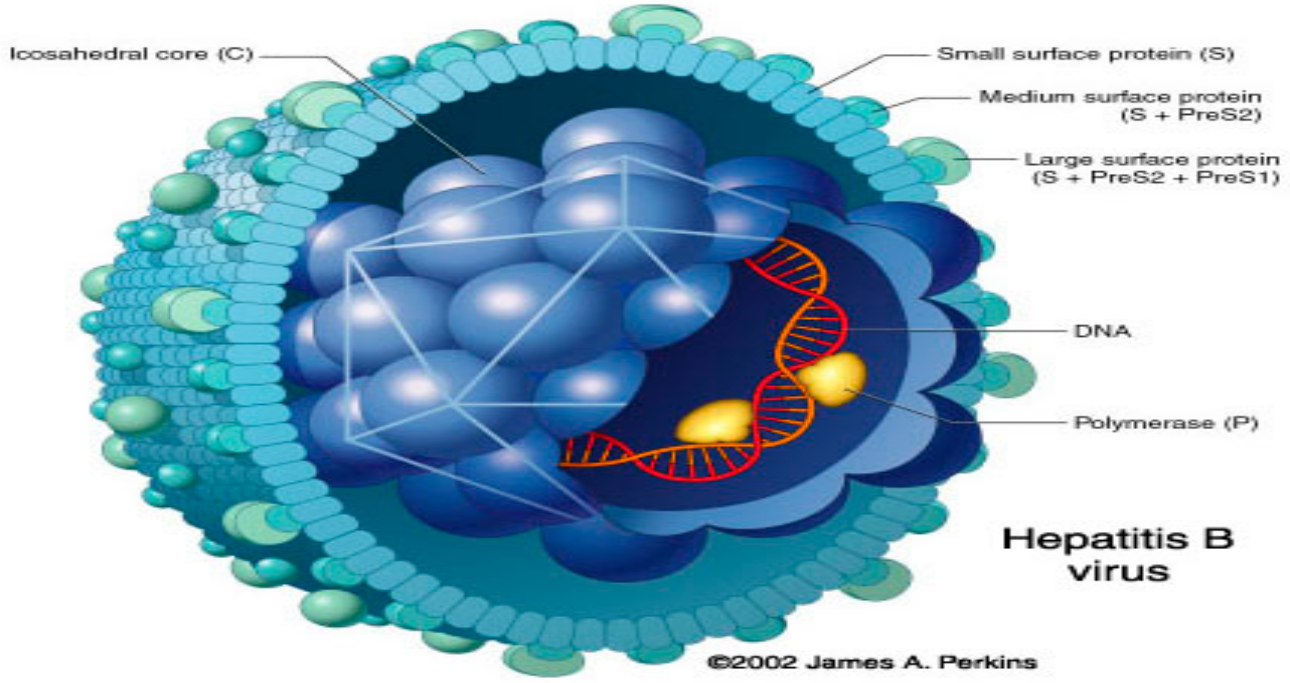


Protein (virulence factors)

Hepatitis B proteins

Orthohepadnavirus

Host: human



Protein	Short name	Alternative name(s)	Function
1. **Capsid protein**	CAPSD_HBVCJ	Core antigen, Core protein, HBcAg, p21.5	Self assembles to form an icosahedral capsid
2. **Protein P**	DPOL_HBVCJ	DNA-directed DNA polymerase RNA-directed DNA polymerase Ribonuclease H	Multifunctional enzyme that converts the viral RNA genome into dsDNA in viral cytoplasmic capsids.
3. **External core antigen**	HBEAG_HBVCJ	HBeAg Precore protein p25	May regulate immune response to the intracellular capsid by having an immunoregulatory effect which prevents destruction of infected cells
4. **Large envelope protein**	HBSAG_HBVCJ	L glycoprotein L-HBsAg Short name:LHB Large S protein Large surface protein Major surface antigen	The large envelope protein exists in two topological conformations, one which is termed 'external' or Le-HBsAg and the other 'internal' or Li-HBsAg.

5. Protein X	X_HBVCJ	HBx Peptide X pX	Multifunctional protein that may modulate protein degradation pathways, apoptosis, transcription, signal transduction, cell cycle progress, and genetic stability by directly or indirectly interacting with hosts factors
6. Putative X-Core fused protein	XCORE_HBVC4		The action of a molecule that contributes to the structural integrity of a complex or assembly within or outside a cell.
7. Putative uncharacterized 15.3 kDa protein	Y15K_HBVD3		uncharacterized
8. Putative uncharacterized 10.4 kDa protein	Y10K_HBVD3		uncharacterized

Transmission:

You may get infected without knowing it. You may not find out that you have an infection until you have a routine blood test or donate blood. Finding out that a family member or someone you live with is infected also may cause you to be tested. Some people never know they have hepatitis B until a doctor finds that they have cirrhosis or liver cancer.

However, until the virus has been cleared from their body, they can pass it on to others. If there are any symptoms, these will develop on average 40 to 160 days after exposure to the virus and will usually pass within one to three months.

