Introduction to hepatitis B virus (HBV)

What is hepatitis B?

Hepatitis B is an infection of the liver caused by the hepatitis B virus (HBV). The liver is a major organ of the body that has several critical functions, including the removal of toxins from the blood and providing support in regulating blood sugar and gut metabolism. When the liver is inflamed or damaged, it may not work properly and this can result in serious ill-health.

Infection with HBV can cause both acute (short-term) and chronic (long-term) disease that can damage the liver.

Acute HBV infection refers to the initial stage of HBV infection after someone has been exposed to the virus. It typically lasts from a few weeks to several months. Most people with an acute HBV infection have no symptoms and make a full recovery, but in some cases the acute infection can be severe and may lead to liver failure. There is currently no specific treatment for acute HBV infection and people are treated for relief of their symptoms.

Approximately 5% of adults with an acute HBV infection are unable to clear the virus from their blood and consequently they develop **chronic HBV infection**. Chronic HBV infection occurs when the virus persists in the body for more than six months after the acute phase. Many people with chronic HBV infection may not experience symptoms for years until the virus causes liver damage, leading to serious liver conditions such as cirrhosis (scarring of the liver) and liver cancer.

Over time, infection with HBV can seriously damage liver function, causing fibrosis or cirrhosis (scarring of the liver), and this can lead to hepatocellular carcinoma (HCC) (liver cancer). The rate of progression to cirrhosis is variable and depends on several factors, including age of initial infection, gender, alcohol consumption, co-infections (e.g. HIV and hepatitis C virus), and obesity. Around one in four people with chronic HBV infection are at risk of premature death from cirrhosis or liver cancer.

Effective anti-viral treatments are available for chronic HBV which can reduce the risk of developing complications from the disease and improve long-term health and survival.

Geographical distribution

According to the World Health Organization (WHO)there are an estimated 254 million people worldwide living with chronic hepatitis B [1]. The highest prevalence of HBV is in Asia, Africa and the Pacific Islands. According to the European Centre for Disease Prevention and Control (ECDC), there are an estimated 3.6 million people living with chronic HBV infection in the European Union [2]. Across the European Union there is also a geographical variation in the burden of cases, with the highest estimates of disease burden in the south and east of the region.

Symptoms

Many people who are newly infected with HBV show no signs of infection and are symptom free. However, if symptoms and signs of infection do occur, these may include:

- a yellowing of the skin and the whites (conjunctiva) of the eyes (jaundice);
- dark urine;
- loss of appetite;
- nausea and vomiting;
- fatigue.

Many people with chronic HBV infection have no symptoms, but some may feel fatigue or have mild symptoms of acute hepatitis.

Transmission

The most commonly reported route of transmission in Europe is through sexual transmission, when someone has sex without a condom with a person who has HBV infection. Transmission is also reported through the sharing of needles and syringes, or other sharp objects that have been contaminated with blood or other body fluids from someone who has HBV. Transmission through contaminated objects may occur in healthcare settings, where appropriate precautions have not been taken, or in the community through accidental needlestick injury or, more commonly, through injecting drug use. Transmission of infection is also possible through the transfusion of unscreened blood or blood products, but this is now extremely rare in Europe due the tight regulations in place.

In countries where HBV is more widespread, the virus is more commonly transmitted from a mother with HBV to her baby at the time of birth (perinatal transmission) or during the first five years of life through exposure to infected blood (horizontal transmission).

Prevention

Hepatitis B can be easily prevented through vaccination. A safe and highly effective vaccine is widely available that can protect against infection with the virus. It is recommended that the vaccine is provided as a course of three doses during early childhood and most countries have now included the vaccine in their routine childhood vaccination schedule. A full course of vaccination is considered to provide lifelong protection.

Other prevention measures to reduce the transmission of hepatitis B include:

- strict enforcement of infection prevention and control measures in healthcare settings;
- measures to prevent perinatal transmission, including the provision of antiviral treatment to mothers with HBV and the provision of a birth dose of HBV vaccine (+/- immunoglobulin) to babies born to infected mothers;
- safe sex through the use of condoms;
- harm reduction measures targeting people who inject drugs, including the provision of sterile needles and syringes and the use of opioid agonist therapy for opiate users.

Testing and treatment

A blood test can tell if someone has been infected with HBV or has been vaccinated against it (Table 1). HBV infection is diagnosed through blood tests that detect the presence of HBV viral proteins and antibodies. Blood tests can differentiate between acute and chronic infection and are also able to assess the severity of any liver damage.

HBV testing should include testing for hepatitis B surface antigen (HBsAg), antibody to hepatitis B surface antigen (anti-HBs), and total antibody to hepatitis B core antigen (anti-HBc).

Table 1. Simple guide to the hepatitis B blood tests

Type of blood test	What does the blood test check for?	What does a positive test result mean?
Hepatitis B surface antigen (HBsAg)	The blood test checks whether someone has current hepatitis B infection.	If the test is positive then the person is currently infected with the hepatitis B virus and should be assessed medically.
Antibody to hepatitis B surface antigen (anti-HBs)	This test checks whether a person has immunity to hepatitis B infection.	A positive test indicates that the person has immunity to the virus, through either vaccination or after recovering from the virus. A positive test indicates that the person cannot be infected with hepatitis B again.
Total antibody to hepatitis B core antigen (anti-HBc)	This test checks for antibodies to the core antigen which develop after a person has been infected with the hepatitis B virus.	A positive test indicates that the person has at some point in their life been infected with the hepatitis B virus.

Adapted from Hepatitis Australia. Testing for hepatitis B: https://www.hepatitisaustralia.com/testing-for-hepatitis-b

Effective anti-viral treatments are available for chronic HBV, but not all individuals with chronic HBV are considered eligible for treatment and everyone will need to be assessed by a clinician to determine whether they meet the criteria for treatment. Current treatments commonly used to treat chronic hepatitis B include the oral medicines tenofovir or entecavir. Unlike treatment for hepatitis C virus (HCV) infection, treatment for HBV infection is not curative and most people who start HBV treatment must continue it for life.

References

1. World Health Organization (WHO). Global hepatitis report 2024: action for access in low- and middle-income countries. Geneva: World Health Organization; 2024.
2. European Centre for Disease Prevention and Control (ECDC). Prevention of hepatitis B and C in the EU/EEA. Stockholm: ECDC; 2024. Available at: https://www.ecdc.europa.eu/en/publications-data/prevention-hepatitis-b-and-c-eueea-2024

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