

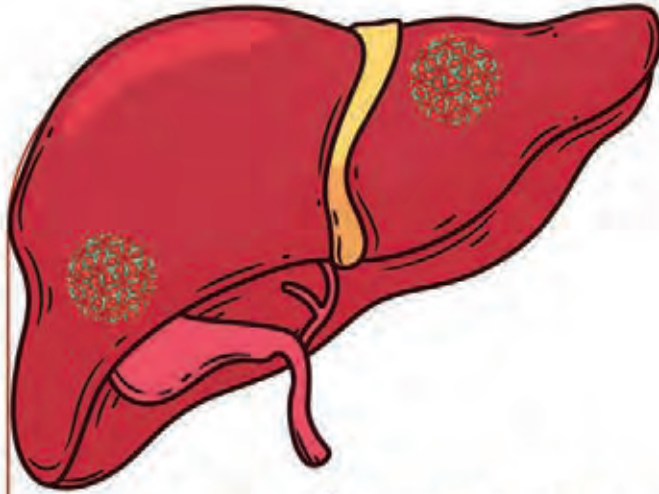
Hepatitis B

A Comprehensive Guide for Patients

Authors

- Professor Seyed Moayed Alavian
Professor of Gastroenterology and Hepatology
- SeyedHoda Alavian
Internist





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موضوع

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Preface

Hepatitis B is a pervasive and persistent global health challenge, impacting over 296 million individuals worldwide. It is a disease that knows no borders, affecting people across all continents, ethnicities, and socio-economic backgrounds. This chronic viral infection, primarily transmitted through blood and bodily fluids, can lead to life-threatening complications such as liver cirrhosis and hepatocellular carcinoma (liver cancer). The burden of this disease is further compounded by Hepatitis D, a virus that co-infects or superinfects individuals with Hepatitis B, worsening the clinical outcomes and increasing the complexity of treatment.

Despite advancements in medicine, Hepatitis B and D remain under-addressed in many parts of the world. Lack of awareness, limited access to vaccination and treatment, and socio-economic disparities continue to perpetuate their spread. Regions such as Sub-Saharan Africa, East Asia, and parts of the Middle East bear the heaviest burden, but no country is immune to the impact of these diseases. The stigma surrounding viral hepatitis often discourages individuals from seeking timely diagnosis and treatment, exacerbating the public health crisis.

Global efforts to combat Hepatitis B have yielded some progress. The introduction of the Hepatitis B vaccine in national immunization programs has dramatically reduced new infections among children in many countries. Organizations like the World Health Organization (WHO) have set ambitious goals for the elimination of Hepatitis B and C as public health threats by 2030. However, achieving these goals requires a multifaceted approach that includes enhanced public awareness, expanded vaccination coverage, early diagnosis, effective antiviral therapies, and robust surveillance systems.

This book is born from a collective vision to empower individuals and communities with knowledge. It serves as a comprehensive yet accessible resource for understanding Hepatitis B and D. From the science of the viruses and their transmission to prevention strategies, management, and treatment options, this book aims to bridge the gap between medical expertise and public understanding. It is a call to action for patients, caregivers, healthcare professionals, and policymakers to work collaboratively in tackling these diseases.

The authors bring decades of experience in clinical hepatology, research, and public health advocacy. Their combined efforts are reflected in the depth and clarity of this book, which is designed to demystify complex medical concepts and provide actionable insights for readers at all levels.

We dedicate this work to the millions living with Hepatitis B and D, whose resilience inspires hope and progress. To the healthcare workers on the frontlines, researchers advancing treatments, and advocates raising awareness—this book is a tribute to your unwavering commitment. And to the global community, let this book be a tool to foster understanding, compassion, and action in the fight against viral hepatitis.

Together, through innovation, awareness, and global collaboration, we can envision a future where the burden of Hepatitis B and D is dramatically reduced, and their impact on human lives is diminished. The journey is long, but every step forward brings us closer to a world free of these preventable and manageable diseases.

With hope and determination.

- Dr. Professor Seyed Moayed Alavian
- Dr. SeyedHoda Alavian

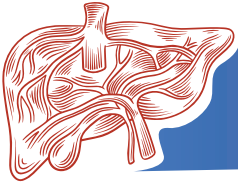


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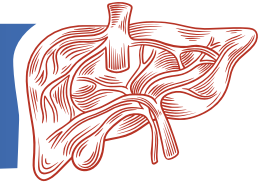
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Each chapter of this book comprehensively addresses various aspects of hepatitis B, offering practical solutions for the prevention and management of the disease.

HEPATITIS B



Chapter 1

Structure and Function of the Digestive System and Liver

This chapter examines the structure and function of the digestive system and liver. These two parts of the body play a crucial role in maintaining overall health. The liver is one of the most important and complex organs in the body, responsible for numerous tasks essential for proper body function. Understanding the proper function of these organs helps us better comprehend the effects of diseases like hepatitis B.

• Structure and Function of the Digestive System

The digestive system is a hollow tube extending from the mouth to the anus, responsible for digesting and absorbing nutrients. This process begins with food entering the mouth, where it is mixed with saliva and broken down before passing through the esophagus. From the esophagus, food reaches the stomach, where it mixes with stomach acids and enzymes, transforming into a semi-liquid substance.

After the stomach, food enters the small intestine, where most nutrients are absorbed into the bloodstream and transported to the body's cells. In the large intestine, water and minerals are absorbed from the remaining food matter, and waste products are excreted as feces. Each part of the digestive system plays a significant role in digesting and absorbing nutrients:

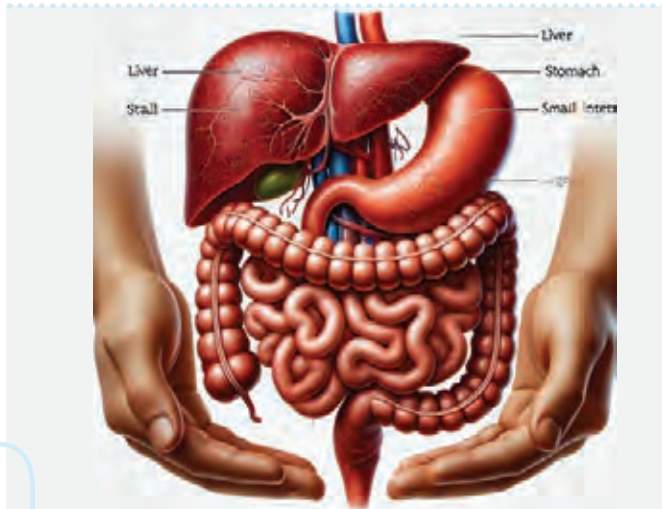
Mouth and Esophagus: The initial digestion process begins with food mixing with saliva in the mouth and then being transported to the stomach through the esophagus.

Stomach: In the stomach, food is broken down by enzymes and stomach acid, forming a semi-liquid mixture.

Small Intestine: At this stage, most nutrients are absorbed into the bloodstream.

Large Intestine: Water and minerals are absorbed, and waste is expelled.

One of the critical organs in food digestion is the liver, located in the upper right abdomen beneath the diaphragm and protected by the ribcage. The liver aids in the digestion of fats by secreting bile into the small intestine and also removes many toxins from the body. This vital organ plays a key role in maintaining overall health.



In the schematic illustration provided, the location of the liver in the human body is depicted. The liver is situated in the upper right abdomen, beneath the diaphragm, and is protected by the ribcage. This image clearly shows the liver in relation to the stomach, intestines, and other vital organs such as the heart and lungs.

● The Liver and Its Role in the Digestive System

The liver is one of the most vital organs in the body, playing a crucial role in digestion, metabolism, and detoxification. This large organ is located in the upper right abdomen, beneath the diaphragm, and is protected by the ribcage. The liver's structure comprises various components, each with specific functions:

Lobes: The liver consists of two main lobes; the right lobe, which is larger than the left lobe.

Glisson's Capsule: The liver is encased in a membrane called Glisson's capsule, which provides protection.

Hepatocytes (Liver Cells): These are the liver's functional units, responsible for producing enzymes, various chemicals, and participating in critical metabolic processes.

Blood Vessels: The liver has two blood supplies: the portal vein, which delivers nutrient-rich blood from the digestive system to the liver, and the hepatic artery, which brings oxygenated blood from the heart.

The liver has an extensive blood supply, as it must store or convert nutrients absorbed from the digestive system into chemicals needed by the body. Vascular networks around hepatocytes transport nutrients from the intestines to these cells, where they are stored or processed. Waste products and liver secretions are transported via bile ducts to the gallbladder.

The liver plays an essential role in regulating glucose (sugar) and protein metabolism and aids in the digestion and absorption of fats in the digestive system by producing and secreting bile. Bile, produced in the liver, is temporarily stored in the gallbladder and released into the small intestine during digestion to

assist in breaking down fats. Additionally, the liver is responsible for removing waste products from the body's metabolism, secreting them into bile to be eliminated from the body.

For these reasons, the liver is considered a key organ in maintaining and regulating overall health.

● Key Functions of the Liver

The liver is responsible for performing several vital functions essential for the health and survival of the body.

● The Liver's Role in Producing Essential Proteins

The liver plays a critical role in producing many of the body's essential proteins, which participate in various physiological processes. Among the most important proteins produced by the liver are **albumin** and **blood clotting factors**:

Albumin: This protein is essential for maintaining the body's fluid balance. Albumin regulates osmotic pressure in blood vessels and prevents excessive fluid from leaking into body tissues. If the liver's production of albumin decreases, the individual may develop edema (swelling caused by fluid accumulation in tissues).

Blood Clotting Factors: The liver also produces many factors essential for blood clotting. These factors help form blood clots and prevent severe and prolonged bleeding. If the liver is not functioning properly and clotting factor production is impaired, the body becomes prone to internal or subcutaneous bleeding. This condition can lead to unexplained bruising, gastrointestinal bleeding, and, in severe cases, uncontrolled bleeding following injury.

In addition to these, the liver produces other proteins that play vital roles in the immune system, hormone transport, and nutrient metabolism. Thus, any disruption in liver function can have widespread effects on overall health.

● Storage of Vitamins and Minerals

The liver plays a key role in storing and releasing vitamins and minerals necessary for proper body function. This process helps maintain balance and provides the body with the nutrients it needs during specific times.

● Vitamin Storage

The liver is a storage site for various fat-soluble and some water-soluble vitamins. These vitamins are essential for many of the body's vital processes:

Vitamin A: The liver is the largest storage site for vitamin A in the body. This vitamin is crucial for vision, cell growth, and maintaining the immune system. The liver releases vitamin A as needed, delivering it to different parts of the body.

Vitamin D: The liver stores vitamin D and aids in its activation when needed to maintain bone health and regulate calcium and phosphorus levels in the body. Vitamin D is also vital for the immune system.

Vitamin E: This vitamin acts as an antioxidant, protecting the body's cells from oxidative damage. The liver stores vitamin E and releases it when required to protect body tissues.

Vitamin K: Vitamin K is essential for the blood clotting process. The liver stores this vitamin and uses it to produce clotting proteins, which prevent severe bleeding.

● Mineral Storage

In addition to vitamins, the liver stores certain essential minerals that play a significant role in bodily functions:

Iron: The liver stores iron in the form of ferritin and releases it when the body needs it to produce hemoglobin (the protein that carries oxygen in the blood). Iron is also crucial for many enzymes and metabolic processes in the body.

Copper: Copper is an essential mineral involved in numerous enzymes and contributes to energy production, connective tissue formation, and nervous system function. The liver stores copper and releases it as needed.

● Regulation of Nutrient Release

The liver not only stores vitamins and minerals but also intelligently releases these substances based on the body's needs. For example's:

- During periods of fasting or malnutrition, the liver can release stored vitamins and minerals to help the body maintain normal function.
- In situations where the body requires increased amounts of these substances, such as during growth, pregnancy, or illness, the liver provides these reserves.

The liver serves as the primary reservoir for fat-soluble vitamins (A, D, E, and K) and minerals such as iron and copper. These stores are released during times of deficiency or increased need to support the body's normal function. Any impairment in liver function can lead to deficiencies in these essential nutrients, jeopardizing the body's health.



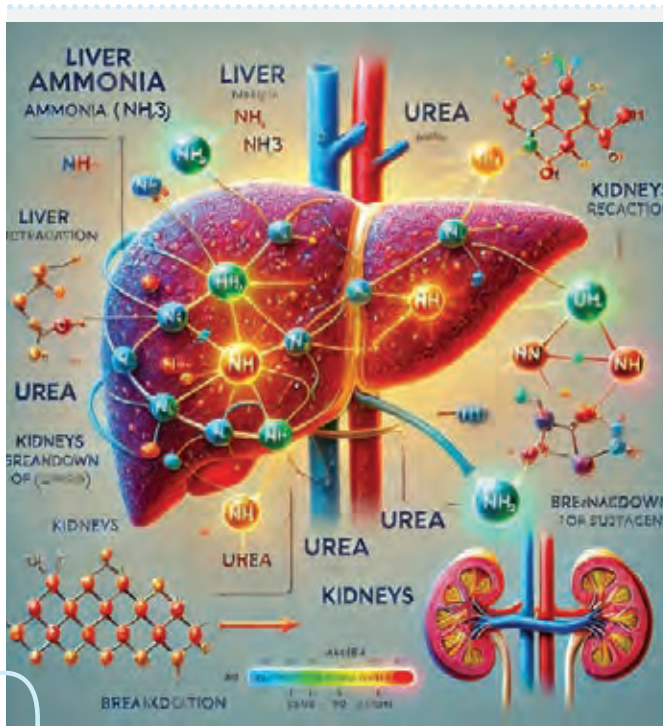
The schematic illustration provided clearly depicts the primary functions of the liver in the human body. This image highlights the liver's essential roles, including the production of vital proteins (albumin and clotting factors), storage of vitamins and minerals (iron and copper), regulation of blood sugar, fat metabolism, and bile production for fat digestion. All key liver functions are accurately labeled in this illustration to enhance understanding of this organ's significance in the body.

● **The Role of the Liver in Detoxification**

The liver plays a critical role in detoxifying the body. One of the substances produced during chemical reactions in the body and by intestinal bacteria is ammonia (NH_3). Ammonia is produced in large quantities and enters the bloodstream, but it is toxic and dangerous to many cells in the body, particularly brain cells. The liver's job is to extract ammonia from the blood and convert it into urea through a series of chemical reactions. Urea is then excreted from the body via the kidneys.

The liver's detoxification role is not limited to ammonia. Many other harmful substances, including drugs and various toxins, are also broken down in the liver and converted into compounds that can be eliminated from the body. If liver function is impaired, these toxins accumulate in the body, potentially causing significant damage, especially to the brain and other organs.

As the body's natural refinery, the liver plays an essential role in maintaining overall health.



The schematic illustration provided clearly demonstrates the liver's role in detoxifying the body. This image includes the process of converting ammonia into urea by the liver, as well as the breakdown of other toxins and drugs. The kidneys' role in excreting urea is also clearly depicted. The illustration effectively shows the detoxification pathways and the elimination of harmful substances through the liver and kidneys.

● **Food Metabolism**

The liver plays a crucial role in the metabolism of nutrients and participates in

complex processes such as the metabolism of carbohydrates, fats, and proteins.

● Carbohydrate Metabolism

The liver is key in regulating blood glucose levels and energy storage. The processes it performs in carbohydrate metabolism include:

Glycogenesis: After food consumption, glucose in the bloodstream is converted into glycogen and stored in the liver. Glycogen serves as a short-term energy reserve in the body.

Glycogenolysis: When the body needs more energy (e.g., during fasting or intense physical activity), the liver breaks down glycogen into glucose and releases it into the bloodstream to supply energy to cells.

Gluconeogenesis: In emergency situations (such as prolonged fasting), the liver can produce glucose from non-carbohydrate sources such as amino acids and glycerol. This process is vital for maintaining blood sugar levels during glucose shortages.

● Fat Metabolism

The liver also plays an essential role in digesting and metabolizing fats:

Oxidation of Fatty Acids: The liver breaks down free fatty acids and uses them to generate energy, which is utilized in various bodily processes.

Production of Lipoproteins: The liver produces lipoproteins such as VLDL and LDL, which transport fats and cholesterol from the liver to other tissues in the body.

Bile Production: By producing bile, the liver plays a crucial role in fat digestion. Bile breaks fats into smaller droplets, aiding the small intestine in their absorption.

● Protein Metabolism

The liver processes and manages proteins in several ways:

Deamination: The liver breaks down amino acids, converting the resulting ammonia into urea, which is excreted through the kidneys. This process is critical for eliminating toxic waste products from protein metabolism.

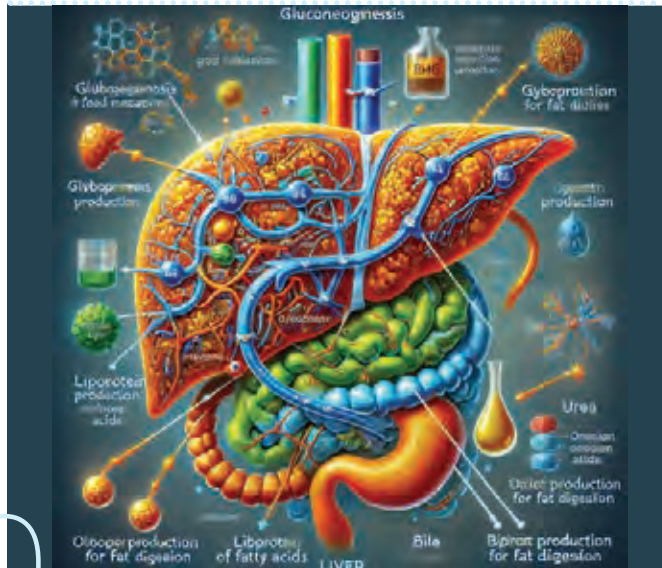
Production of Plasma Proteins: The liver produces essential proteins such as albumin and clotting factors, which are involved in transporting substances and maintaining the body's fluid balance.