Hepatitis B is transmitted through blood and infected bodily fluids. This can occur through:

1. direct blood-to-blood contact
2. unprotected sex
3. unsterile needles
4. From an infected woman to her newborn during the delivery process.

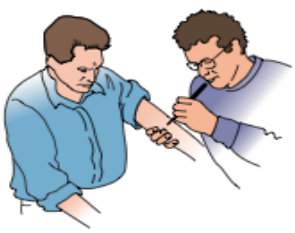
Other possible routes of infection include sharing sharp instruments such as razors, toothbrushes or earrings. Body piercing, tattooing and acupuncture are also possible routes of infection unless sterile needles are used.

If you have hepatitis B during pregnancy, you can pass the virus on to your baby. That's why a routine blood test to detect hepatitis B is offered to all pregnant women.

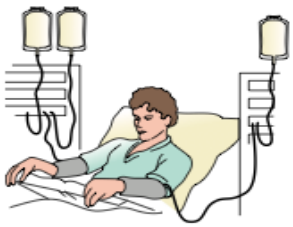
Hepatitis B is NOT transmitted casually. It cannot be spread through sneezing, coughing, hugging or eating food prepared by someone who is infected with hepatitis B. Everyone is at some risk for a hepatitis B infection, but some groups are at higher risk because of their occupation or life choices.

High Risk Groups :

1. Health care workers and emergency personnel
2. Infants born to mothers who are infected at the time of delivery
3. Partners or individuals living in close household contact with an infected person
4. Individuals with multiple sex partners, past or present
5. Individuals who have been diagnosed with a sexually transmitted disease
6. Illicit drug users (injecting, inhaling, snorting, popping pills)
7. Men who have sex with men
8. Individuals who received a blood transfusion prior to 1992
9. Individuals who get tattoos or body piercing
10. Individuals who travel to countries where hepatitis B is common (Asia, Africa, South America, the Pacific Islands, Eastern Europe, and the Middle East)
11. Individuals emigrating from countries where hepatitis B is common, or born to parents who emigrated from these countries (see above)
12. Families adopting children from countries where hepatitis B is common (see above)

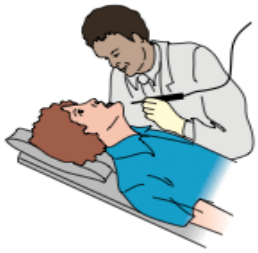


Nonsterile tatooing needles



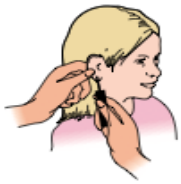
Contaminated dialysis equipment

Contaminated vaccination equipment



Nonsterile dental practices

Contaminated drug needles



Nonsterile body piercing equipment

Penetration:

The HBV virion binds to a receptor at the surface of the hepatocyte A number of candidate receptors have been identified, including the transferrin receptor, the asialoglycoprotien receptor molecule, and human liver endonexin. The mechanismof HBSAg binding to a specific receptor to enter cells has not been established yet .

Viral nucleocapsids enter the cell and reach the nucleus, where the viral genome is delivered. In the nucleus, second-strand DNA synthesis is completed and the gaps in both strands are repaired to yield a covalently closed circular (ccc) supercoiled DNA molecule that serves as a template for transcription of four viral RNAs that are 3.5, 2.4, 2.1, and 0.7 kb long. These transcripts are polyadenylated and transported to the cytoplasm, where they are translated into the viral nucleocapsid and precore antigen (C, pre-C), polymerase (P), envelope L (large), M (medium), S Small and transcriptional transactivating proteins (X).

Replication cycle:

(1) Reversible and non-cell-type specific attachment to cell-associated heparan sulfate proteoglycans.

(2) Specific and probably irreversible binding to an unknown hepatocyte-specific preS1-receptor. This step presumably requires activation of the virus resulting in exposure of the myristoylated N-terminus of the L-protein.

(3) Two different entry pathways have been proposed: endocytosis followed by release of nucleocapsids from endocytic vesicles; fusion of the viral envelope at the plasma membrane.

(4) Cytoplasmic release of the viral nucleocapsid containing the relaxed circular partially double stranded DNA (rcDNA) with its covalently linked polymerase.

(5) Transport of the nucleocapsid along microtubules. Accumulation of the capsids at the nuclear envelope facilitates interactions with adaptor proteins of the nuclear pore complex.

(6) Possible trapping of the nucleocapsid in the nuclear basket and release of rcDNA into the nucleoplasm. The mechanisms determining the breakdown of the capsid and the release of the viral DNA genome are unsolved .

(7) “Repair” of the incoming rcDNA: Completion of the plus strand of the rcDNA by the viral polymerase. Removal of the polymerase from the 5′-end of the minus strand DNA. Removal of a short RNA-primer used for the DNA-plus strand synthesis. Both processes are mediated by cellular enzymes.

(8) cccDNA formation by covalent ligation of both DNA strands. The cccDNA molecule is organized as a chromatin-like structure displaying the typical beads-on-a string arrangement consisting of both histone and non-histone proteins (minichromosome) . The lack of cccDNA in artificial host cells (e.g. hepatocytes of HBV transgenic mice) suggests that host specific factors may regulate cccDNA formation.

(9) Transcription. The cccDNA utilizes the cellular transcriptional machinery to produce all viral RNAs necessary for protein production and viral replication. Both host transcription factors, such as CCAAT/enhancer-binding protein (C/EBP) and hepatocyte nuclear factors (HNF) and viral proteins (core, the regulatory X-protein) regulate this process and may modulate viral gene expression by interacting with the viral promoters of the four major overlapping open reading frames (ORFs): (I) the precore/core gene, coding for the nucleocapsid protein and for the non-structural, secreted, precore protein, the HBeAg; (II) the polymerase gene coding for the reverse transcriptase, RNase H and terminal protein domains; (III) the L-,M-, and S-gene, coding for the three envelope proteins, which are synthesized in frame from different promoters; and (IV) the X gene, coding for the small regulatory X-protein. A correlation between viremia levels and the acetylation status of cccDNA-bound

histones has been reported, indicating that epigenetic mechanisms can regulate the transcriptional activity of the cccDNA.

(10) All 4 major mRNAs utilize a single
common polyadenylation signal. Processing of viral RNAs, nuclear export as well as stabilization of the viral RNAs appears to be exclusively mediated by host factors (i.e. La RNA binding protein).

(11) Translation of the pregenomic RNA (pgRNA) to the core protein and the viral polymerase. The regulatory X-protein and the three envelope proteins are translated from the subgenomic RNAs.

(12) Complex formation of the pgRNA (via its epsilon stem-loop structure) with the core protein and the polymerase and self-assembly of an RNA-containing nucleocapsid.

(13) Reverse transcription of the pgRNA followed by plus-strand DNA-synthesis within the nucleocapsid.Maturation of the RNA-containing nucleocapsids to DNA-containing nucleocapsids within the cytoplasm.

(14) DNA-containing nucleocapsids can be either re-imported into the nucleus to form additional cccDNA molecules or can be enveloped for secretion . The envelope proteins are co-translationally inserted into the ER membrane, where they bud into the ER lumen, and are secreted by the cell, either as 22 nm subviral envelope particles (SVPs) or as 42 nm infectious virions (Dane particles) if they have enveloped the DNA-containing nucleocapsids before budding. During synthesis of the L-protein, the preS-domains remain cytoplasmically exposed and become myristoylated. At some step after preS-mediated nucleocapsid envelopment translocation across the membrane occurs.

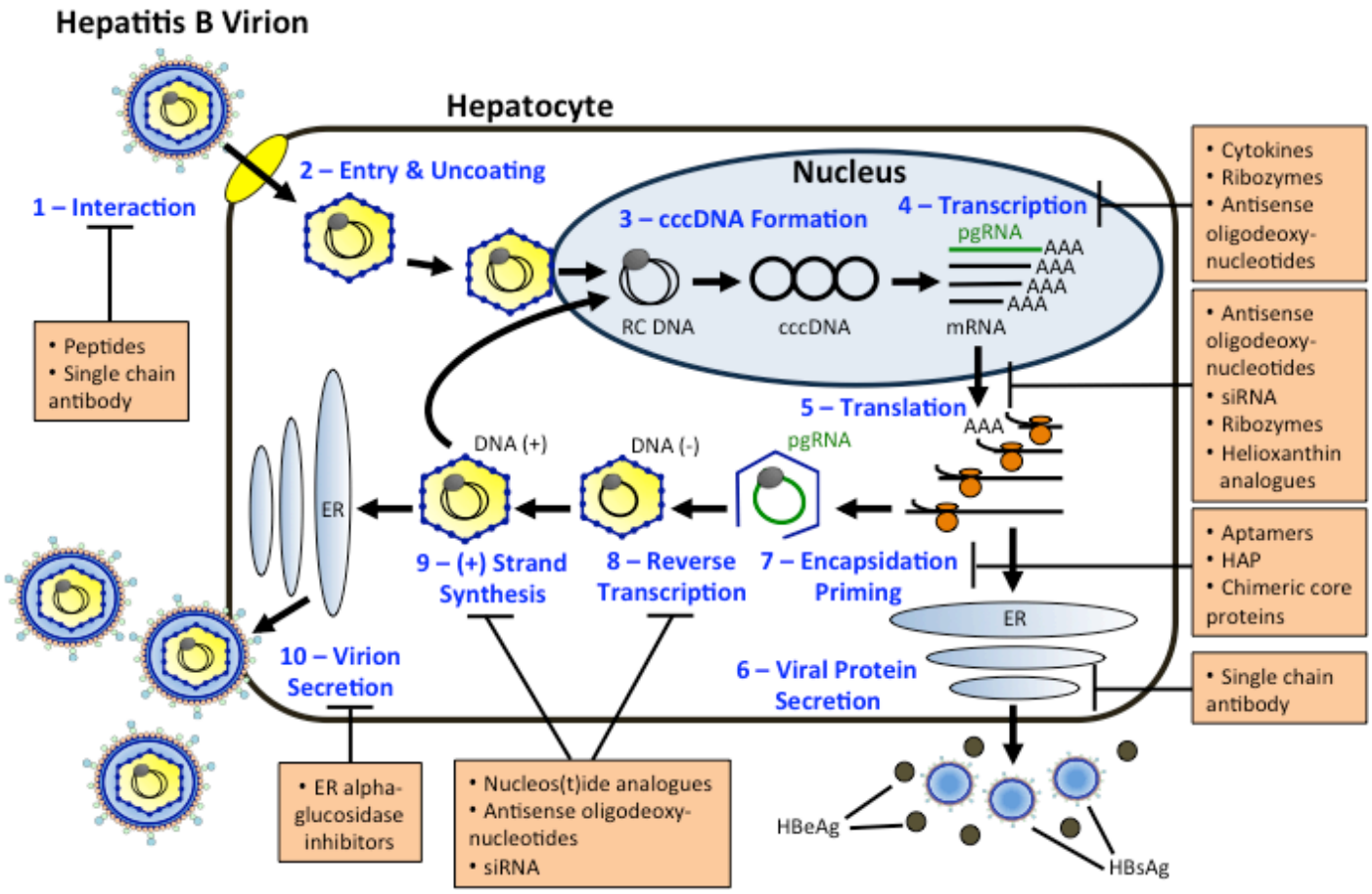
(15) Experiments performed using duck hepatitis B revealed that the majority of cccDNA molecules in infected hepatocytes comes from newly synthesized nucleocapsids. 1–50 cccDNA molecules appear to accumulate per cell, though