Urea Production: One of the liver's most important roles in protein metabolism is converting toxic ammonia into urea, a less harmful substance that is eliminated via urine.

● Cholesterol Regulation

The liver both produces and breaks down cholesterol. Cholesterol is used by the liver to produce various hormones and bile. Additionally, the liver regulates blood cholesterol levels and removes excess cholesterol from the body.

As one of the body's vital organs, the liver is responsible for nutrient metabolism and plays a significant role in regulating glucose, fats, and proteins. Any dysfunction in liver performance can have widespread effects on metabolism and overall health.



This schematic illustration clearly depicts the liver's role in food metabolism. The image highlights essential processes such as blood glucose regulation through glycogen storage and release, fat digestion via bile production, and protein metabolism. Additionally, the liver's connection with other organs such as the pancreas and intestines is effectively demonstrated in the illustration.

● Bile Production

The production of bile is one of the liver's vital functions, playing a critical role in digestion and the elimination of waste products. Bile is a yellow-green fluid continuously produced by liver cells (hepatocytes). It contains bile salts, cholesterol, phospholipids, bilirubin, and other waste substances produced or excreted by the liver. Below is a detailed explanation of bile and its functions:

● Role of Bile in Fat Digestion

Bile is a key component in the digestion of fats. When fatty foods enter the small intestine, bile is secreted from the gallbladder and delivered to the small intestine. The bile salts in bile break fats into smaller particles (emulsification), increasing the surface area for digestive enzymes (such as pancreatic lipase) to act on, facilitating the breakdown and absorption of fats.

● Storage and Concentration of Bile

Although bile is continuously produced by the liver, the body only requires it at specific times, such as when food enters the intestines. Therefore, bile is transported through the bile ducts to the gallbladder, where it is stored and concentrated. When needed, the gallbladder contracts, releasing bile through the bile duct into the small intestine (duodenum). This process is primarily regulated by the hormone cholecystokinin, which is secreted in response to the presence of fatty foods in the intestine.

•• Role of Bile in Eliminating Bilirubin and Other Wastes

In addition to aiding fat digestion, bile plays a crucial role in eliminating bilirubin and other waste products. Bilirubin is the final product of hemoglobin breakdown in red blood cells. The liver adds this substance to bile for excretion from the body. If bilirubin levels in the blood increase (due to liver dysfunction or bile duct obstruction), jaundice may occur, resulting in yellowing of the skin and the whites of the eyes.

•• Excretion of Cholesterol and Toxins

The liver eliminates excess cholesterol and toxins through bile. Cholesterol dissolved in bile, along with bilirubin and other waste substances, is transported to the intestines and excreted through feces. This process helps regulate cholesterol levels in the body.

•• Regulation of Bile Flow

The secretion of bile into the small intestine occurs periodically and in response to the body's need for digesting fatty foods. Between meals, bile is stored in the gallbladder, and when food is consumed, especially fatty meals, the gallbladder contracts and releases bile.

•• Bile-Related Disorders

Disorders in bile production or secretion can lead to digestive or liver problems. For example:

Gallstones: Excess cholesterol in the gallbladder can form stones that may block bile flow, causing pain and digestive issues.

Jaundice: Increased bilirubin levels in the blood can lead to jaundice. This condition may result from bile duct obstruction, liver disease, or problems in hemoglobin breakdown.

Bile is essential not only for fat digestion but also for waste elimination and maintaining metabolic balance. Disorders affecting bile production or secretion can significantly impact overall health.

Advanced Stages of Disease: Significant changes in the liver, such as hardening or abnormal texture, are typically noticeable only in advanced or terminal stages of certain liver diseases, such as cirrhosis or large tumors. In these cases, the liver may feel firmer or abnormal during palpation.

Limitations of Ultrasound Alone: Even with abdominal ultrasound, liver diseases cannot always be definitively diagnosed. Additional diagnostic tools are usually required, such as:

Blood Tests: To evaluate liver enzymes, bilirubin, and other markers.

Ultrasound or Advanced Imaging Techniques: To detect structural changes.

Liver Biopsy: In some cases, to confirm a diagnosis.

Physical examination is an important part of the diagnostic process but is not sufficient on its own. A combination of medical history, physical examination, imaging studies, and laboratory tests is essential for an accurate diagnosis of liver diseases.



The schematic illustration clearly depicts a doctor performing a physical abdominal examination and palpating the liver. The image demonstrates that palpation of the liver below the ribcage during deep inhalation is part of the liver assessment process but is not sufficient for a definitive diagnosis of liver diseases. It also highlights the need for additional diagnostic methods, such as blood tests and ultrasound, for a more accurate evaluation.

Can One Survive Without a Liver?

The liver is one of the body's vital organs, and without it, the body cannot perform essential functions such as metabolism, detoxification, and the production of crucial proteins. While liver transplantation can save a person's life in specific circumstances, the complete loss of liver function will lead to death. Therefore, maintaining liver health is critical for survival.



The schematic illustration clearly depicts the liver's vital functions. The image highlights the liver's essential roles in processes such as metabolism, detoxification, and protein production. It emphasizes that without the liver, the body cannot perform these critical tasks, making survival impossible. The illustration underscores the importance of maintaining liver health for sustaining life.

The liver plays a key role in maintaining nutrient balance, regulating metabolism, detoxification, and producing essential proteins. As the largest gland in the body, it performs numerous vital functions, all of which are crucial for human health. Understanding the liver's functions and its relationship with the digestive system provides better insight into the impacts of diseases such as hepatitis B and highlights the importance of appropriate treatment.

HEPATITIS B



Chapter 2

What is Hepatitis B?

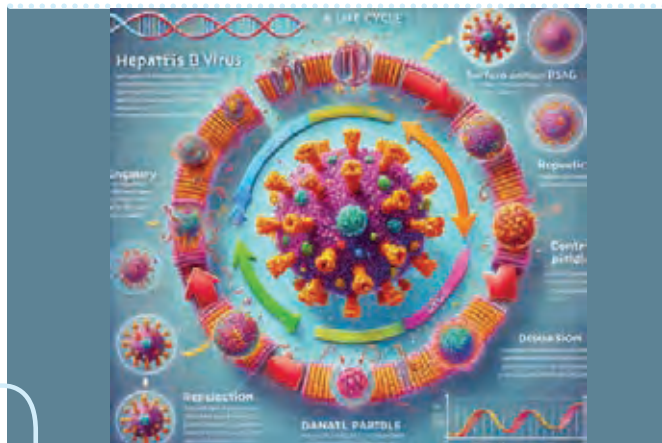
The hepatitis B virus (HBV) is the causative agent of hepatitis B disease in humans. This virus resides and replicates in the liver, with its byproducts entering the bloodstream. Using electron microscopy, the shape and structure of this virus have been identified. Hepatitis B virus belongs to the Hepadnaviridae family and is a DNA virus with a highly compact genetic structure.

● Virology

The hepatitis B virus (HBV) measures approximately 42 nanometers in size, with its active portion located in the central core. The surface antigen of the hepatitis B virus (HBsAg) is present on the virus's surface. The complete form of the virus is called the Dane particle.

When HBV enters liver cells, it forces these cells to produce identical copies of the virus. In this process, the liver cell nucleus produces the active part of the virus, while other parts of the cell create small surface particles and additional viral proteins that surround the Dane particle. The fully formed virus is then released from the liver cell and enters the bloodstream. Any individual with detectable surface antigen of HBV in their blood is considered infected.

To diagnose viral replication in the body, sensitive blood tests are conducted. The most sensitive blood test indicating viral replication is the PCR test, which measures HBV DNA levels. Today, with devices such as AMPLICOR and TaqMan and the Real-Time PCR technique, it is also possible to quantify the virus in the blood. These tests assist physicians in determining the appropriate treatment approach and patient follow-up.



The schematic illustration clearly depicts the structure of the hepatitis B virus (HBV) and its life cycle. The image highlights key components of the virus, such as the surface antigen (HBsAg), the viral core (Dane particle), and the viral DNA. Additionally, it demonstrates the various stages of the virus's life cycle, from entering liver cells to replication and the release of new viruses into the bloodstream.

● Hepatitis B Virus

The hepatitis B virus (HBV) replicates within liver cells, disrupting liver function. To infect liver cells, the virus must first attach to the cell surface. After entering the liver cell, the virus's core is transported to the cell nucleus, where replication occurs.

The surface antigen of hepatitis B (HBsAg) is located on the surface of the virus and is produced in large quantities. This antigen circulates in the bloodstream in the form of spherical and tubular particles approximately 22 nanometers in size. The antibody response against the hepatitis B surface antigen plays a protective role in the body and, if successful, helps to suppress the virus.

● Differences Between Hepatitis B and Other Types of Hepatitis (A and C)

● Comparison of Viral Structure

● **Hepatitis B:** The hepatitis B virus (HBV) is a DNA virus belonging to the Hepadnaviridae family. It has a complex structure with a surface antigen (HBsAg) and a central core particle called the Dane particle. Due to its dense and circular DNA structure, HBV has a high potential for mutation and adaptability.

Hepatitis A: The hepatitis A virus (HAV) is an RNA virus from the Picornaviridae family. Its structure is simpler than that of HBV and HCV, consisting of a single-stranded RNA molecule enclosed in a protein capsid. HAV does not have the potential to become chronic.

Hepatitis C: The hepatitis C virus (HCV) is an RNA virus from the Flaviviridae family. This virus, with its single-stranded RNA, undergoes continuous genetic changes, making it more challenging for the immune system to combat. Unlike HAV, HCV can easily become chronic.

● Comparison of Transmission Methods

Hepatitis B: Hepatitis B is transmitted through contact with blood, body fluids (such as saliva, semen, and vaginal secretions), mother-to-child transmission during childbirth, and sexual contact. HBV can also spread through sharing contaminated needles, such as in drug injection practices.

Hepatitis A: Hepatitis A is primarily transmitted through contaminated food and water or direct contact with the feces of an infected person. The virus is spread via the fecal-oral route and does not involve bloodborne transmission.

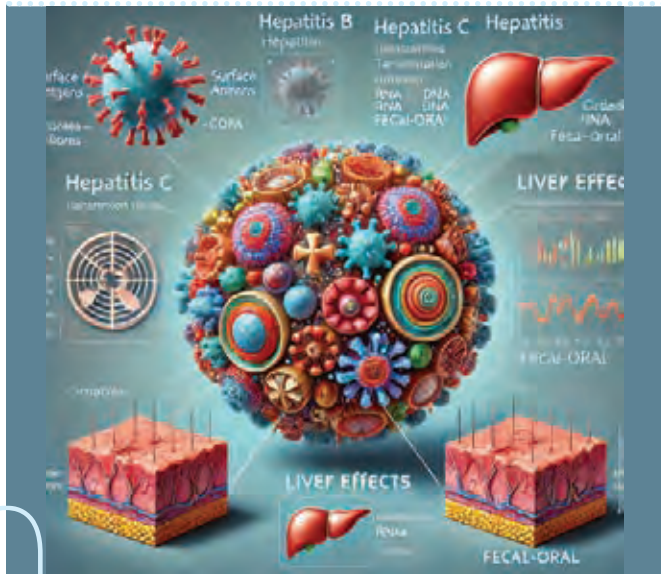
Hepatitis C: The hepatitis C virus is mostly transmitted through direct contact with infected blood. Common transmission routes include sharing contaminated needles, receiving infected blood or blood products, and, in some cases, sexual contact, though less frequently than HBV.

● Comparison of Effects

Hepatitis B: Hepatitis B can lead to acute or chronic infection. Chronic HBV infection may result in cirrhosis (liver scarring) or liver cancer. Hepatitis B can remain asymptomatic for years and cause severe complications later.

Hepatitis A: Hepatitis A rarely leads to chronic or severe liver issues. This type of hepatitis causes acute infection, and the body typically recovers on its own. The long-term effects of HAV are much less significant than those of HBV and HCV.

Hepatitis C: Hepatitis C is more commonly associated with chronic infection. Unlike HAV, HCV infection often lacks early symptoms and gradually progresses to cirrhosis and liver cancer. Due to its continuous genetic changes, HCV is harder to treat, and the risk of chronicity is very high.



The schematic illustration clearly highlights the differences between the hepatitis B, hepatitis A, and hepatitis C viruses. This image compares the viral structure of each, their transmission methods—such as contact with blood, body fluids, and the fecal-oral route—and their effects on the liver, including the risk of developing cirrhosis and liver cancer.

● Summary of Differences

In terms of viral structure, hepatitis B is a DNA virus, while hepatitis A and hepatitis C are RNA viruses. The primary transmission route for hepatitis B is through blood and sexual contact, whereas hepatitis A is transmitted via contaminated food or water, and hepatitis C is mainly spread through blood contact. Additionally, hepatitis B and C can lead to chronic infections and serious liver complications such as cirrhosis and cancer, while hepatitis A is typically short-term and resolves on its own.

● Prevalence of Hepatitis B

As the third millennium began, hepatitis B virus was recognized as one of the most prevalent viral agents worldwide. Over two billion people globally have been exposed to the virus, and approximately 350 to 400 million individuals are chronic carriers of HBV. Each year, nearly one million people die due to the lack of timely diagnosis and appropriate treatment.

Fortunately, with the implementation of vaccination programs for newborns and high-risk individuals, the global prevalence of the disease has decreased. However, the prevalence of chronic hepatitis B infection varies across regions

and is categorized into three levels: low, moderate, and high prevalence areas.

•• Low Prevalence Areas (Less than 2%)

In these regions, less than 2% of the population are carriers of HBV. These areas include:

- The United States
- Western Europe
- Australia
- New Zealand

•• Moderate Prevalence Areas (2% to 8%)

In these regions, 2% to 8% of the population are carriers of HBV. These areas include:

- Countries around the Mediterranean
- Japan
- Central Asia
- The Middle East
- Parts of South and Latin America
- Eastern Europe

•• High Prevalence Areas (More than 8%)

In these regions, more than 8% of the population are HBV carriers. These areas include:

- Southeast Asia
- China
- Pacific Islands
- Alaska
- Parts of the Middle East and Eastern Europe

• Factors Influencing Variations in Prevalence

Differences in hepatitis B carrier rates across various regions of the world are primarily related to the age at which individuals become infected. The younger a person is when exposed to the virus, the higher the likelihood of chronic infection. For instance, in high-prevalence areas, transmission from mother to child or infection in children under the age of 5 is common.

• Global Prevalence

Chronic hepatitis B is one of the most prevalent infectious and contagious diseases worldwide, ranking third after tuberculosis and malaria. Three-quarters of the global population reside in high-prevalence regions. Approximately 90% of hepatitis B carriers live in developing or underdeveloped countries.

China and Taiwan: These countries are home to about 100 million chronic hepatitis B carriers.

United States: Around 2.1 million chronic carriers reside here.

Central Africa: Hepatitis B prevalence is extremely high, largely due to mother-to-child transmission and infection among children under the age of 5.



This schematic illustration depicts the global prevalence of hepatitis B virus across different regions of the world. On the map, areas with low, moderate, and high prevalence are marked with different colors, clearly representing the geographical distribution of the disease on a global scale.

• Reducing the Burden of Hepatitis B in Iran: A Successful Experience

◦ Iran has made significant progress in reducing the prevalence of hepatitis B, primarily through extensive public health initiatives. Key factors contributing to this success include:

• Widespread Vaccination Programs

◦ **Newborn Vaccination:** Since the early 1990s, Iran has implemented a universal hepatitis B vaccination program for newborns, with three doses administered at birth, one month, and six months. This has been a cornerstone in reducing prevalence.

◦ **Vaccination of High-Risk Groups:** Healthcare workers, hemodialysis patients, individuals who inject drugs, and others exposed to bloodborne risks have been prioritized for vaccination.

• Public Education and Awareness

◦ Media campaigns, healthcare centers, and physicians have educated the public on transmission and prevention methods, fostering better understanding and reducing risky behaviors.

• Supplementary Interventions

◦ Vaccination of school-aged children, born before the introduction of newborn vaccination, has further protected younger generations.

◦ Screening programs in healthcare settings have identified carriers and controlled the spread of the virus.

● Outcomes and Challenges

- **Decline in Prevalence:** Studies led by Dr. Seyed Moayed Alavian reveal that vaccination has reduced hepatitis B prevalence in Iran from 3.5–5% to approximately 2%. Over 90% of vaccinated newborns have developed immunity.
- **Remaining Challenges:** Contaminated instruments in certain professions, sharing of needles, and limited healthcare access in underserved areas continue to pose risks. Some regions, especially in the south and southeast, show higher prevalence due to migration and historical vaccination gaps.

● Lessons Learned

Iran's experience highlights the critical role of universal vaccination, targeted interventions for high-risk groups, and public education in reducing the burden of hepatitis B. Sustained efforts, including expanding vaccination and screening programs, are essential to achieving further reductions and preventing complications such as cirrhosis and liver cancer. This model offers valuable insights for other countries aiming to tackle hepatitis B.



The new infographic illustrates the prevalence of hepatitis B in Iran. It uses various charts and icons to display information about the disease's prevalence, the success of vaccination programs, and regional differences. This infographic presents the data in a clear and visually engaging manner.

● Prevention and Control of Disease

Vaccination is one of the most effective methods for preventing hepatitis B infection. Vaccinating newborns, especially in high-prevalence areas, has significantly contributed to reducing the prevalence of the disease. Additionally, individuals at high risk, such as healthcare workers and those who share needles, should receive the vaccine.

The prevalence of hepatitis B remains widespread globally and continues to pose a significant public health challenge. Increasing public awareness, widespread vaccination, and appropriate prevention methods can help reduce the spread of this disease and prevent its serious complications, such as cirrhosis and liver cancer.

• Hepatitis D

Hepatitis D, also known as Delta hepatitis, is a liver infection caused by the hepatitis D virus (HDV). This virus is unique in that it requires the presence of hepatitis B virus to replicate, making co-infection with HBV necessary for HDV infection. HDV can exacerbate the severity of hepatitis B, leading to more serious liver complications.

• Global Prevalence

Hepatitis D is prevalent in various regions worldwide, including parts of Europe, the Middle East, India, and Africa. The World Health Organization (WHO) estimates that approximately 5% of individuals with chronic hepatitis B are co-infected with HDV, translating to about 15-20 million people globally. The prevalence varies significantly across different regions, with higher rates observed in areas with endemic HBV infection.

• Transmission Routes

HDV is transmitted through similar routes as HBV, primarily via:

- **Blood-to-blood contact:** This includes sharing needles among intravenous drug users or exposure to contaminated blood products.
- **Unprotected sexual contact:** Engaging in sexual activities without protection with an infected individual.
- **Perinatal transmission:** From an infected mother to her child during childbirth, though this mode is less common for HDV.

• Prevention and Control

The most effective strategy to prevent HDV infection is through vaccination against HBV, as HDV cannot establish infection without HBV. The HBV vaccine is highly effective and is recommended for all infants, unvaccinated children under 18, and adults at risk. Additionally, public health measures such as safe injection practices, blood screening, and promoting safe sexual behaviors are crucial in reducing transmission.

• Treatment Advances

Treating HDV is challenging due to its reliance on HBV for replication. Historically, pegylated interferon-alpha has been the primary treatment, but its efficacy is limited, and relapse rates are high. Recent advancements have introduced new therapeutic agents:

- **Bulevirtide:** Approved in the European Union, bulevirtide inhibits the entry of HDV into hepatocytes, showing promise in reducing viral load and improving liver function.
- **Lonafarnib:** An oral prenylation inhibitor that interferes with HDV assembly, currently undergoing clinical trials with encouraging results.
- **Role of Professor Mario Rizzetto:** Professor Mario Rizzetto, an Italian scientist, discovered the hepatitis D virus in 1977. His groundbreaking work identified HDV as a unique pathogen requiring HBV for replication. Over the years, Professor Rizzetto has significantly contributed to understanding HDV's virology, epidemiology, and clinical management, paving the way for current research and treatment strategies.

For more detailed information, refer to the World Health Organization's fact sheet on hepatitis D.

HEPATITIS B



Chapter 3

Modes of Transmission of Hepatitis B



Hepatitis B is one of the most contagious viruses, transmitted through bodily fluids, particularly blood, semen, and vaginal fluids. The concentration of the hepatitis B virus in blood is 100 to 1000 times higher than in other body secretions. The incubation period of the disease ranges from 45 to 160 days, and the modes of transmission vary depending on geographical location and social conditions. Below are the main methods of virus transmission along with explanations and prevention strategies:

● Transmission from Mother to Infant

Transmission from an infected mother to her infant: If a mother is infected with hepatitis B during pregnancy or childbirth, the newborn can become infected with the virus. This method was one of the most significant routes of hepatitis B transmission in the past. In Iran, it used to be the most common mode of transmission. Since infection immediately after birth is asymptomatic, most cases in Iran are discovered incidentally, for example, during blood donation or medical checkups, with no prior history of symptoms. The risk of hepatitis B virus transmission from mother to infant is directly related to the viral replication status in the mother. Mothers who are HBeAg-positive or have a high HBV viral load are at a greater risk of transmitting the virus. Measuring viral levels in the last weeks of pregnancy and administering antiviral treatment, if necessary, can reduce the risk of transmission. Transmission of the virus from mother to fetus in utero is very rare, with most transmissions occurring during childbirth.

● Prevention of Transmission

Immunization with the hepatitis B vaccine and administration of hepatitis B-specific immunoglobulin (HBIG) immediately after birth can prevent the infant from contracting the virus. Pregnant mothers with hepatitis B should not worry; with the use of vaccines and specific immunoglobulin, they can have healthy babies and safely conceive children.

● Important Notes

- There is no evidence that cesarean delivery prevents the transmission of hepatitis B virus.
- Breastfeeding does not transmit the infection.
- This type of transmission, known as vertical transmission, remains significant in countries where pregnant women are not screened for hepatitis B or where newborns are not vaccinated within the first hours after birth. Controlling this mode of transmission can contribute to a healthier society in the future.



A schematic illustration showing the transmission of the Hepatitis B virus from an infected mother to her newborn has been prepared, including the stages of transmission and prevention methods, such as vaccination and the administration of Hepatitis B immunoglobulin for the newborn. As shown in the illustration, the virus is primarily transmitted during childbirth, and breastfeeding does not lead to infection.

• Breastfeeding and Hepatitis B

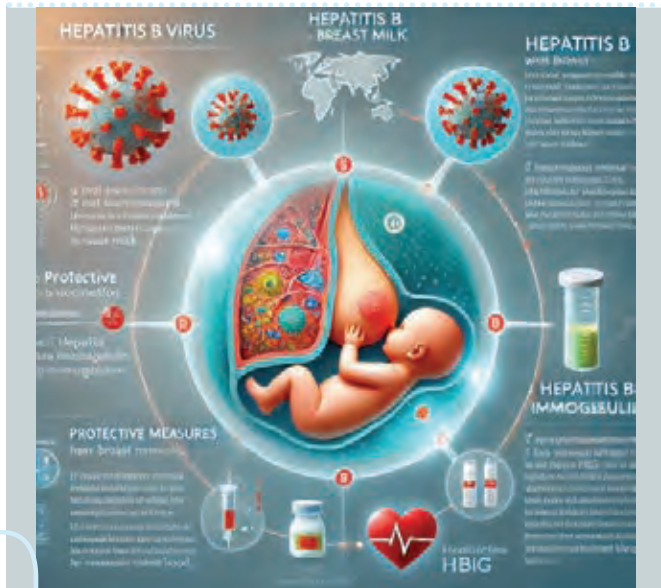
Studies and medical recommendations indicate that breastfeeding by a mother with hepatitis B poses no risk of virus transmission to the infant. The hepatitis B virus is not present in breast milk, and therefore breastfeeding is considered safe even for infants of mothers with the virus. The World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) recommend that mothers with hepatitis B continue breastfeeding their infants.

• Infant Immunization Protocol

- **Infant Vaccination:** Infants born to mothers with hepatitis B should receive the hepatitis B vaccine immediately after birth. This vaccine is the first step in protecting the infant against the virus.
- **Hepatitis B Immunoglobulin Injection (HBIG):** Along with the vaccine, administration of hepatitis B immunoglobulin within the first few hours after birth is recommended to provide additional protection against the virus. HBIG should be administered within the first 12 hours of the infant's birth to maximize protection against hepatitis B. Timing is critical, as earlier administration increases the likelihood of preventing infection.
- **Combined Immunization:** Both the hepatitis B vaccine and HBIG should be administered immediately after birth for infants born to mothers with hepatitis B. Delaying HBIG injection may reduce its effectiveness, so it is advised to carry out this step as soon as possible, within a maximum of 12 hours after birth.

● Important Notes

- While breastfeeding itself poses no risk, mothers should ensure the health of their nipples. If there are any wounds or cracks on the nipples leading to bleeding, breastfeeding should be paused until full healing occurs. Pumped breast milk can be used during this time to minimize the risk of contaminated blood transmission.
- By following these guidelines and properly immunizing the infant, mothers with hepatitis B can safely breastfeed their infants without concern about virus transmission.



A schematic illustration depicting the process of breastfeeding by a mother with Hepatitis B to her infant has been prepared. The image emphasizes that the Hepatitis B virus is not transmitted through breast milk, and protective measures such as vaccination and the administration of Hepatitis B immunoglobulin for the newborn are highlighted. Additionally, it is noted that if there are cracks or bleeding on the mother's nipples, breastfeeding should be paused to prevent the risk of transmitting infected blood.

● Transmission Through Blood and Blood Products

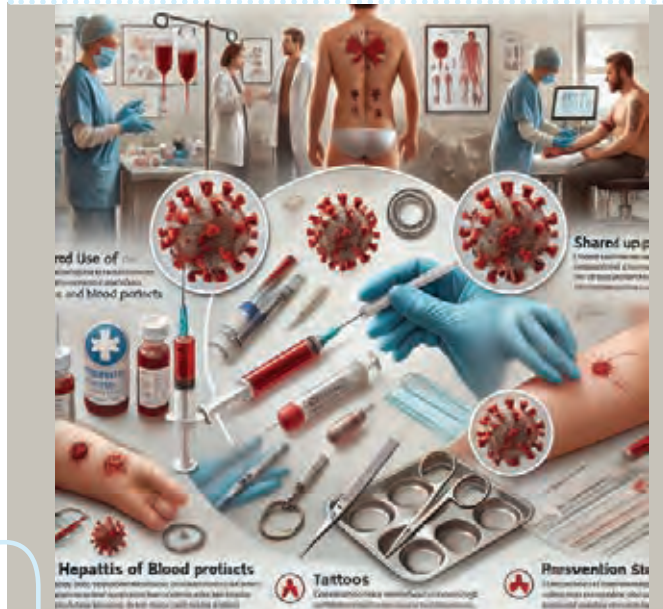
Hepatitis B virus is easily transmitted through contact with infected blood or blood products, making it one of the most common and high-risk methods of transmission. Some instances of this type of transmission include:

Shared Injections: The use of contaminated needles for drug injection is one of the primary methods of transmission. Individuals who inject drugs and share needles are at significantly higher risk.

Tattooing and Piercing: Undergoing tattoos or piercings in unregulated settings with non-sterile equipment can lead to virus transmission. Piercing the body or ears with unsterilized instruments can transmit the virus.

Use of Contaminated Tools: Items such as razors, scissors, toothbrushes, and

other personal items that come into contact with blood can transmit the virus if contaminated. Sharing personal items in unsanitary environments (e.g., barbershops) increases the risk of transmission. Accidental needle sticks, particularly among healthcare workers, or medical procedures performed with non-sterile equipment can also result in transmission.



The provided illustration clearly depicts various methods of hepatitis B virus transmission through blood and blood products. These methods include the shared use of contaminated needles, performing tattoos and piercings in unregulated environments, and using contaminated personal items such as razors and toothbrushes. Additionally, the image features a scene of healthcare workers handling blood cautiously, along with a potential incident of an accidental needle stick. This educational illustration is designed to enhance audience understanding of the risks and prevention strategies for the transmission of this virus.

● High-Risk Groups

Certain high-risk groups for hepatitis B infection through blood contact include:

- Patients with hemophilia
- Dialysis patients
- Healthcare and medical center workers
- Individuals with multiple sexual partners
- Family members of people with hepatitis B
- Intravenous drug users who share needles



● Other Transmission Methods

In addition to transmission through blood, other methods of hepatitis B virus transmission include:

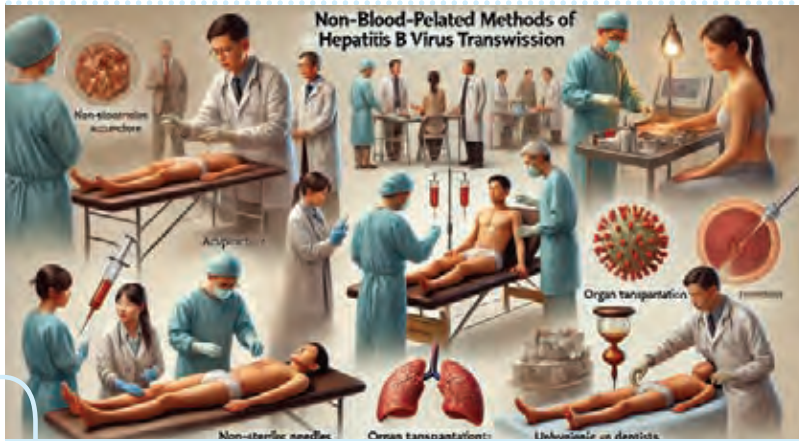
Acupuncture, if non-sterile needles are used.

Organ transplantation, if the donated organ is infected.

Frequent visits to unlicensed dentists using non-sterile equipment.

Unhygienic cupping therapy and virus transmission in family settings.

By adhering to hygiene principles and using sterile equipment, many of these transmission methods can be prevented.

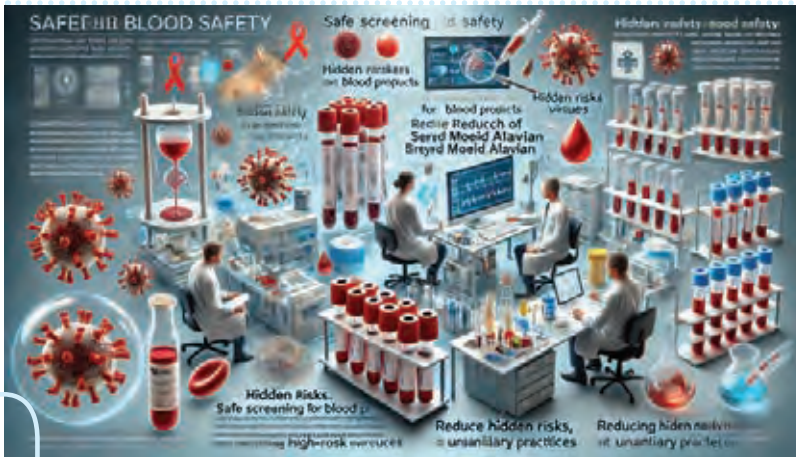


The provided illustration depicts other methods of hepatitis B virus transmission apart from blood transmission. These methods include the use of non-sterile needles in acupuncture, organ transplantation from an infected donor, frequent visits to unhygienic dentists with non-sterile equipment, and unhygienic cupping therapy.

The hepatitis B virus is easily transmitted through contact with contaminated blood or blood products. One of the significant studies in this field was conducted by Dr. Seyed Moayed Alavian, a prominent specialist in liver diseases. In his research, he examined the risks associated with the transmission of the hepatitis B virus through blood products and demonstrated that, despite remarkable improvements in donor screening, there are still risks related to transmission from donors with low levels of undetectable virus in their blood. However, these risks have significantly decreased over time.

One of the critical points highlighted by Dr. Alavian is the importance of follow-up on blood donors in blood transfusion centers to investigate potential causes of virus transmission to recipients. This approach has led to increased safety of blood products. Nevertheless, in many cases, the transmission of the virus occurs not through blood products but rather through high-risk individual behaviors, such as sharing needles and other unsanitary practices.

For further information, multiple studies by Dr. Alavian on the prevalence of hepatitis B in blood donors in Iran have shown that the risk of transmission through blood products has significantly decreased, and today, the safety of blood and its derivatives can be trusted.



The provided illustration clearly depicts the safe screening processes for blood and blood products, emphasizing the research of Dr. Seyed Moayed Alavian. The image highlights the advancements made in blood product safety and the significant reduction in the risk of hepatitis B virus transmission, while also addressing the existence of hidden risks (occult virus). Additionally, individual high-risk behaviors, such as sharing needles and unsanitary practices that can still transmit the virus, are shown alongside these advancements.

● Transmission Through Sexual Contact

The hepatitis B virus is transmitted through unprotected sexual contact with an infected person. The virus is present in bodily fluids such as semen, saliva, and vaginal secretions, and can be transmitted through contact with mucous membranes.

Sexual Transmission: The virus exists in body secretions such as saliva, semen, and vaginal fluids, although in much lower concentrations than in blood. It is transmitted through unprotected sexual intercourse (without the use of condoms) with an infected person. However, this risk exists only if the person has not been vaccinated. The hepatitis B vaccine can protect the partners of infected individuals from the risk of infection.

Personal Hygiene and Vaccination: Practicing good hygiene and receiving vaccination ensures safe and reliable sexual relations.

Principles of Sexual Activity: Failure to adhere to proper sexual practices can lead to virus transmission. It is recommended to use condoms in the presence of genital sores, and sexual contact during menstruation should be avoided. For individuals with multiple sexual partners, the use of preventive measures is essential.

Regular Testing: Periodic testing and awareness of one's infection status and that of their sexual partner can prevent transmission.