differences in cccDNA dynamics and efficiency of cccDNA accumulation may exist between HBV and the other hepadnaviruses. Both viral and host factors controlling

cccDNA formation and pool size are yet poorly defined. A negative-feedback mechanism suppressing cccDNA amplification might involve the L-protein.

As HBV polymerase inhibitors do not directly affect the cccDNA, a decrease in cccDNA levels is supposed to derive from the lack of sufficient recycling of viral nucleocapsids to the nucleus, due to inhibition of viral DNA-synthesis in the cytoplasm, and less incoming viruses from the blood .

(16) Compared to virions spherical and filamentous SVPs are secreted in a 103–106-fold excess into the blood of infected individuals. SVPs lack a nucleocapsid and are therefore non-infectious.



Assembly and egression:

In the vision assembly, the nucleocapsid reach the ER where they associate with the envelope proteins and bud into the lumen of the ER from which they are associated via the Golgi apparatus out of the cell.

The new, mature viral nucleocapsid can then follow two different intracellular pathways. One of which leads to formation and secretion of new virions whereas the other leads to amplification of viral genome inside nucleus.

The pre-core polypeptide is transported into the ER lumen where it's amino and carboxyl terminal is trimmed and the resultant protein is secreted as precore antigen.

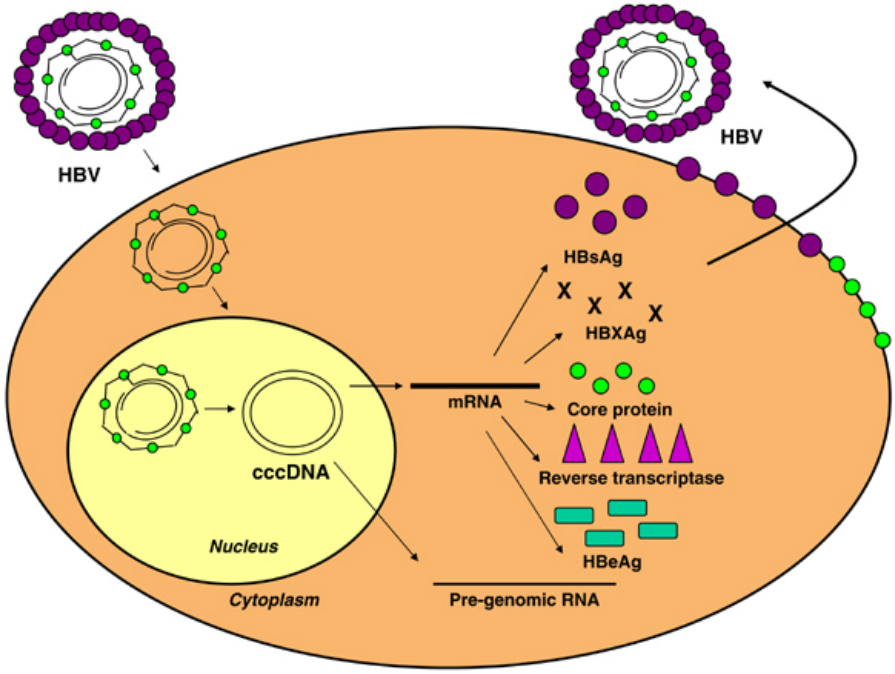
The X protein contributes to the efficiency of HBV replication by integrating with different transcription factors and is capable of stimulating both cell proliferation and cell death.