The provided illustration educationally and clearly depicts the sexual transmission of the hepatitis B virus through various methods. This image highlights key points such as the presence of the virus in bodily fluids, including semen, saliva, and vaginal secretions, and emphasizes the importance of using condoms for prevention. Additionally, it underscores the role of vaccination in prevention, personal hygiene, and avoiding unprotected sexual activity during high-risk times, such as menstruation or in the presence of genital sores.

There are various ways hepatitis B virus can be transmitted, such as through blood, sexual contact, and from mother to child. By adopting preventive measures such as using condoms, vaccination, and avoiding the sharing of personal items, the transmission of the virus can be effectively prevented. Additionally, correcting misconceptions about the disease through proper education and accurate information can help reduce anxiety and social stigma.

In most Asian, African, and Middle Eastern countries, including Iran, hepatitis B infections have been transmitted during infancy from infected mothers to their children. However, despite extensive research, the exact history of infection cannot be determined in some patients. In Western countries, major causes of transmission include sexual promiscuity, intravenous drug use, and being in prisons or places with poor hygiene.

Other causes of transmission worldwide include visits to unlicensed dentists and undergoing minor surgical procedures. Hepatitis transmission can occur due to the use of non-sterile dental equipment, unclean ear piercing, unhygienic subcutaneous injections, acupuncture, tattooing, poor hygiene in barbershops, and unsanitary circumcision. Another route of transmission is ritual self-flagellation using shared blades during mourning ceremonies, which continues to result in new cases annually.

Blood-sucking insects, such as mosquitoes or bedbugs, particularly in tropical regions, may also play a role in spreading infection, although there is no evidence of the virus replicating within these insects. Skin piercing with a needle for tattooing is a known route of hepatitis transmission. This applies to men who tattoo their bodies and women who tattoo their eyebrows.



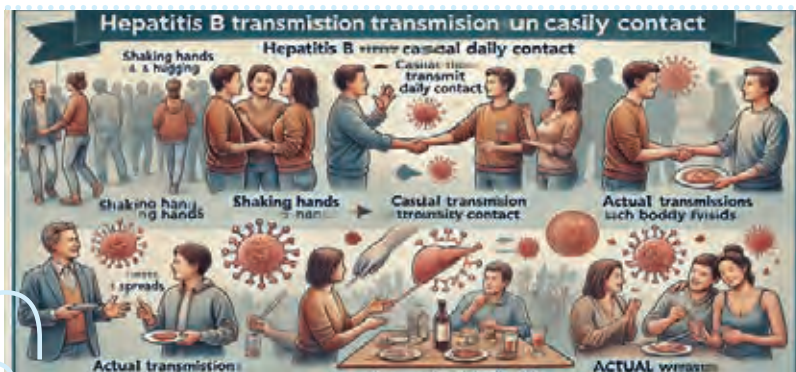
The provided illustration clearly depicts the methods of hepatitis transmission through unsanitary practices. This includes factors such as non-sterile dental procedures, unhygienic ear piercing, subcutaneous injections, acupuncture, tattooing, unsanitary barbershops, and non-sterile circumcision. Additionally, it highlights the risks of sharing blades during religious rituals such as self-flagellation and the potential transmission of the disease through blood-sucking insects like mosquitoes and bedbugs.

• Misconceptions About Hepatitis B Transmission and How to Avoid Them

There are many misconceptions about the transmission of hepatitis B that can lead to anxiety and discrimination. Here are some of these misconceptions along with scientific facts:

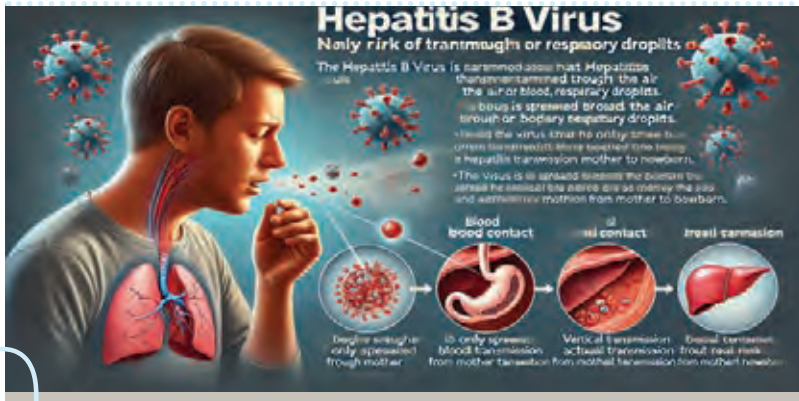
Misconception: Hepatitis B is transmitted through casual contact, such as handshakes, hugs, or sharing utensils.

Fact: Hepatitis B virus is not transmitted through everyday casual contact. Sharing utensils, dining together, or shaking hands and hugging an individual with hepatitis B does not pose a risk of transmission.



The provided illustration addresses a common misconception about hepatitis B virus transmission. It shows that everyday casual contact, such as handshakes, hugs, and sharing utensils, does not transmit the virus. Additionally, the distinction between these types of contact and the actual transmission methods through blood and bodily fluids is clearly demonstrated. This illustration is designed to correct misconceptions and raise awareness about the real ways hepatitis B virus is transmitted.

Misconception: Hepatitis B is transmitted through air or respiratory droplets.
Fact: Hepatitis B virus is not transmitted through air, sneezing, or coughing. The virus is specifically transmitted through blood, bodily fluids, or vertical transmission from mother to child. It poses a risk of transmission.



The provided illustration addresses a common misconception about hepatitis B virus transmission, clearly showing that the virus is not transmitted through air or respiratory droplets. The image emphasizes that hepatitis B is transmitted only through blood, bodily fluids, or vertical transmission from mother to child, and that sneezing and coughing do not contribute to the spread of the virus. This illustration is effectively designed for education and raising awareness about the actual modes of transmission.

Misconception: People with hepatitis B cannot lead a normal life.
Fact: Many individuals with hepatitis B can live normal and healthy lives by receiving proper medical care, vaccination, and appropriate treatments. They can also prevent the transmission of the virus to others.



The provided illustration addresses a common misconception that individuals with hepatitis B cannot lead normal lives. It demonstrates that many people with hepatitis B can continue living healthy and normal lives by following medical care, receiving vaccination, and adhering to appropriate treatments. Everyday activities such as exercising, working, and socializing are clearly depicted in this illustration. The image is positively designed to emphasize the importance of medical care and proper disease management, offering hope to individuals that they can live well with hepatitis B and prevent its transmission.

● How to Avoid Misconceptions:

Education and Awareness: Providing accurate and widespread information about the methods of transmission and prevention of hepatitis B can help dispel misconceptions and reduce social stigma.

Vaccination: The hepatitis B vaccine is one of the most effective ways to prevent the disease. Those who are vaccinated are protected against the virus and do not need to worry about its transmission.

● Hepatitis B and Intra-Family Transmission

Transmission of the hepatitis B virus within families is a significant concern, as the virus can spread through close contact or the shared use of contaminated items. If a family member is a hepatitis B carrier, there is a possibility of transmitting the virus to other members, but this requires prolonged and continuous contact. Transmission occurs when the carrier's blood enters the mucous membranes or bloodstream of a healthy individual.

Although hepatitis B virus has been detected in saliva, gingival crevicular fluid, urine, and breast milk, the highest risk of transmission is through infected blood. Evidence also suggests the possibility of transmission through saliva in cases of biting by an infected individual. Reports from the World Health Organization emphasize that infected blood is the primary bodily fluid capable of transmitting hepatitis B.

With hepatitis B vaccination, it is entirely safe to live and interact within a family where one member is infected with the virus. It should be noted that due to the possibility of infection during infancy, siblings may also be at risk of having contracted the virus from an infected mother. Therefore, it is recommended that family members of the infected individual (mother, father, brothers, and sisters) undergo screening.

If a family member is infected with hepatitis B, preventive measures should be taken to avoid transmitting the virus to other family members.

● Hepatitis B can be transmitted within a family setting through the following methods

Contact with infected blood: Any contact with the blood of an infected individual, even in very small amounts, can transmit the virus. Open wounds, cuts, or skin abrasions that come into contact with the infected person's blood carry a risk of transmission.

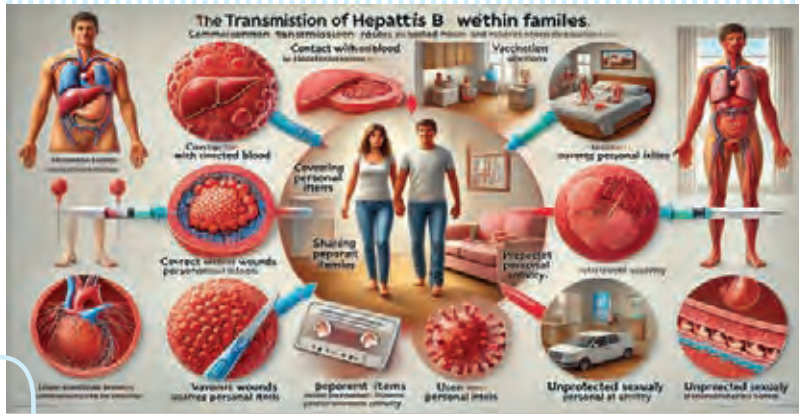
Sharing contaminated personal items: Items such as toothbrushes, razors, nail clippers, and scissors can become contaminated with blood or bodily fluids. Sharing these items can result in virus transmission. Even small traces of blood on these items can transmit the virus, as hepatitis B is highly stable and can survive outside the body for several days.

Sexual contact: One of the primary routes of hepatitis B transmission among adults is unprotected sexual intercourse with an infected individual. Until complete vaccination and confirmation of sufficient immunity against the disease, condom use is essential.

Mother-to-child transmission: Transmission from an infected mother to her child during childbirth is a common route of transmission in some parts of the

world. This can occur during birth through contact with the mother's blood and bodily fluids. Vaccination of newborns and the administration of hepatitis B immunoglobulin immediately after birth can prevent this type of transmission.

Close contact: Hepatitis B virus is not directly transmitted through kissing, handshaking, hugging, coughing, or sneezing. However, contact with bodily fluids such as saliva may pose a risk if there are cuts or sores in the mouth.



The provided illustration effectively depicts the transmission of hepatitis B virus within families and the methods for its prevention. The image addresses common transmission routes, such as contact with infected blood, sharing personal items like toothbrushes and razors, and unprotected sexual intercourse. It also emphasizes the importance of vaccination, covering wounds, using separate personal items, and maintaining proper hygiene at home to prevent virus transmission. This illustration is designed to educate and raise awareness among family members living with an individual infected with hepatitis B, clearly highlighting key preventive measures for stopping the virus's transmission within a family setting.

● Preventive Measures to Avoid Transmission Within Families

To prevent the transmission of hepatitis B virus to other family members, the following measures should be implemented:

Vaccination: Vaccination is one of the most effective methods of preventing hepatitis B. All family members, especially those living with an infected individual, should receive the hepatitis B vaccine. The vaccine is administered in three doses and provides high immunity after the course is completed.

Separate use of personal items: Personal items such as toothbrushes, razors, towels, and scissors should be used separately and never shared.

Covering wounds: If the individual with hepatitis B has a wound or cut, it should be covered with proper bandaging to prevent virus transmission. Family members should avoid contact with the wounds or blood of the infected individual.

Maintaining hygiene at home: Household surfaces, especially those that may come into contact with blood or bodily fluids (e.g., bathrooms, kitchens, and shared spaces), should be regularly cleaned and disinfected. Use appropriate disinfectants like sodium hypochlorite (bleach) for surface disinfection.

Safe sexual practices: If one sexual partner is infected with hepatitis B, the use of condoms is recommended in every sexual encounter to reduce the risk of transmission. After receiving the vaccine and ensuring sufficient immunity by

testing anti-hepatitis B antibody levels, unprotected intercourse is safe.

Awareness of family members' health status: Family members should check their hepatitis B status through testing. These tests may include assessing antibody levels and infection status.

Education and awareness: Proper education for family members about the ways hepatitis B is transmitted and how to prevent it is essential. This knowledge helps them take better care of themselves and others.



The provided illustration educationally depicts preventive measures to avoid hepatitis B virus transmission within a family setting. This image includes receiving vaccination, using separate personal items such as toothbrushes and razors, covering wounds, cleaning and disinfecting household surfaces, practicing safe sex with the use of condoms, and undergoing regular testing to monitor the health status of family members. This illustration is designed to raise awareness and protect family members from hepatitis B transmission, emphasizing the importance of adhering to these preventive measures.

In summary, hepatitis B is a preventable disease, and its transmission within a family can be avoided by adhering to hygiene practices and vaccination. If a family member is infected with the virus, adopting safe and preventive measures can effectively prevent its spread to other family members.

Does the hepatitis B virus spread through everyday interactions?

No, the hepatitis B virus does not spread through simple daily interactions such as talking, shaking hands, kissing, hugging, or in places like swimming pools.



The provided illustration clearly debunks the misconception that the hepatitis B virus is transmitted through everyday interactions. The image features individuals engaging in activities such as talking, shaking hands, hugging, and swimming in a pool, explicitly demonstrating that these actions do not lead to the transmission of hepatitis B. This illustration is designed to educate the general public about the actual methods of hepatitis B virus transmission and helps individuals overcome unfounded concerns about daily interactions.

● **I work in a government office, and one of my colleagues is HBsAg positive. Is there a risk of hepatitis B transmission from them to us?**

No, fortunately, normal daily interactions such as shaking hands, working in the same office, or socializing with friends and schoolmates do not pose a risk of disease transmission, so there is no cause for concern. Simply following basic hygiene practices is sufficient.

● **Disinfecting Items Contaminated with the Hepatitis B Virus**

The hepatitis B virus is highly resistant outside the human body and can survive under various environmental conditions for extended periods. For example:

- It can remain viable at room temperature for up to 6 months.
- At -20°C, it can survive for up to 15 years.
- In dried materials, it can live for up to 4 weeks.
- However, the virus is completely destroyed by boiling at 100°C for 5 minutes.
- To disinfect items contaminated with hepatitis B virus, effective methods and materials must be used to prevent its spread. This virus is resistant to many common disinfection methods but can be effectively eliminated using the following substances:
 - 2% glutaraldehyde
 - Chloroform
 - Peracetic acid
 - Formalin (1:4000 dilution)

● **Steps to disinfect contaminated items and clothing**

- **Clean visible blood stains or other bodily fluids first.**

Clothing: Boil in water or soak in a 0.5% sodium hypochlorite solution (1 part bleach to 10 parts water) for 30 minutes.

After disinfection: Thoroughly wash and dry the items to ensure no virus remains. These methods are recognized as the most effective ways to prevent the spread of hepatitis B virus, and strict adherence to them helps protect individuals' health.



The provided illustration clearly and educationally depicts the steps for disinfecting items contaminated with the hepatitis B virus. The image includes details about the virus's resistance under various environmental conditions and effective methods for disinfection. These methods include boiling items at 100°C for 5 minutes, using 2% glutaraldehyde, chloroform, peracetic acid, and formalin (1:4000 dilution). Additionally, cleaning blood stains, soaking items in a sodium hypochlorite solution (bleach), and thoroughly washing and drying items to prevent virus transmission are clearly shown.

HEPATITIS B



Chapter 4

Symptoms and Diagnosis of Hepatitis B

Hepatitis B is a viral infection that affects the liver and may present in two forms: acute and chronic. Symptoms of hepatitis B can vary among individuals, and some people may exhibit no symptoms at all. Hepatitis B can range from being asymptomatic to causing severe symptoms with significant liver involvement.

Typically, after the virus enters the body and a latency period, symptoms similar to a cold may appear, including weakness, fatigue, malaise, loss of appetite, fever, muscle pain, joint inflammation, and skin rashes. After some time, the second phase of symptoms may occur, characterized by the onset of jaundice and the resolution of preliminary symptoms, along with darkened urine or pale stools. Following this phase, the patient enters the recovery stage.

Children usually exhibit milder symptoms and are often asymptomatic. Many individuals infected with hepatitis B do not display symptoms of jaundice or icterus. This is primarily due to infection during infancy or childhood, which is often asymptomatic.

- **Here, the symptoms and signs of hepatitis B are described in detail**

- **Incubation Period**

The incubation period of hepatitis B is typically between 30 and 180 days (average 75 days), during which the infected individual does not show any symptoms.

- **Acute Hepatitis B**

After the hepatitis B virus enters the body, the incubation period (time required for the virus to replicate and symptoms to appear) lasts 4 to 24 weeks. Initial symptoms include loss of appetite, nausea and vomiting, lethargy, headache, muscle fatigue, joint pain, and fever. These symptoms subside with the onset of jaundice, darkened urine, and pale stools. Abdominal pain is also a symptom of the disease. Fortunately, in most cases, jaundice subsides, and the initial symptoms completely disappear within three months. Acute hepatitis B may begin with flu-like symptoms and then progress to more serious symptoms, which typically appear a few weeks after the initial infection:

Early Symptoms

- Severe fatigue: Feeling extremely tired without a specific reason.
- Fever: Usually mild but can be higher in some individuals.
- Muscle and joint pain: Similar to flu symptoms.
- Loss of appetite: Decreased desire to eat.
- Nausea and vomiting: A feeling of nausea, sometimes accompanied by vomiting.
- Abdominal pain: Especially in the liver area (upper right abdomen).

◦ Diarrhea or constipation: Some individuals may experience digestive symptoms, including changes in bowel movements.

Advanced Symptoms:

Jaundice: Yellowing of the skin and the whites of the eyes due to increased bilirubin in the blood.

Dark urine: Urine may appear dark, like tea or cola.

Pale stools: Stools may become gray or white.

Severe pain in the upper right abdomen: Usually felt near the liver.

Itchy skin: Possibly caused by jaundice.

Abdominal swelling: In severe cases, fluid accumulation in the abdomen (ascites) may occur.

•• **Chronic Hepatitis B**

As mentioned earlier, following hepatitis B infection, the virus may remain dormant in the body for years. In some individuals, the virus may become active and cause liver inflammation. In this process, liver enzyme levels in the blood rise, and clinical and laboratory evidence of liver inflammation appears. Chronic hepatitis B occurs when the virus persists in the body for more than six months. This condition can be asymptomatic but, over time, may cause liver damage and lead to more serious problems. Symptoms at this stage may resemble acute symptoms but are milder or appear gradually. Many individuals live for years without symptoms, but the virus slowly damages the liver, making treatment at this stage crucial. Most chronic hepatitis B patients are asymptomatic, but in symptomatic cases, weakness, lethargy, fatigue, and loss of appetite are the most common symptoms. A small percentage of patients may experience mild abdominal pain. As the disease progresses, symptoms of liver cirrhosis may appear. It should be noted that a high level of hepatitis B virus increases the risk of liver damage and liver cancer. Suppressing the virus, managing fatty liver, and avoiding alcohol are beneficial for patients.



The provided illustration clearly depicts the different stages of hepatitis B. This image includes the asymptomatic incubation period, acute symptoms such as fatigue, jaundice, dark urine, and pale stools. It also addresses the chronic stage of hepatitis B and the long-term liver damage it can cause, such as cirrhosis and liver cancer. The illustration is educationally designed to help individuals recognize the symptoms and stages of hepatitis B and gain a better understanding of the disease.

● **Complications of Hepatitis B**

Complications of hepatitis B can be very serious and life-threatening if not properly controlled or treated. Below are some of the most significant complications of this disease:

●● **Liver Cirrhosis**

Cirrhosis refers to the scarring and destruction of liver tissue. In chronic hepatitis B, the virus gradually causes inflammation and damage to liver tissues. This process eventually leads to extensive scarring in the liver, impairing its function and potentially causing liver failure. Symptoms of cirrhosis may include jaundice, severe fatigue, abdominal and leg swelling (due to fluid retention), and clotting issues. Cirrhosis is one of the main complications of chronic hepatitis B.

●● **Liver Cancer (Hepatocellular Carcinoma)**

Individuals with chronic hepatitis B are at a higher risk of developing liver cancer. Chronic inflammation and liver damage caused by this virus can gradually result in abnormal liver cell growth, eventually leading to cancer. Liver cancer is one of the most dangerous complications of hepatitis B, which, especially in advanced stages, may require surgery or liver transplantation.

●● **Liver Failure**

Liver failure refers to poor or incomplete liver function. This condition occurs when liver tissue is so severely damaged that it cannot perform its essential tasks, such as detoxifying the blood, producing essential proteins, and regulating fat metabolism. Liver failure may result from advanced cirrhosis or liver cancer and, in some cases, the only treatment option is liver transplantation.

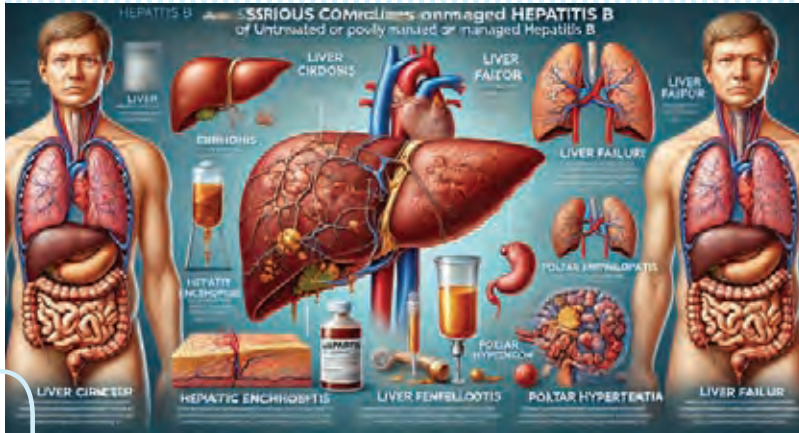
●● **Hepatic Encephalopathy**

This condition results from the liver's inability to detoxify the blood, leading to the accumulation of toxic substances in the body, particularly in the brain. Symptoms of this complication include confusion, lack of concentration, behavioral changes, and in severe cases, coma.

●● **Portal Hypertension**

Portal hypertension refers to increased blood pressure in the portal vein (the vein that delivers blood to the liver), caused by severe scarring and blockage in the liver tissue. This complication can lead to the formation of esophageal varices (enlarged and swollen veins in the esophagus wall), which, if ruptured, can cause severe and life-threatening bleeding.

Chronic hepatitis B, if not properly treated, can lead to serious and dangerous complications such as cirrhosis, liver cancer, liver failure, and neurological issues. Early diagnosis and regular monitoring can prevent these complications or slow their progression.



The provided illustration educationally depicts the serious complications of hepatitis B if not properly controlled or treated. These complications include liver cirrhosis, liver cancer, liver failure, hepatic encephalopathy, and portal hypertension. The image accurately demonstrates how this disease can impact liver function and other parts of the body.



● Asymptomatic Individuals (Virus Carriers)

Some individuals, especially in the chronic phase, may exhibit no symptoms and are referred to as silent carriers of the hepatitis B virus. These individuals can still transmit the virus to others.

●● Factors Contributing to Severe Symptoms

Certain factors may exacerbate symptoms or increase the risk of progressing from inactive hepatitis B to a chronic form, including:

Weakened immune system: Such as in individuals with HIV or those taking immunosuppressive drugs.

Alcohol consumption: Which can cause additional liver damage.

Co-infection with other viral infections: Such as hepatitis C or hepatitis D.

In summary, hepatitis B can cause a wide range of symptoms, which vary depending on the disease stage and the individual's immune response. Recognizing these symptoms is crucial for early diagnosis and timely treatment to prevent serious complications.



The provided illustration educationally depicts individuals who are carriers of the hepatitis B virus, who may not exhibit symptoms but can still transmit the virus to others. Additionally, factors that can exacerbate the disease, such as a weakened immune system, alcohol consumption, and co-infections with other viral infections like hepatitis C and hepatitis D, are also clearly shown in the image.

● Diagnosis of Hepatitis B

There are accurate and appropriate tests available to identify hepatitis B, confirm the presence of the virus, and determine the stage and status of the disease. In many cases, hepatitis B infection is discovered incidentally through periodic tests or after blood donation. Many individuals have no symptoms and are surprised when they learn of their infection.

● Key Diagnostic Tests

Hepatitis B surface antigen test (HBsAg): This test measures the hepatitis B surface antigen. A positive result indicates that the individual is infected with the hepatitis B virus and the virus is present in their body.

Liver function tests: Specialized liver tests (such as measuring liver enzymes), liver ultrasound, and other specific tests are conducted to evaluate liver status.

PCR (Polymerase Chain Reaction): This technique measures the viral load in the blood. It helps the physician determine the activity level of the virus and the severity of the infection.

● Imaging Methods

Abdominal Ultrasound: In most patients, ultrasound results appear normal. However, in more advanced stages of the disease, particularly if it progresses to cirrhosis, signs such as spleen enlargement, fluid in the abdomen (ascites), and swelling of the limbs can be identified through ultrasound.

These diagnostic methods assist the physician in making treatment decisions and provide valuable insights into the stage and severity of the disease.



The provided illustration clearly depicts the diagnostic methods for hepatitis B. This image includes the hepatitis B surface antigen test (HBsAg), liver function tests, PCR testing to measure the viral load in the blood, and abdominal ultrasound to evaluate liver enlargement, the presence of fluid in the abdomen (ascites), or spleen enlargement.



● Hepatitis B Viral Markers

● Hepatitis B Surface Antigen (HBsAg)

HBsAg is a protein present on the surface of the hepatitis B virus and is usually the first viral marker to appear in the blood following infection. Its primary role in the diagnosis and management of hepatitis B is as follows:

●● Initial Diagnosis of Hepatitis B Infection

HBsAg is the first marker of hepatitis B infection and typically appears in the blood a few weeks after infection. It is detectable 4 to 6 weeks after exposure to the virus.

●● Differentiating Acute and Chronic Infection:

If HBsAg persists in the blood for more than 6 months, it indicates chronic infection. If the antigen disappears after a few months, it shows that the individual has recovered.

●● Virus Carrier Status

Individuals who are HBsAg-positive for an extended period are considered carriers. These individuals may be asymptomatic but can still transmit the virus to others.

●● Supplementary Tests

To confirm the infection status, additional tests such as HBsAb and HBcAb are typically performed alongside HBsAg.

● Anti-HBc (Hepatitis B Core Antibody)

Antibodies against the core protein of the virus exist in two forms, IgM and IgG, which reflect different stages of infection:

Anti-HBc IgM: This antibody is produced during the early stages of acute in-

fection and indicates recent infection or active viral activity.

Anti-HBc IgG: This antibody forms after recovery from infection or during chronic infection. It remains in the body for life and indicates past exposure to the virus.

- **HBeAg**

The presence of this marker in the blood indicates viral activity and infectivity. However, in some cases, mutations in the virus may result in active infection without the presence of HBeAg.

- **HBV DNA**

HBV DNA reflects the genetic material of the virus in the blood or body tissues. This test measures the viral load and helps assess the severity of infection and determine appropriate treatment:

Diagnosis of Active Infection: Measures active virus levels in the blood.

Monitoring Treatment Response: A reduction in viral levels following treatment indicates successful therapy.

- **Clinical Applications of Viral Tests**

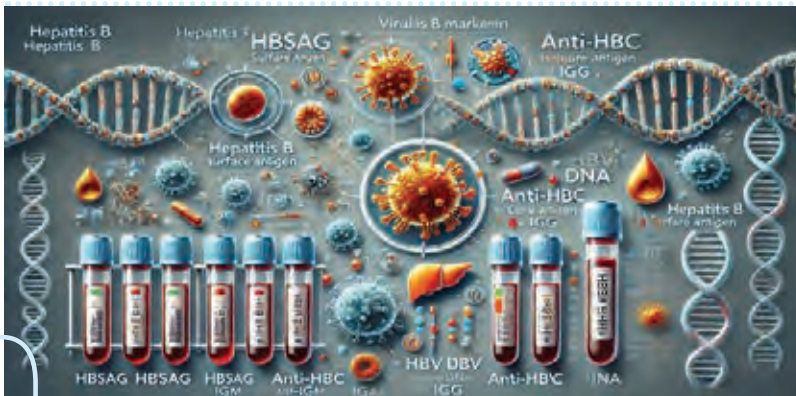
Diagnosis and Monitoring: HBsAg and HBV DNA tests are used to diagnose and monitor disease progression.

Carrier Management: These tests help identify silent carriers of the virus and assess the risk of transmission.

Treatment Monitoring: In patients undergoing treatment, these tests assist physicians in evaluating the effectiveness of therapy and reducing viral replication.

- **Conclusion**

HBsAg, HBV DNA, and Anti-HBc are among the most important viral markers used in the diagnosis and management of hepatitis B. These tests enable physicians to accurately assess the infection status, disease stage, and response to treatment.



The provided illustration clearly and educationally depicts the viral markers of hepatitis B. These markers include HBsAg (hepatitis B surface antigen), Anti-HBc (core antibodies, including IgM and IgG), HBeAg (indicating infectivity and viral activity), and HBV DNA (representing the genetic material of the virus).

● Role of Liver Enzymes

Liver enzymes are proteins produced by liver cells that play a crucial role in metabolic processes and liver functions. An increase or decrease in these enzymes' levels in the blood can indicate liver problems such as inflammation, damage, or various liver diseases. The most important liver enzymes commonly evaluated in blood tests include:

●●ALT (Alanine Aminotransferase)

- **Other Name:** SGPT (Serum Glutamic Pyruvic Transaminase)
- This enzyme is found in liver cells and is involved in protein metabolism. Elevated ALT levels in the blood are usually indicative of liver damage. Conditions such as acute hepatitis, chronic hepatitis, cirrhosis, and fatty liver disease can cause ALT levels to rise.

Normal ALT levels: Typically, between 7 and 35 units per liter.

●●AST (Aspartate Aminotransferase)

- **Other Name:** SGOT (Serum Glutamic Oxaloacetic Transaminase)
- This enzyme is present not only in the liver but also in the heart, muscles, kidneys, and other tissues. Elevated AST levels can result from liver problems or other conditions affecting organs such as the heart and muscles.

Normal AST levels: Typically between 10 and 40 units per liter.

●●ALP (Alkaline Phosphatase)

- This enzyme is found in the liver, bones, kidneys, and bile ducts. Elevated ALP levels in the blood can indicate liver problems, particularly issues related to bile duct obstruction (cholestasis), bone diseases, or other conditions. Situations such as gallstones or liver tumors can cause ALP levels to increase.

- **Normal ALP levels:** Typically between 44 and 147 units per liter.

●●GGT (Gamma-Glutamyl Transferase)

- This enzyme is primarily found in the liver and bile ducts. Elevated GGT levels are usually associated with liver diseases, particularly issues involving the bile ducts (e.g., bile duct obstruction).

- Excessive alcohol consumption and certain medications can also raise GGT levels.

- **Normal GGT levels:** For men, typically between 7 and 50 units per liter; for women, between 5 and 40 units per liter.

●●Bilirubin

- Bilirubin is a waste product from the breakdown of hemoglobin in red blood cells, which is transported to bile by the liver. Elevated bilirubin levels in the blood can indicate liver or bile duct problems and are often associated with jaundice (yellowing of the skin and eyes).

- **Normal bilirubin levels:** Usually less than 1.2 milligrams per deciliter.

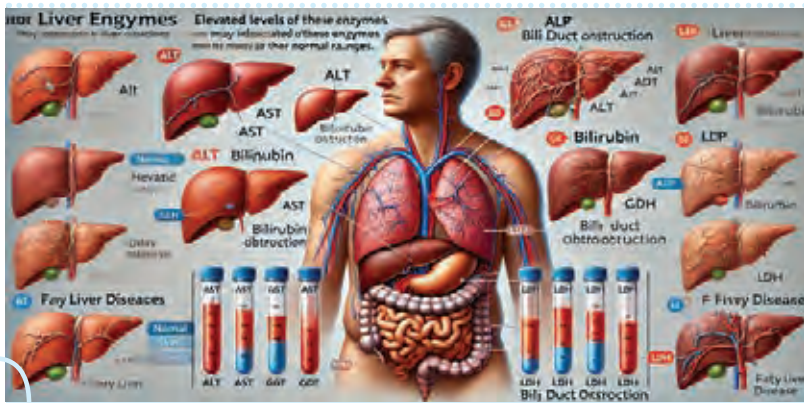
●●LDH (Lactate Dehydrogenase)

- This enzyme is found in the liver and other tissues such as the heart, muscles, kidneys, and brain. Elevated LDH levels may indicate tissue or liver damage.

- While LDH is not typically used in liver function tests, it can serve as a general

marker for cellular damage in the body.

These liver enzymes and markers provide valuable insights into liver health and help in diagnosing and managing liver-related conditions.



The provided illustration clearly depicts the role of liver enzymes such as ALT, AST, ALP, GGT, bilirubin, and LDH in diagnosing liver problems. These enzymes are commonly evaluated in blood tests, with their normal ranges explained. Elevated levels of these enzymes can indicate conditions such as hepatitis, cirrhosis, bile duct obstruction, or fatty liver disease.

● Causes of Elevated Liver Enzymes

Elevated liver enzymes typically indicate liver damage or inflammation. Some common causes of elevated liver enzymes include:

Hepatitis (viral, autoimmune, alcoholic): Infection or inflammation of the liver can lead to increased ALT and AST levels.

Non-alcoholic fatty liver disease (NAFLD): One of the most common causes of elevated liver enzymes in individuals who are obese or have diabetes.

Excessive alcohol consumption: Prolonged and heavy alcohol use damages liver cells, leading to elevated liver enzyme levels.

Use of certain medications: Drugs such as statins, painkillers (e.g., paracetamol), and some chemotherapy agents can cause elevated liver enzymes.

Biliary diseases: Gallstones or tumors obstructing the bile ducts can lead to increased ALP and GGT levels.

Liver cirrhosis: A chronic liver disease characterized by scarring of liver tissue, which can cause elevated liver enzyme levels.

Liver cancer or metastatic cancer to the liver: These conditions can result in elevated liver enzymes.

● Conclusion

Measuring liver enzymes is an important tool for evaluating liver health and diagnosing liver diseases. Elevated levels of these enzymes usually indicate liver damage or inflammation and require further investigations to determine the cause and appropriate treatment. Overall, liver enzyme tests can indicate the presence of liver disease. Among liver enzymes, AST and ALT are the most significant. Elevated blood levels of these enzymes suggest liver inflammation; however, their absolute levels do not necessarily correlate with the severity of liver disease.