The HBV polymerase is multifunctional enzyme. The products of P gene are involved in multiple function of the viral life cycle, including priming activity to initiate minus-strand DNA synthesis a polymerase activity which synthesis DNA by using either RNA or DNA templates, a nuclease activity which degrades the RNA strand of RNA-DNA hybrids, and the packaging of the RNA pregenome into nucleocapsids. . Nuclear localisation signals on the polymerase mediate the transport of covalently linked viral genome through the nuclear pore

The 3.5 kb species, spanning the entire genome and termed pregenomic RNA, is packaged together with HBV polymerase and a protein kinase into core particles where it serves as a template for reverse transcription of negative strand DNA .the RNA to DNA conversion takes place inside the particles Ebression/budding out

Three independent reports have demonstrated that HBV budding and egress depend on functions of the so-called multivesicular body (MVB) pathway .MVBs

have the unique ability to generate intraluminal vesicles (ILV) that bud away from the cytosol, a process topologically equivalent to that of enveloped virus budding. Normally, cargo destined for either degradation, lysosomal functions, or exosomal release are sequestered(hidden) into these inwardly budding vesicles. The MVBs then fuse with the lysosome or the plasma membrane for ILV delivery.



Symptoms:

Hepatitis B is a name for swelling (inflammation) of the liver caused by the hepatitis B virus (HBV). HBV is one of five types of hepatitis virus. The others are hepatitis A, C, D, and E.It is passed from person to person in body fluids, such as blood, semen or vaginal fluids.

The Centers for Disease Control and Prevention (CDC) state that 2,000 to 4,000 people in the United States die each year from complications caused by hepatitis B. HBV infection can be acute or chronic.

Acute hepatitis B causes symptoms to appear quickly in adults. Children rarely develop acute hepatitis B. Any infections in children are far more likely to be chronic.

Most people remain healthy without any symptoms while they fight off the virus. Some will not even know they have been infected. Most healthy adults are able to fight off a hepatitis B infection within a few months, even without treatment . Symptoms may not occur for a few days or longer after contracting the virus. However, it is still contagious, even without symptoms.

Chronic hepatitis B develops slowly. about one in 20 people who get infected continue to carry the virus . This is called chronic, or long-running, hepatitis. Over time, it can cause serious damage to the liver, but good medical care and a healthy lifestyle can do a lot to slow this down.Symptoms may not be noticeable unless complications develop. Hepatitis B is said to be chronic when you have been infected for longer than six months. The symptoms are usually much milder and tend to come and go. In many cases, people with chronic hepatitis B infection will not experience any noticeable symptoms.

Symptoms of hepatitis B may not be apparent for months or years. However, common symptoms include:

1. dark urine
2. joint pain
3. loss of appetite
4. fever
5. abdominal discomfort
6. weakness
7. yellowing of the whites of the eyes (sclera) and skin (jaundice)

Diagnosis and cytopathic effect:

If your doctor suspects you have hepatitis B, he or she will examine you and likely order blood tests. Blood tests can determine if you have the virus in your system and whether it's acute or chronic. Your doctor might also want to remove a small

sample of your liver for testing (liver biopsy) to determine whether you have liver damage. During this test, your doctor inserts a thin needle through your skin and into your liver and removes a tissue sample for laboratory analysis.

Diagnosis of hepatitis is made by biochemical assessment of liver function. Initial laboratory evaluation should include: total and direct bilirubin, ALT, AST, alkaline phosphatase, prothrombin time, total protein, albumin, globulin, complete blood count, and coagulation studies.

Diagnosis is confirmed by demonstration in sera of specific antigens and/or antibodies. Three clinical useful antigen-antibody systems have been identified for hepatitis B:

-hepatitis B surface antigen (HBsAg) and antibody to HBsAg (anti-HBs)

-antibody (anti-HBc IgM and anti-HBc IgG) to hepatitis B core antigen (HBcAg)

-hepatitis B e antigen (HBeAg) and antibody to HBeAg (anti-HBe)

Tests specific for complete virus particles or DNA and DNA polymerase-containing virions, and for HDAg and HDV RNA in liver and serum are available only in research laboratories.

HBsAg can be detected in the serum from several weeks before onset of symptoms to months after onset. HBsAg is present in serum during acute infections and persists in chronic infections. The presence of HBsAg indicates that the person is potentially infectious

Very early in the incubation period, pre-S1 and pre-S2 antigens are present. They are never detected in the absence of HBsAg. Hepatitis B virions, HBV DNA, DNA polymerase, and HBeAg are then also detected. The presence of HBeAg is associated with relatively high infectivity and severity of disease.