•• Clinical Applications of Liver Biopsy

Determining Disease Severity: Liver biopsy can assess the extent of damage caused by various liver diseases such as hepatitis, cirrhosis, and fatty liver.

Choosing Appropriate Treatment: Biopsy results help physicians determine the type and severity of liver disease, facilitating the selection of the best treatment approach.

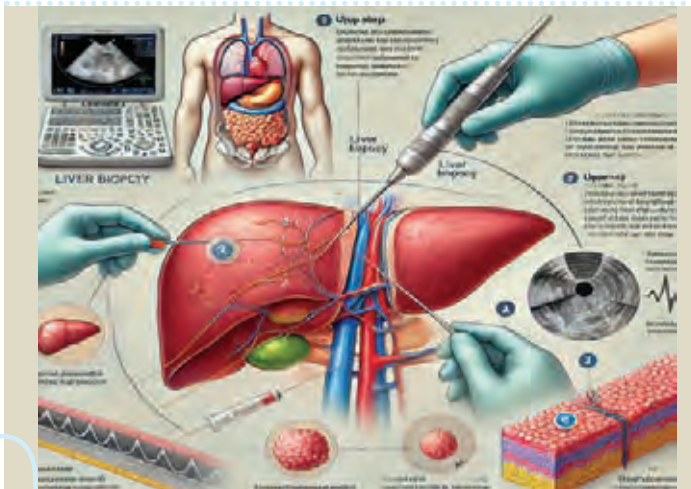
Detecting Advanced Changes in the Liver: One of the critical applications of liver biopsy is diagnosing liver cancer or worsening liver diseases that may not be identified through imaging techniques alone.

• Limitations of Liver Biopsy

Liver biopsy is still considered an invasive diagnostic method and is used only when necessary due to its risks. Additionally, performing liver biopsy in individuals with significant excess weight is more challenging and carries greater risks.

• Conclusion

Liver biopsy is one of the most essential diagnostic tools for determining the type and severity of liver damage. Although it is considered an invasive procedure, it is the best and most accurate option for diagnosis in cases where more detailed information about liver condition is required.



The provided image accurately illustrates the liver biopsy process. This image includes the steps of obtaining a liver sample using a specialized needle under ultrasound guidance and clearly explains the applications of this method in diagnosing liver diseases such as hepatitis, cirrhosis, and liver cancer.

• FibroScan: A Modern Method for Diagnosing Liver Fibrosis

FibroScan is a non-invasive technique that uses low-frequency sound waves to assess liver stiffness and the extent of fibrosis. This method is particularly useful for diagnosing and monitoring chronic liver diseases such as hepatitis

B, hepatitis C, non-alcoholic fatty liver disease (NAFLD), and cirrhosis. With FibroScan, physicians can evaluate the level of liver scarring (fibrosis) and accumulated fat without the need for a biopsy.

● How FibroScan Works

FibroScan employs elastography based on sound waves that are sent into the liver tissue. Vibrational waves are transmitted through a specialized probe from the skin's surface toward the liver. The speed at which these waves return indicates the stiffness and health of the liver tissue. In stiffer liver tissues, the waves return faster, which can indicate fibrosis or chronic damage.



This image illustrates the FibroScan procedure. In the image, the patient is lying calmly on an examination table while the technician places a small device called a probe on the patient's abdomen in the liver area. The results of the liver stiffness measurements are displayed on a screen next to the patient.

● Steps of FibroScan Procedure

Patient Preparation: The patient lies on a table, and the liver area on the right side of the abdomen is exposed.

Using the Probe: A small probe is placed on the skin over the liver area, and vibrational waves are sent to the liver. These waves measure liver stiffness based on their speed through the liver tissue. The FibroScan device analyzes the results and reports liver stiffness in kilopascals (kPa).

● Applications of FibroScan

Assessment of Chronic Liver Diseases: Widely used in conditions such as chronic hepatitis, cirrhosis, and fatty liver.

Monitoring Disease Progression: Helps physicians measure liver fibrosis and track disease changes without requiring a biopsy.

Evaluating Treatment Response: FibroScan can also assess the effectiveness of liver treatments.

● **Advantages of FibroScan**

Non-invasive: Unlike liver biopsy, it does not involve needle insertion, resulting in less pain and fewer complications.

Quick and Painless: The procedure takes only a few minutes, and the patient feels no discomfort or pain.

High Accuracy: In many cases, FibroScan provides precise information about liver damage.

● **FibroScan Results are Reported as Follows**

FibroScan Values: Results are presented numerically, ranging from 2.5 to 75 kilopascals (kPa), with higher values indicating greater liver fibrosis or damage.

Normal Liver Stiffness: Typically, normal liver stiffness is less than 7 kPa, indicating a healthy liver without fibrosis.

Fibrosis or Advanced Cirrhosis: Values above 7 kPa may indicate fibrosis or liver scarring. Values of 12.5 kPa or higher usually suggest the presence of advanced liver cirrhosis.

CAP Technology: Newer FibroScan models can measure fat accumulation in the liver using Controlled Attenuation Parameter (CAP) technology, particularly useful for patients with non-alcoholic fatty liver disease (NAFLD).

This method allows physicians to gather detailed information about liver health without requiring a biopsy.

● **Limitations of FibroScan**

Severe Obesity or Ascites: In individuals with significant obesity or excess abdominal fluid, FibroScan results may be less accurate.

Other Liver Conditions: Certain conditions, such as acute liver inflammation, can affect FibroScan results.

● **Conclusion**

FibroScan is one of the newest and most accurate diagnostic tools for assessing liver health and fibrosis. Its non-invasive nature, high accuracy, and lack of the need for liver biopsy have made it a widely adopted alternative to traditional biopsy methods.

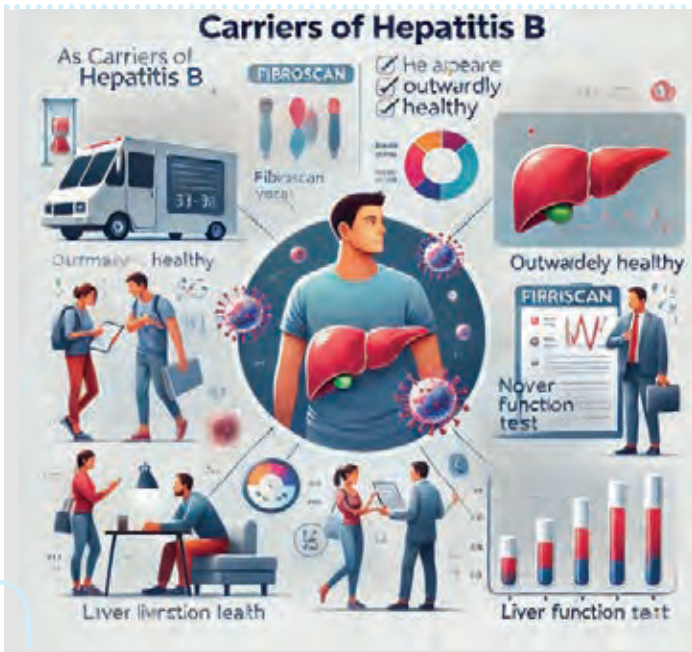
HEPATITIS B



Chapter 5

Hepatitis B Carriers

The hepatitis B virus can remain dormant in the body for years, and individuals who have the virus in their blood but show no symptoms of the disease are referred to as hepatitis B carriers. A hepatitis B carrier is someone in whom the virus has persisted for more than six months, but their general health is good, and liver function tests are normal. In such cases, the virus does not cause significant harm to the body, and the individual shows no clinical signs of the disease. However, to ensure liver health and check for fibrosis or cirrhosis, it is essential to perform a FibroScan and monitor the hepatitis B viral load in the blood.



The image depicts individuals as carriers of hepatitis B. These individuals appear outwardly healthy, engaging in normal daily activities, with no visible signs of illness. A graphical representation highlights the presence of the hepatitis B virus in their blood. Additional visual elements, such as a FibroScan device and normal liver function test results, emphasize their good liver health. Another section shows the need for regular monitoring, including checking fibrosis or cirrhosis using FibroScan and assessing the hepatitis B viral load in the blood.

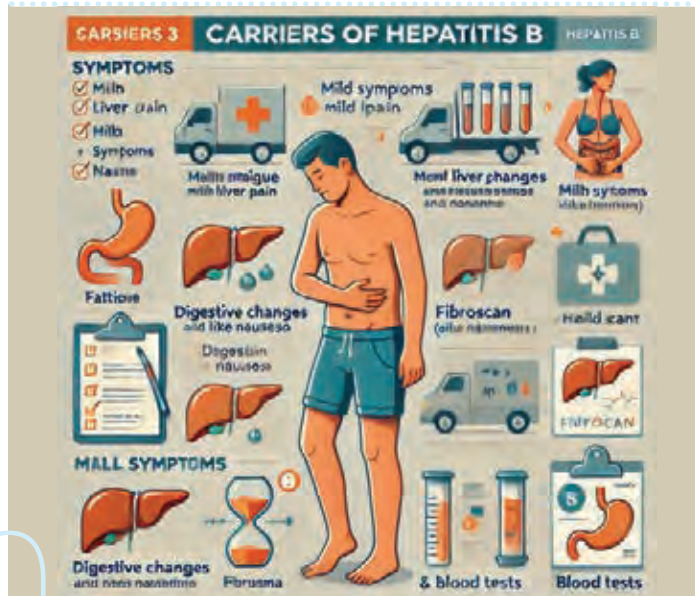
● Hepatitis B Carriers

Hepatitis B carriers often exhibit no specific symptoms and may live asymptotically for years. Many of these individuals, especially those who acquired the infection through mother-to-child transmission, do not display

any signs. However, in some carriers, mild symptoms such as chronic fatigue, slight pain in the liver area (under the right rib), loss of appetite, or digestive changes like nausea and abdominal discomfort may occur, although these symptoms are not directly linked to hepatitis B.

In some individuals, after acute hepatitis infection, the body fails to eliminate the virus, leading to chronic carrier status. In such cases, the immune system cannot clear the hepatitis B surface antigen (HBsAg), and despite apparent recovery, the virus remains in the body.

As mentioned, the hepatitis B virus is present in the blood and other bodily fluids of carriers and can be transmitted to healthy individuals through contact with these fluids. Hepatitis B carriers, in most cases, continue their daily lives without issues, but regular testing and monitoring of liver health are essential to detect any changes or disease progression promptly. If someone is identified as a carrier, they need to be under medical supervision and take measures to prevent transmitting the virus to others.



The image provides an explanation about hepatitis B carriers and their symptoms. It highlights signs such as fatigue, mild pain in the liver area, digestive changes like nausea, and abdominal discomfort. The image also emphasizes the importance of regular testing and liver monitoring to identify any changes or disease progression.

Can Acute Hepatitis B in Adults Be Fully Treated?

Acute hepatitis B in adults is usually treatable, and in most cases, the body naturally combats the virus and recovers. In the majority of individuals, the immune system effectively clears the virus from the body. Only about 5 to 10 percent of cases result in the virus remaining in the body, leading to a carrier state of hepatitis B.

The exact factors causing some individuals to become chronic carriers after an acute infection are not fully understood. However, a weakened immune system

and the type of virus are among the factors that may play a role in this process. There appears to be a genetic predisposition in some families that makes them more prone to becoming carriers, although no correlation has been found between this condition and blood type.

- **Treatment for Acute Hepatitis B Includes**

Rest and Care: Adequate rest helps the body fight the infection more effectively.
Nutritional Support: A balanced diet and sufficient fluid intake help maintain the patient's health.

Medications: In severe cases, antiviral medications may be prescribed to reduce the severity of the disease.

Continuous Monitoring: Regular monitoring of liver function and viral levels in the blood is essential to evaluate treatment progress.

Most individuals recover from acute hepatitis B and return to their normal lives without needing further treatment. However, medical follow-up remains necessary to take appropriate action in case the disease becomes chronic.



One of My Friends Has Hepatitis B. Can I Visit Their Home for a Meal or Party?

Yes, there is no restriction on visiting your friend's home who has hepatitis B or attending a party there. Hepatitis B virus is primarily transmitted through contact with blood or bodily fluids and cannot be spread through food, drinks, or everyday social interactions such as shaking hands or sharing a meal with the infected person.

Even if the infected individual is cooking and you eat food they prepared, there is no risk to you. However, practicing general personal hygiene, such as washing your hands, is always recommended.

There is no specific requirement for hepatitis B vaccination in this situation, but vaccination is recommended for individuals at risk of exposure. In general, hepatitis B vaccination is advised for individuals under the age of 60 to provide protection against the virus.



The image is explaining that “the hepatitis B virus is not transmitted through food, drinks, or ordinary social interactions.” The image emphasizes that there is no risk in social gatherings or sharing meals with someone who has hepatitis B.

● Important Tips for Hepatitis B Carriers

●● Regular Health Monitoring

Hepatitis B carriers should undergo tests every six to twelve months to assess liver function and viral load in the blood. This helps the doctor evaluate liver health and prescribe appropriate treatment if necessary.

●● Personal Hygiene

Use personal items such as toothbrushes, razors, towels, and tattoo equipment individually and never share these items.

Wounds and skin abrasions should be properly covered to reduce the risk of virus transmission.

●● Avoid Risky Behaviors

Unprotected sexual activities and sharing needles are significant transmission factors and should be avoided.

●● Avoid Alcohol and Drugs

Alcohol and drug use can exacerbate liver damage, making abstinence from them crucial.

●● Stress Management

Stress management techniques and mental health care can help carriers maintain a better quality of life.

●● Inform Healthcare Providers

Inform doctors, dentists, laboratories, or any centers where there is a risk of virus transmission about your hepatitis B status.

●● Vaccination for Family Members

All family members, especially spouses and children, should be vaccinated against hepatitis B to prevent virus transmission.

●● Avoid Alcohol Consumption

Alcohol consumption aggravates the disease and should be strictly avoided.

●● No Blood Donation

People with hepatitis B should not donate blood, as the virus can be transmitted this way.

●● Prevent Obesity and Fatty Liver

To prevent obesity and fatty liver, reduce sugar intake and exercise regularly. Overweight individuals should strive to lose weight.

By following these guidelines, hepatitis B carriers can lead a normal life and minimize the risk of transmitting the virus to others.

hepatitis B may spontaneously clear the virus from their body each year. In such cases, the individual's HBsAg test becomes negative, indicating they are no longer a carrier of the virus. This demonstrates that complete recovery and spontaneous clearance of the virus are possible, although this occurs in only a small percentage of carriers.

On the other hand, 2 to 3 percent of hepatitis B carriers may progress to chronic hepatitis over time, and their disease may become active. In such cases, viral activity increases again, leading to liver damage. For this reason, Dr. Alavian recommends that hepatitis B carriers undergo liver examinations and tests every six months to ensure their liver health and to identify any changes in the disease status promptly.

The final conclusion is that most carriers continue their lives without significant problems, but regular check-ups are crucial for preventing potential complications and monitoring liver health.



The image depicts an individual identified as a hepatitis B carrier who continues their daily life by adhering to medical recommendations. The doctor advises them to undergo regular check-ups, monitor liver health, avoid alcohol consumption, and maintain a healthy lifestyle through exercise and vitamin supplements. Alongside these precautions, the individual interacts normally with family and friends, leading a healthy and normal daily life.

● Important Tips for Hepatitis B Carriers

● Marriage and Vaccination:

Hepatitis B carriers can get married, but it is crucial for their partner to be vaccinated against the disease beforehand. It is also important to confirm the vaccine's effectiveness by checking the antibody levels. Fortunately, with vaccination, the risk of virus transmission in a healthy marital relationship is minimized.

● Screening Pregnant Women

All pregnant women must be screened for hepatitis B. If an infection is detected,

necessary measures should be taken to prevent transmission to the newborn, such as administering hepatitis B immunoglobulin to the baby immediately after birth.

•• **Avoiding Additional Pregnancies**

Women who are hepatitis B carriers and already have enough children are advised to avoid additional pregnancies, as there may be a risk of transmitting the virus to the baby.

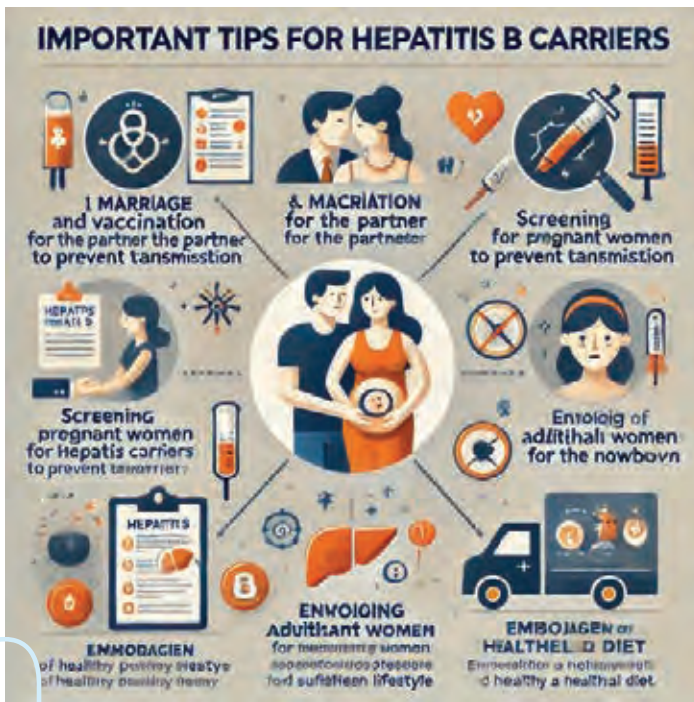
•• **Daily Life and Physical Activity**

Hepatitis B carriers can continue their daily lives like other members of society. Exercise and physical activity are beneficial for them, and there are no restrictions on participating in such activities.

•• **Diet**

Hepatitis B carriers do not require specific dietary restrictions and can enjoy a healthy and balanced diet.

By following these guidelines, hepatitis B carriers can live a healthy and normal life while minimizing the risk of transmitting the virus to others.



The infographic titled “Important Tips for Hepatitis B Carriers,” visually presenting the key recommendations.

HEPATITIS B



Chapter 6

Complications of Hepatitis B



● Liver Cirrhosis: Symptoms, Diagnosis, and Treatment

●● What is Liver Cirrhosis?

Liver cirrhosis is an advanced stage of chronic liver diseases resulting from continuous and widespread destruction of liver cells. This condition often develops due to chronic viral infections such as hepatitis B and hepatitis C, excessive alcohol consumption, or fat accumulation in the liver (non-alcoholic fatty liver disease).

Liver fibrosis, the precursor to cirrhosis, occurs when the liver attempts to repair itself, but instead of healthy tissue, scar tissue and fibrosis replace the liver's normal tissue. Due to this chronic damage, the liver gradually loses its ability to perform essential functions such as detoxifying the blood, producing proteins, and storing energy. This loss of liver function leads to widespread complications throughout the body.

● Stages of Liver Cirrhosis Progression

Liver cirrhosis develops gradually through the following stages:

●● Early Stage (Compensated)

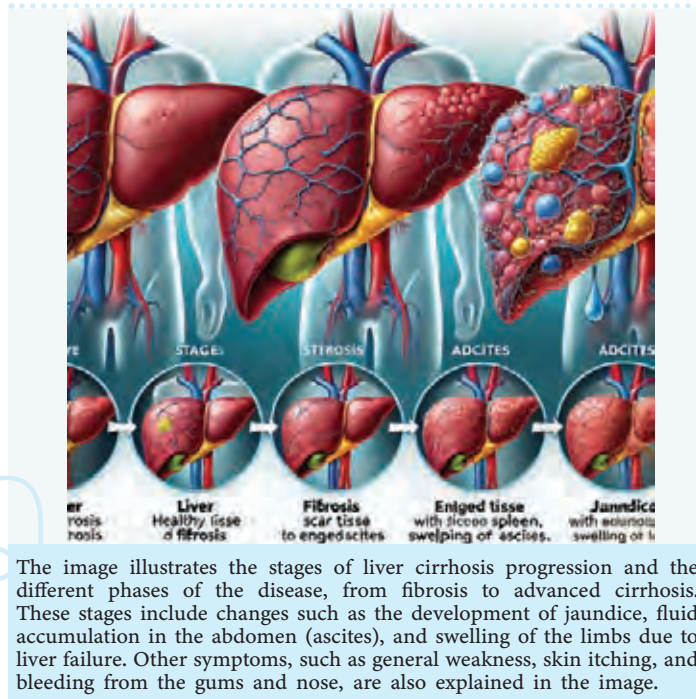
At this stage, there are no obvious symptoms, and the liver can still perform its functions adequately despite the presence of scar tissue.

●● Intermediate Stage (Partially Compensated)

Mild symptoms, such as fatigue, general weakness, reduced appetite, and abdominal discomfort, begin to appear.

●● Advanced Stage (Decompensated)

Symptoms become more severe, and serious complications such as ascites (fluid accumulation in the abdomen), bleeding from esophageal varices, and kidney failure emerge.



● Symptoms of Liver Cirrhosis

The symptoms of cirrhosis vary depending on the stage of the disease. Some of these symptoms include:

Fatigue and General Weakness: Persistent fatigue without any specific cause.

Ascites (Fluid Accumulation in the Abdomen): Caused by the liver's inability to regulate body fluids.

Enlarged Spleen: Due to increased pressure in the blood vessels leading to the liver.

Swelling of Legs and Hands (Edema): Caused by fluid retention.

Severe Skin Itching: Due to toxin buildup in the body.

Darkened Skin and Bruising: Resulting from decreased production of clotting factors.

Jaundice: Yellowing of the skin and eyes due to elevated bilirubin levels in the blood.

Muscle Weakness and Wasting: Caused by reduced protein and energy levels in the body.

Bleeding from the Nose and Gums: Due to the liver's reduced ability to produce clotting factors.

● Complications of Liver Cirrhosis

Liver cirrhosis can lead to severe and life-threatening complications:

Liver Failure: Occurs when the liver completely ceases to function and cannot perform its duties.

Internal Bleeding: Due to esophageal varices that may rupture and bleed.

Hepatic Encephalopathy: Toxin buildup in the brain leading to confusion, behavioral changes, and in severe cases, coma.

Liver Cancer (Hepatocellular Carcinoma): Cirrhosis significantly increases the risk of developing liver cancer.

● Diagnosis of Liver Cirrhosis

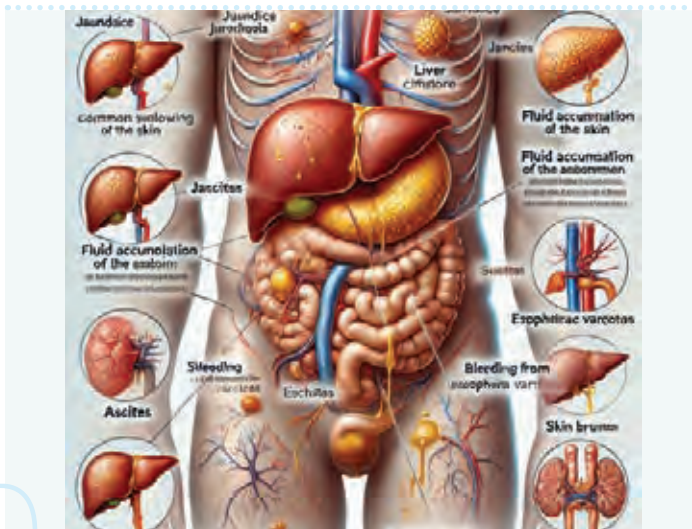
Doctors use a combination of clinical tests and imaging to diagnose liver cirrhosis:

Blood Tests: To check liver enzymes, bilirubin levels, and other liver markers.

Ultrasound and FibroScan: To assess liver structure, fibrosis, and stiffness.

Liver Biopsy: If necessary, to collect a tissue sample for a precise evaluation of liver damage.

Endoscopy: To examine esophageal varices, which may result from high blood pressure in liver-related veins.



The provided image accurately and medically depicts the symptoms and complications of liver cirrhosis. The image illustrates common symptoms of the disease, such as jaundice, fluid accumulation in the abdomen (ascites), swelling of limbs (edema), and skin bruising. It also highlights more severe complications, including liver failure, bleeding from esophageal varices, and hepatic encephalopathy. These symptoms and complications are key indicators of disease progression, emphasizing the need for precise and continuous medical care for diagnosis and management.

● Treatment of Liver Cirrhosis

Treatment of cirrhosis aims to manage complications and improve the patient's quality of life. Some treatment methods include:

●● Managing Swelling in Limbs and Abdomen (Ascites)

Diuretics are prescribed to reduce fluid accumulation in the body.

●● Treating Coagulation Disorders

Vitamin K and anticoagulant medications are administered to address bleeding issues.

● Liver Cancer: Risks and Prevention

Liver cancer is a potential and serious complication for individuals with long-term chronic hepatitis B. Below is more information about the causes, diagnostic methods, and prevention of liver cancer:

● Causes of Liver Cancer

●● Chronic Hepatitis B

Individuals with chronic hepatitis B are at a higher risk of developing liver cancer. Hepatitis B virus causes chronic inflammation and damage to liver cells, which over time can lead to abnormal cell growth and eventually liver cancer (hepatocellular carcinoma).

●● Fibrosis and Cirrhosis

The higher the degree of liver fibrosis and cirrhosis, the greater the risk of liver cancer. Fibrosis and cirrhosis indicate long-term damage to liver tissue, creating a suitable environment for the growth of cancer cells.

●● Alcohol Consumption

In addition to hepatitis B, frequent alcohol use is a recognized risk factor for liver cancer, as alcohol exacerbates liver damage and inflammation.

●● Diabetes and Obesity

Individuals with diabetes or obesity are also at increased risk of developing liver cancer. These conditions can lead to non-alcoholic fatty liver disease, which increases cancer risk.

● Diagnosis of Liver Cancer:

●● Ultrasound

Ultrasound is a key method for diagnosing liver cancer. It helps doctors identify abnormal changes in liver tissue. Due to the lack of clear symptoms in early stages, regular ultrasounds are recommended for those at risk.

●● Alpha-Fetoprotein (AFP) Test

This blood test measures the level of alpha-fetoprotein in the blood. Elevated AFP levels may indicate the presence of cancerous growth in the liver.

●● CT Scan and MRI

These imaging techniques provide more precise diagnostics for liver cancer and can accurately detect tumors and changes in liver structure.

● Prevention of Liver Cancer

●● Managing Chronic Hepatitis B

Controlling and managing chronic hepatitis B through antiviral medications, following hygiene practices, and regular medical check-ups can help reduce the risk of liver cancer. Antiviral treatments can reduce viral replication and liver inflammation.

•• **Vaccination**

Vaccination against hepatitis B is one of the most effective ways to prevent infection and reduce the risk of liver cancer. People at risk or those not yet vaccinated should receive the hepatitis B vaccine.

•• **Avoiding Alcohol Consumption**

Avoiding or minimizing alcohol use can prevent further liver damage and reduce cancer risk. Controlling tobacco use and avoiding other harmful substances is also important.

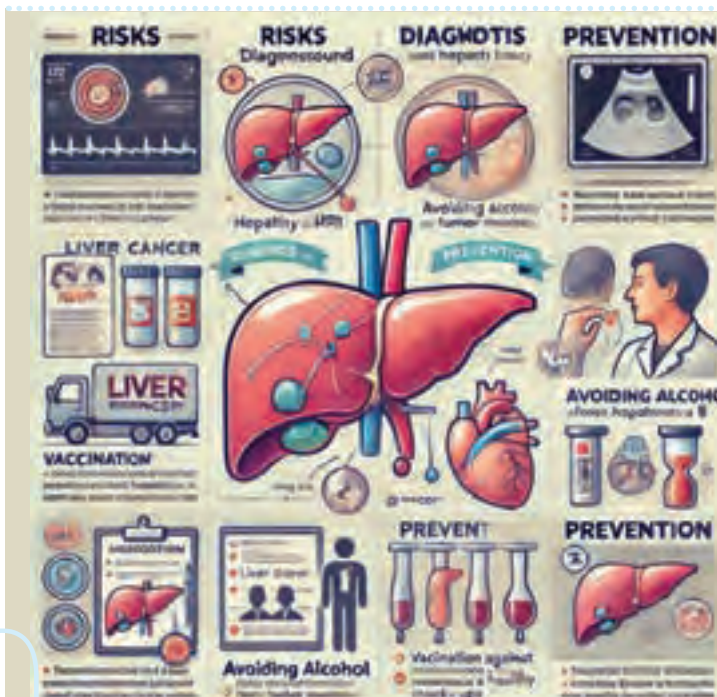
•• **Healthy Diet**

Consuming a healthy and balanced diet, particularly with vegetables, fruits, and low-fat foods, can improve overall body and liver health and lower the risk of liver cancer.

•• **Early Detection and Regular Check-ups**

Individuals at high risk, such as those with chronic hepatitis B or a family history of liver cancer, should regularly consult a doctor and undergo diagnostic tests like ultrasounds and AFP tests to detect any changes in liver condition early.

These preventive measures can help reduce the risk of liver cancer, and early diagnosis enables more effective treatments.



An educational image about the risks, diagnosis, and prevention of liver cancer, based on the provided information, is displayed for you. This image includes methods of diagnosis and actions that can help reduce the risk of developing liver cancer.

● Liver Failure: Stages and Available Treatments

Liver failure is one of the most severe liver-related issues, occurring when this vital organ ceases to function. It can manifest as acute or chronic liver failure, requiring prompt and precise treatment. Below are the stages of liver failure and treatment methods.

● Stages of Liver Failure

●● Acute Liver Failure

This type occurs suddenly and rapidly, usually within a few days or weeks following severe liver damage. Causes may include chemical poisoning (e.g., excessive use of medications like acetaminophen), viral infections (e.g., hepatitis), or allergic reactions to certain drugs. Symptoms of acute liver failure include jaundice, easy bleeding, fluid accumulation in the abdomen (ascites), and cognitive disorders (hepatic encephalopathy).

●● Chronic Liver Failure

This type develops over time, often over several years, due to continuous liver damage (e.g., cirrhosis, chronic hepatitis B and C, or prolonged alcohol use). In this condition, the liver gradually becomes unable to perform its functions. Symptoms of chronic liver failure include fatigue, general weakness, jaundice, clotting disorders (bleeding), and abdominal and limb swelling due to fluid retention.

●● Treatments for Liver Failure

Early diagnosis and identifying the cause of failure are crucial. Treatment includes measures such as toxin elimination, infection control, and discontinuing problematic medications. In some cases, antiviral drugs, antioxidants, and liver-supporting medications may be prescribed. If the liver cannot recover and its function severely declines, a liver transplant is considered the ultimate solution.

● Supportive Care and Lifestyle Changes

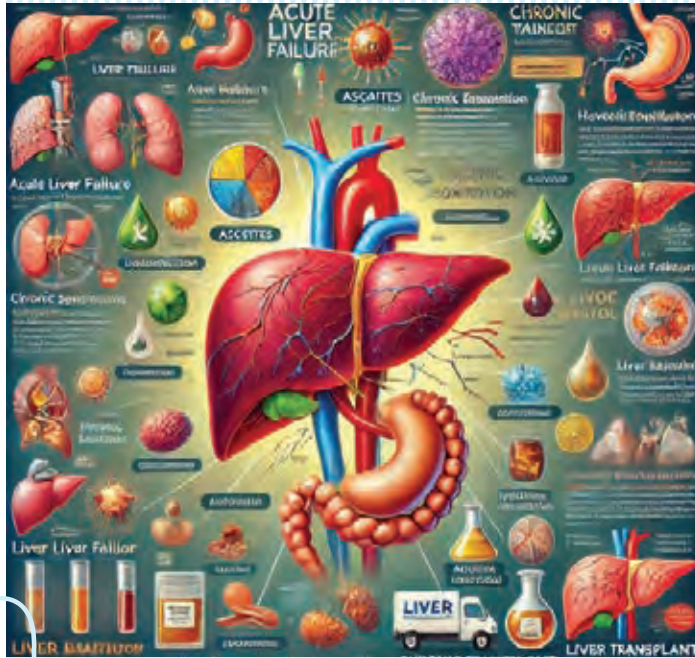
Low-Sodium and Low-Protein Diet: Helps reduce fluid accumulation and minimize toxin production by the body.

Avoiding Alcohol and Drugs: Alcohol use can worsen liver conditions and must be strictly avoided.

Regular Physical Activity: Gentle exercise and weight control support overall health and liver function.

Regular Doctor Visits: Essential for monitoring liver health and conducting periodic tests.

Liver failure, due to its extensive impact on the entire body, requires careful management and comprehensive support. Timely diagnosis and proper control of risk factors can improve patients' quality of life and prevent the progression of failure. If not managed and treated appropriately, hepatitis B can lead to serious complications, including cirrhosis, liver cancer, and liver failure. Early detection and adherence to medical recommendations can prevent these complications and contribute to healthier living.



The educational image illustrates the stages of liver failure and the differences between acute and chronic liver failure. The image clearly depicts symptoms such as jaundice, abdominal swelling (ascites), and mental confusion (hepatic encephalopathy), helping to better understand the disease and treatment options.

HEPATITIS B



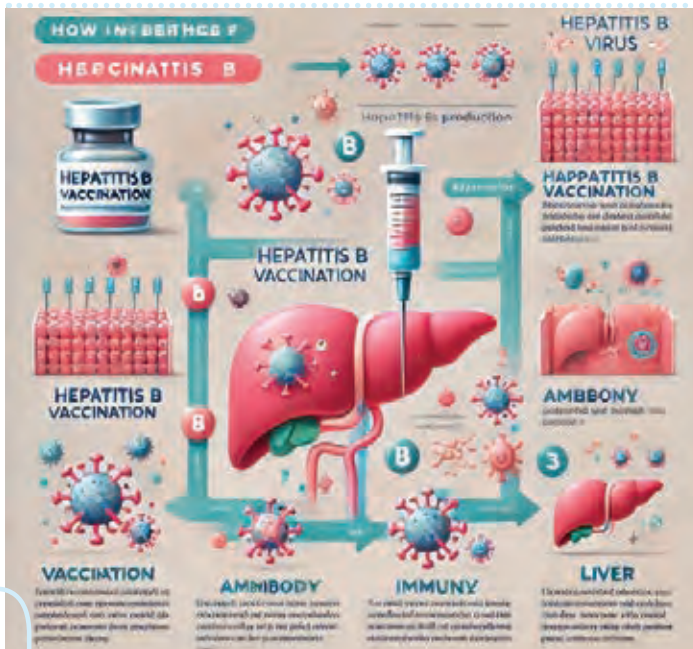
Chapter 7

Prevention of Hepatitis B

• The Importance of Vaccination

Given the risks associated with hepatitis B infection, the best way to prevent this disease is by avoiding risky behaviors, maintaining hygiene, and, most importantly, receiving the hepatitis B vaccine. This vaccine provides long-term immunity and is usually administered subcutaneously or intramuscularly. The hepatitis B vaccine contains a part of the virus (hepatitis B surface antigen or HBsAg) that does not cause infection on its own. However, the immune system recognizes this antigen and begins producing protective antibodies. As a result, if the person is exposed to the virus in the future, the immune system quickly identifies and destroys the virus.