Anti-HBc is the first antibody to appear. Demonstration of anti-HBc in serum indicates HBV infection, current or past. IgM anti-HBc is present in high titre during acute infection and usually disappears within 6 months, although it can persist in some cases of chronic hepatitis. This test may therefore reliably diagnose acute HBV infection. IgG anti-HBc generally remains detectable for a lifetime.

Anti-HBe appears after anti-HBc and its presence correlates to a decreased infectivity. Anti-HBe replaces HBeAg in the resolution of the disease.

Anti-HBs replaces HBsAg as the acute HBV infection is resolving. Anti-HBs generally persists for a lifetime in over 80% of patients and indicates immunity

Acute hepatitis patients who maintain a constant serum HBsAg concentration, or whose serum HBeAg persists 8 to 10 weeks after symptoms have resolved, are likely to become carriers and at risk of developing chronic liver disease.

A complication in the diagnosis of hepatitis B is the rare identification of cases in which viral mutations change the antigens so they are not detectable.

Small-scale screening for HBV infection

Immunofluorescence studies, in situ hybridization, immunohistochemistry, and thin-section electron microscopy are used to examine pathological specimens for the presence of HBV-associated antigens or particles, providing information about the relationship between HBV DNA replication and HBV gene expression.

Within the hepatocyte, HBsAg localizes in the cytoplasm, and HBcAg is seen in the nucleus and/or the cytoplasm. Detection of complete virions in the liver is uncommon.

DNA hybridization techniques and RT-PCR assays have shown that almost all HBsAg/HBeAg-positive patients have detectable HBV DNA in their serum, whereas

only about 65% of the HBsAg/anti-HBe- reactive patients are positive. All patients who recover from acute hepatitis B are negative for HBV DNA. On the other hand, some patients infected chronically who have lost their HBsAg remain HBV DNA positive

HBV serological markers in hepatitis patients. The three standard blood tests for hepatitis B can determine if a person is currently infected with HBV, has recovered, is a chronic carrier, or is susceptible to HBV infection.

Assay results			***Interpretation***
HBsAg	**anti-HBs**	**anti-HBc**	
+	-	-	Early acute HBV infection
+	+/-	+	Acute or chronic HBV infection. Differentiate with IgM-anti-HBc. Determine level of infectivity with HBeAg or HBV DNA.
-	+	+	Indicates previous HBV infection and immunity to hepatitis B.
-	-	+	Possibilities include: past HBV infection; low-level HBV carrier; time span between disappearance of HBsAg and appearance of anti-HBs; or false-positive or nonspecific reaction. Investigate with IgM anti-HBc, and/or challenge with HBsAg vaccine. When present, anti-HBe helps validate the anti-HBc reactivity.
-	-	-	Another infectious agent, toxic injury to the liver, disorder of immunity, hereditary disease of the liver, or disease of the biliary tract.
-	+	-	vaccine-type response.

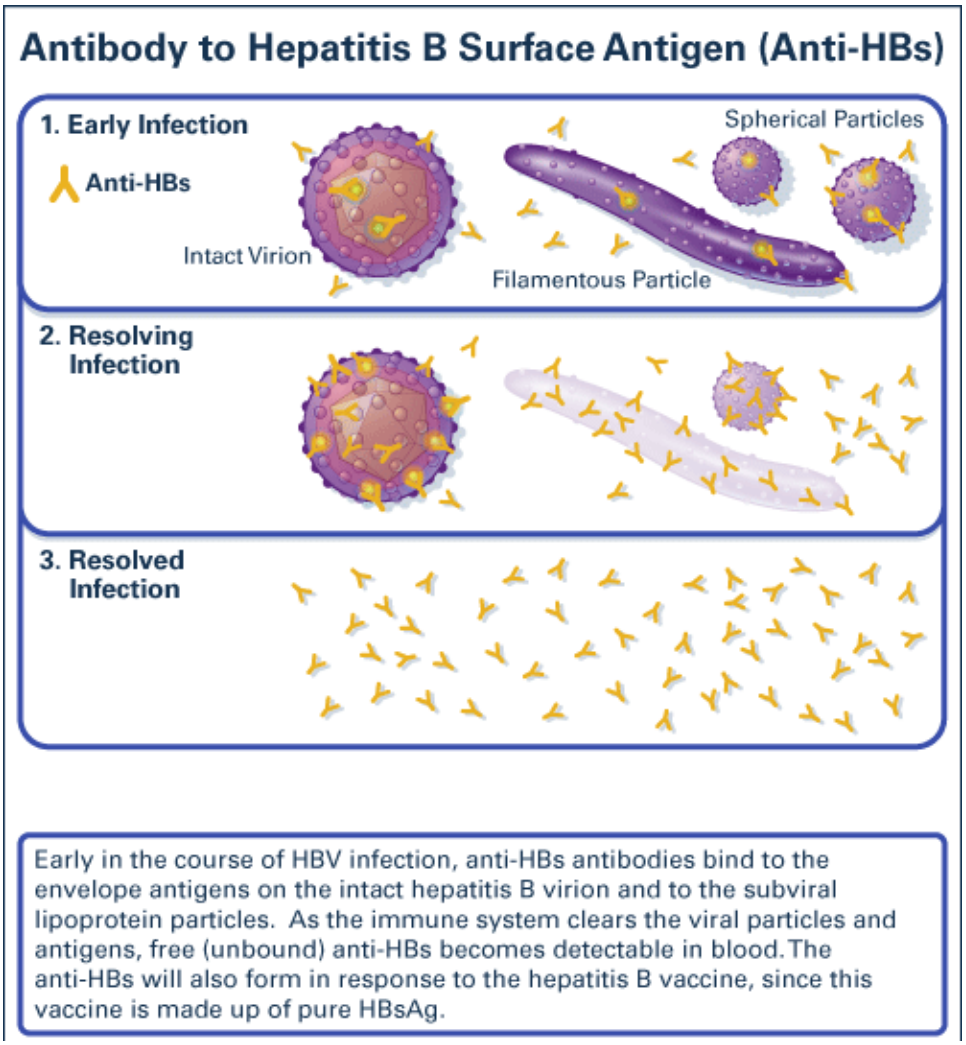
From: Hollinger FB and Liang TJ. Hepatitis B Virus. In: Knipe DM et al., eds. Fields Virology, 4th ed., Philadelphia, Lippincott Williams &Wilkins, 2001:2971-3036,[15] *with permission (*http://lww.com*).*

Interpretation of HBV serologic markers in patients with hepatitis.[15]

Control of virus:

Hepatitis B infection is a global health problem. According to World Health Organization, an estimated 600,000 people die every year due to the acute or chronic consequences of Hepatitis B infection.

The surface antigen of HBV (HBsAg) may be detected in serum 3060days following infection and may persist for widely variable periods of time. Antibody to hepatitis B core antigen is the first to develop, following acute hepatitis B infection, which appears predominantly as IgM antiHBc At about 6 weeks after infection. All patients with acute hepatitis B are HBeAg positive and therefore highly infectious and contact with their blood or body fluids can lead to HBV infection.



Incidence/epidemiology :

HBV infection accounts annually for 4000 to 5500 deaths in the United States and 1 million deaths worldwide from cirrhosis, liver failure, and hepatocellular carcinoma

HBV also plays an important role in the development of liver cirrhosis in Ghana. There are approximately 50 million chronic carriers of hepatitis B virus (HBV) in

Africa, with a 25% mortality risk.

A study conducted in Italy on HBsAg positive samples had 86.4% being HBeAgnegative and the Mediterranean, Asia and in the Far East had a population of 30-80% being HBeAgnegative.

Sheik et al reported a 10% of IgM antiHBcore in Pakistan

A 4% of IgM antiHBcore was reported in Italy amongst HBsAg positive donors who were chronically infected.

A total prevalence of anti HBcore of 16.2% was reported in Yemen and

13.5% in Korea amongst blood donors.

Antar et al reported a 6.25% detectable serum HBV DNA amongst Egyptian blood donors.

Prevention:

Hepatitis B virus infection is a preventable disease. Vaccination (immunization) is most effective, cost-saving and the most important tool in preventing the transmission of HBV. the World Health Organization recommended that childhood hepatitis B vaccination should be included in immunization programs of all countries

1. Immuneprophylaxis with Hepatitis B immunoglobulin (HBIG) has shown significant protection against infection in HBV exposed individuals

2. Hepatitis B immuneGlobulin (HBIG) is also potent to cut down HBV intrauterine infection when administered to pregnant women during late pregnancy.
3. The implementation of vaccination has dramatically changed the epidemiology of HBV in countries where the transmission has been mostly vertical (high).
4. In order to prevent HB transmission from mother to infant, the first dose of HB vaccine needs to be given as soon as possible after birth.
5. Routine screening of blood donors of HBsAg was mandated in 1972.the introduction of anti-HBc screening has efficiently excluded those donors.
6. Universal precautions should be used when handling human blood and body fluids. Specific precautions include use of hand gloves, and masks when handling infectious or contaminated materials.
7. Patients who depend on frequent transfusion should be vaccinated
8. Education and implementation of public health interventions, such as universal immunization and harm reduction programs for HBV,regarding infection prevention and transmission especially of the groups at risk of hepatitis exposure or drug users is supposed to be one of the effective ways of infection control.

Treatment:

People with acute hepatitis B do not require treatment. Getting bed rest, drinking lots of fluids and taking over-the-counter pain relievers (products containing ibuprofen, such as Motrin and Advil, are considered to be safer than products containing acetaminophen, such as Tylenol, in people with acute hepatitis) are usually all that is needed for someone who is experiencing acute hepatitis B symptoms.

Treatment is only recommended for people with chronic hepatitis B, notably those who—based on a person's age, overall health and the results of the various tests

described above—are expected to experience hepatitis B-related illness or death within the next 20 years and are expected to benefit from therapy. The goal of therapy is to prevent cirrhosis, liver failure and liver cancer by reducing HBV viral load and the loss of HBeAg (either with or without detection of anti-HBe) while improving liver enzyme levels.

Deciding when to start therapy, along with which treatments to take, depends on a number of important factors: HBeAg status, HBV viral load, ALT levels, liver biopsy results (if conducted) and a person's readiness to take medications exactly as prescribed.

Treatment to prevent hepatitis B infection after exposure:

If you know you've been exposed to the hepatitis B virus, call your doctor immediately. If you haven't been vaccinated or aren't sure whether you've been vaccinated or whether you responded to the vaccination, receiving an injection of hepatitis B immune globulin within 12 hours of coming in contact with the virus may help protect you from developing hepatitis B. You should be vaccinated at the same time.

Treatment for acute hepatitis B infection

If your doctor determines your hepatitis B infection is acute — meaning it is short-lived and will go away on its own — you may not need treatment. Instead, your doctor might recommend rest and adequate nutrition and fluids while your body fights the infection.

Treatment for chronic hepatitis B infection:

If you've been diagnosed with chronic hepatitis B infection, you may have treatment to reduce the risk of liver disease and prevent you from passing the infection to others. Treatments include:

1. **Antiviral medications**. Several antiviral medications — including lamivudine (Epivir), adefovir (Hepsera), telbivudine (Tyzeka) and entecavir (Baraclude), can help fight the virus and slow its ability to damage your liver. Talk to your doctor about which medication might be right for you.
2. **Interferon alfa-2b (Intron A).** This synthetic version of a substance produced by the body to fight infection is used mainly for young people with hepatitis B who don't want to undergo long-term treatment or who might want to get pregnant within a few years. It's given by injection. Side effects may include depression, difficulty breathing and chest tightness.
3. **Liver transplant**. If your liver has been severely damaged, a liver transplant may be an option. During a liver transplant, the surgeon removes your damaged liver and replaces it with a healthy liver. Most transplanted livers come from deceased donors, though a small number come from living donors who donate a portion of their livers. Other drugs to treat hepatitis B are being developed.

Recent discoveries:

This year's HEP DART conference brought together liver specialists and researchers from around the world to review and brainstorm about the latest research to find a cure for hepatitis B.

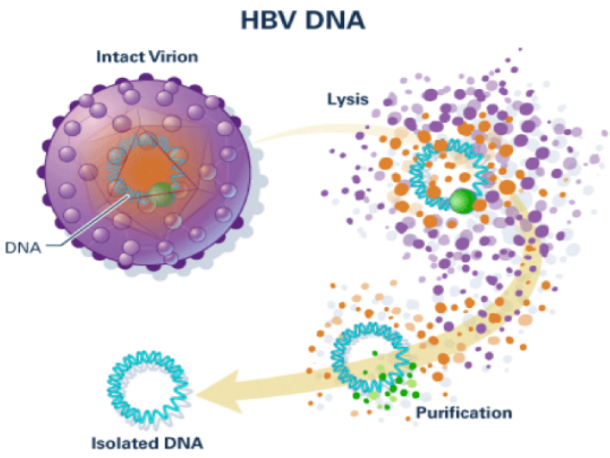
Biopharmaceutical companies presented data that showed their cutting-edge treatments, which use micro-RNAs and other innovative approaches to reduce the virus, appear promising

HBV was once considered hyper-endemic in the Kingdom of Saudi Arabia (KSA), where infection was acquired mainly through horizontal transmission early in life, and less commonly by vertical transmission similar to what is observed in other

HBV-endemic countries.From a historical perspective, the first large-scale community-based epidemiological study conducted on Saudi children showed a hepatitis B surface antigen (HBsAg) seroprevalence of approximately 7% and a > 70% prevalence of at least one HBV marker. The Saudi government initiated a similar program in 1990 aimed at vaccinating all Saudi children at school entry. Mandatory vaccination of healthcare workers and hemodialysis patients were also introduced around this time. Government regulations stipulated that all children born after October 01, 1989 be vaccinated against HBV regardless of the mother's HBV status, thereby setting the stage for a preemptive strategy against HBV infection within the country. he progress in mapping the epidemiological pattern of viral

hepatitis in Saudi Arabia has not only aided our understanding of the disease, but has also exposed the small but relevant gaps in our identification of the intricate details concerning the disease's clinical expression.

Findings Of the 17029 records screened, 1800 report on the prevalence of HBsAg covering 161 countries were included. HBsAg seroprevalence was 3·61% (95% CI 3·61–3·61) worldwide with highest endemicity in countries of the African region (total 8·83%, 8·82–8·83) and Western Pacific region (total 5·26%, 5·26–5·26). Within WHO regions, prevalence ranged from 0·20% (0·19–0·21; Mexico) to 13·55% (9·00–19·89; Haiti) in the Americas, to 0·48% (0·12–1·90; the Seychelles) to 22·38% (20·10–24·83; South Sudan) in the African region. We estimated that in 2010, globally, about 248million individuals were HBsAg positive.



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