This vaccine is recommended for infants, children, and adults at risk and is effective and safe in over 95% of cases. The first hepatitis B vaccine was developed in 1981 using purified HBsAg antigens from the plasma of carrier patients. However, today, recombinant vaccines produced with biotechnology are more common and effective.



The updated image includes the stages of hepatitis B vaccination, the process of antibody production, and how the immune system protects the body against the virus. This image is presented in Persian and can help you better understand the importance of vaccination and the immune system's protection process.

● **Dr. Alavian and Colleagues' Experience in Iran**

In Iran, one of the most significant preventive measures against hepatitis B has been the widespread vaccination of children. Dr. Seyed Moayed Alavian, one of the leading hepatitis specialists in Iran, and his colleagues have played a key role in implementing national hepatitis B vaccination programs. The mandatory vaccination program for newborns began in 1993 and has significantly reduced the prevalence of hepatitis B in the country. This program, which is consistently implemented nationwide, has achieved a vaccination coverage rate of over 95% among newborns and individuals at risk through extensive collaboration with the Ministry of Health and healthcare centers.

Dr. Alavian and his team have also made substantial efforts in public education and raising awareness about the importance of vaccination and hepatitis B prevention. These initiatives have contributed to improved public health and a decline in new hepatitis B cases in Iran.

● **Target Groups for Hepatitis B Vaccination**

Hepatitis B vaccination should include specific groups of individuals who are at a higher risk of infection with this virus. These groups are:

●● **All Newborns**

Hepatitis B vaccination is recommended for all newborns from birth.

●● **Individuals Under 18 Years Old**

Those who have not previously received the hepatitis B vaccine or have not been effectively vaccinated.

●● **Healthcare Workers**

Workers exposed to needles or instruments contaminated with the hepatitis B virus. This group includes doctors, nurses, dentists, medical students, dialysis staff, laboratory staff, and blood transfusion organization personnel.

●● **Family Members of Hepatitis B Carriers**

Spouses, children, and parents of individuals living with hepatitis B carriers.

●● **Patients Receiving Frequent Blood Transfusions**

Including individuals with hemophilia, dialysis patients, those with thalassemia, or intravenous drug users.

●● **Individuals with Chronic Liver Disease or Hepatitis C Infection**

These individuals are at higher risk due to pre-existing liver damage.

●● **Individuals with High-Risk Sexual Behaviors**

Especially those with a history of sexually transmitted infections.

●● **Prisoners with a History of High-Risk Behaviors**

Particularly if their stay exceeds six months.

●● **Public Service Workers**

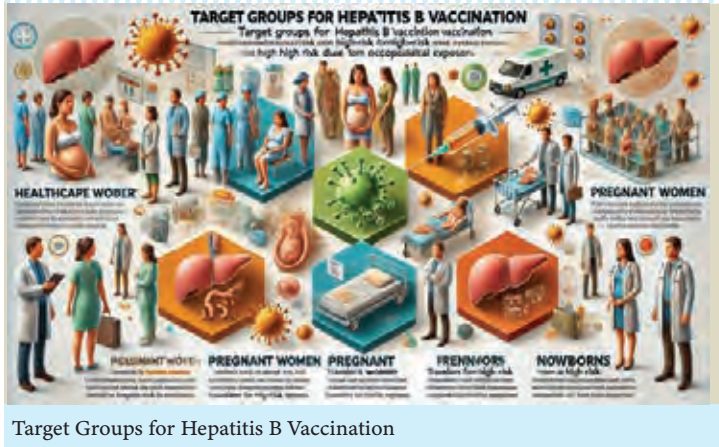
Such as municipal cleaners, firefighters, emergency responders, prison staff,

Hepatitis B and forensic and crime scene investigators.

Hepatitis B ••Candidates for Organ Transplantation

To prevent infection after transplantation.

By ensuring vaccination of these groups, the spread of hepatitis B can be effectively prevented.



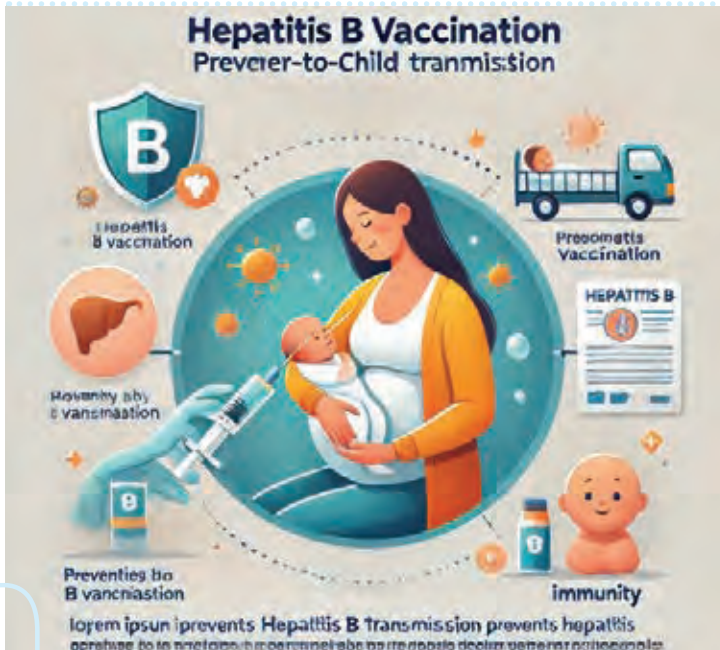
Target Groups for Hepatitis B Vaccination

Currently, vaccination of the mentioned groups is implemented as part of approved national programs. Administering the hepatitis B vaccine to newborns can prevent up to 97% of cases of virus transmission, as the primary mode of hepatitis B transmission is from mother to child. This strategy significantly helps prevent the spread of the virus in society.

According to studies, approximately one-third of the global population has been exposed to the hepatitis B virus during their lifetime. For this reason, if sufficient vaccination resources are available, it is recommended that all at-risk individuals be vaccinated.

However, high-risk groups, particularly school and university students, are prioritized for vaccination. Currently, it is advised that all individuals under 55 years of age be vaccinated against the virus after determining their hepatitis B status (through diagnostic tests).

Additionally, considering the high prevalence of hepatitis B and its rapid transmission through contact with bodily fluids, this vaccination is recognized as a significant and effective measure to prevent major epidemics. Continuing this approach and achieving broader vaccination coverage can greatly reduce the complications and spread of this disease.



The Importance of Hepatitis B Vaccination
 The focus is on preventing the transmission of the virus from mother to child as one of the primary goals of vaccination.

● Hepatitis B Vaccine Administration

Hepatitis B vaccination should be administered in three doses at intervals of zero, one month, and six months. In adults, the vaccine is injected into the deltoid muscle, while in infants, it is injected into the thigh muscle. The dosage for each injection is 10 micrograms (1 milliliter) for adults and 5 micrograms (0.5 milliliters) for infants. It is important to note that the hepatitis B vaccine should not be injected into the gluteal muscle, as this may reduce its efficacy.

● Effectiveness of the Vaccine

The vaccine should be stored at a temperature of 2 to 8 degrees Celsius, and freezing it may render it ineffective. The hepatitis B vaccine stimulates the immune system to produce antibodies against HBsAg, preventing infection. It is effective in immunizing up to 95% of individuals and provides long-term immunity if an adequate antibody response is achieved. Antibody levels should be checked one to two months after completing the vaccination schedule, and if the level is above 10, the individual is considered immune. If antibody levels drop below 10, a booster dose is recommended.

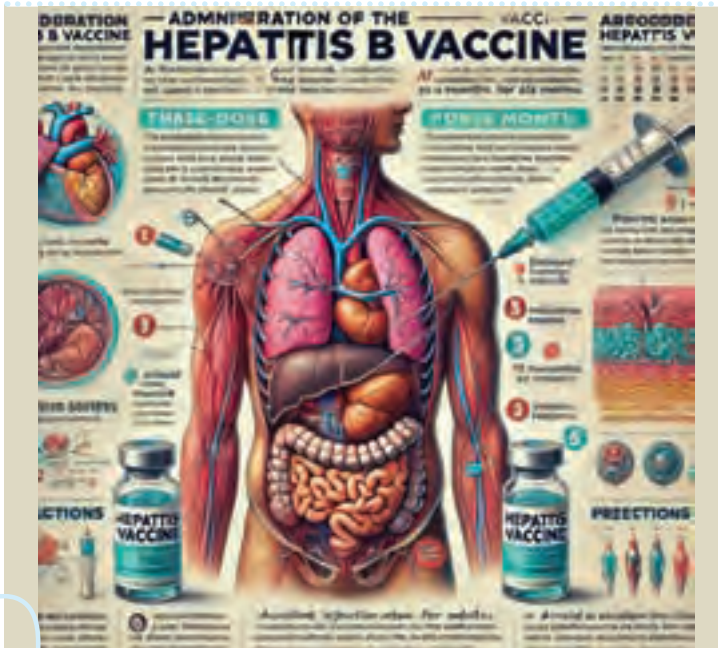
● Recommendations

- The vaccine must be administered intramuscularly, and intravenous administration should be strictly avoided.
- Newborns of HBsAg-positive mothers should receive the hepatitis B vaccine and hepatitis B immunoglobulin immediately after birth.

● Side Effects of the Vaccine

The vaccine has minimal and mild side effects. About 1% of individuals may experience mild fever, redness, pain, or swelling at the injection site. This vaccine has been administered to over a billion people worldwide without reports of serious side effects. Additionally, pregnancy and breastfeeding are not contraindications for hepatitis B vaccination, and it is safe even for those who are virus carriers or already immune.

These guidelines help maintain health and prevent the spread of hepatitis B.



Administration of the Hepatitis B Vaccine

This figure illustrates the method of hepatitis B vaccine administration, including the three-dose schedule (at zero, one month, and six months), proper injection sites (deltoid muscle for adults and thigh muscle for infants), recommended dosages (10 micrograms for adults and 5 micrograms for infants), and important precautions, such as avoiding injection into the gluteal muscle.

● Questions About Administering the Hepatitis B Vaccine to Hepatitis B Carriers


 Does administering the hepatitis B vaccine to hepatitis B carriers have any benefits?

No, administering the hepatitis B vaccine to individuals who are carriers of the virus does not have any benefits. The hepatitis B vaccine is designed to prevent initial infection with the virus, meaning it prevents infection in healthy individuals. In hepatitis B carriers, the virus has already entered the body, and the immune system is already engaged with it, so the vaccine cannot affect treatment or prevent subsequent complications of the infection.

For hepatitis B carriers, the focus is on regular monitoring of liver health and managing potential complications such as cirrhosis or liver cancer. These individuals may require antiviral treatments to control the progression of the infection to more severe diseases.

Research is ongoing into developing specific vaccines for hepatitis B carriers. These approaches use genetic technology to create vaccines that stimulate the immune system of carriers to combat the hepatitis B virus. These vaccines are not yet widely available, but further studies are underway in this area.

In general, the currently available vaccines are not recommended for hepatitis B carriers, but regular health monitoring and appropriate treatment are essential to prevent disease progression.

 **Does using vaccines derived from the blood of healthy carriers or other methods pose a risk of transmitting hepatitis?**

No, the hepatitis B vaccine is made from the hepatitis B surface antigen (HBsAg) and does not contain any blood products, live virus, or killed virus. This vaccine is completely safe, and its production process ensures that there is no risk of transmitting any disease, including hepatitis. To date, no cases of hepatitis transmission have been reported following the use of the hepatitis B vaccine. Existing vaccines are produced and tested under strict health regulations to ensure they pose no risk to public health.

 **Is it necessary to test for hepatitis (HBsAg) before administering the hepatitis B vaccine to family members of carriers?**

Yes, it is necessary and recommended to perform an HBsAg test before vaccinating family members of hepatitis B carriers or individuals at high risk of infection. This test is recommended for the following reasons:

● **Assessing Hepatitis B Infection Status**

The HBsAg test indicates whether the individual is currently infected with the virus or is a carrier. If someone is a carrier, the hepatitis B vaccine will not be effective because it is used to prevent infection and does not affect chronic conditions such as hepatitis B carrier status.

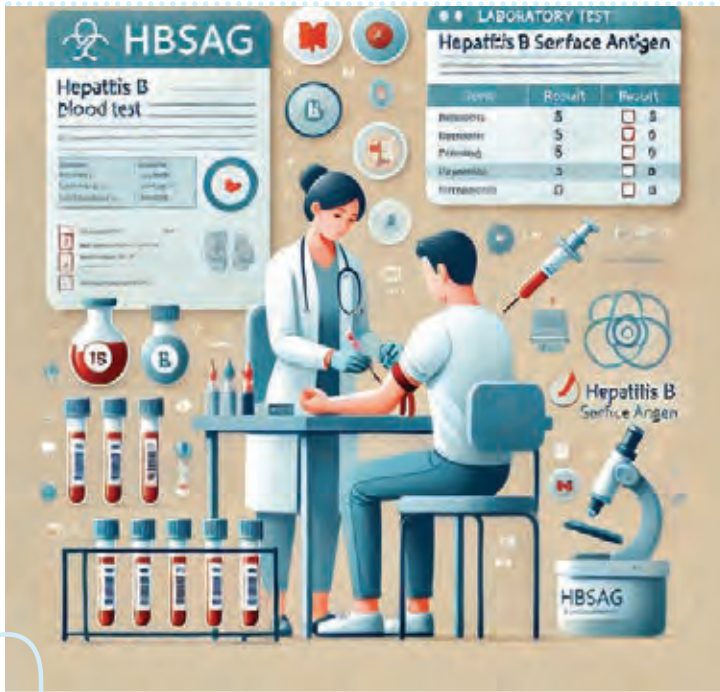
● **Determining the Need for Vaccination**

If the HBsAg test is negative, it means the individual has not been infected, and the vaccine can be administered as a preventive measure. In some cases, the Anti-HBs test is also conducted to determine whether the individual has already been exposed to the virus or vaccinated and has produced protective antibodies. If the Anti-HBs level is high, the individual may not need the vaccine.

● **Reducing the Risk of Virus Transmission**

Testing is particularly important in families where one member is a hepatitis B carrier. These tests help identify uninfected individuals who need vaccination and prevent the transmission of the virus to other family members.

Thus, the HBsAg test before vaccination allows the physician to make better decisions, evaluate the individual's condition, and determine the need for vaccination or other preventive measures.



A healthcare professional is performing a blood test to check for HBsAg to assess the hepatitis B status of an individual before administering the hepatitis B vaccine to family members of hepatitis B carriers. This test is essential for determining the individual's infection status and whether they require vaccination.

•• What should I do if I accidentally get pricked by a contaminated needle from my HBsAg-positive mother during a B-complex injection?

If you have been pricked by a contaminated needle from someone who is HBsAg-positive (such as your mother), immediate actions are crucial:

● Immediate Wound Washing

Thoroughly wash the affected area with soap and water immediately after the incident. If soap and water are unavailable, use an antiseptic solution like alcohol. This step helps reduce the risk of viral transmission.

Seek Medical Consultation Promptly:

Visit a doctor or healthcare center as soon as possible. This situation is classified as an “occupational exposure incident” and requires immediate evaluation. Your doctor may request blood tests (including HBsAg and Anti-HBs) to assess your current infection status.

● Hepatitis B Vaccination

If you have not been vaccinated or your vaccination status is unclear, your doctor may recommend a hepatitis B vaccine. If you have been vaccinated and your antibody levels are sufficient (Anti-HBs > 10 IU/L), the risk of infection is low. However, if your antibody levels are low, a booster dose may be necessary.

● Hepatitis B Immune Globulin (HBIG)

If your immunity status is uncertain or you have not been vaccinated, your doctor may recommend HBIG. This provides ready-made antibodies to fight the virus and reduce the risk of infection.

● Regular Follow-Ups

After taking these measures, follow up with your doctor is essential. You may need multiple blood tests over the next six months to monitor for possible infection.

Timely vaccination and HBIG administration significantly reduce the risk of contracting hepatitis B. Ensure the vaccine and HBIG are stored correctly to maintain their effectiveness.



Can an individual who had hepatitis during childhood receive the hepatitis B vaccine during adolescence?

Yes, there is no contraindication for administering the hepatitis B vaccine during adolescence to someone who had hepatitis during childhood. Typically, hepatitis in childhood is likely hepatitis A, a non-chronic viral hepatitis that usually resolves completely.

To ensure there is no hepatitis B infection, it is recommended to perform an HBsAg test before administering the vaccine. If the test result is negative and the individual is not infected with hepatitis B, vaccination is permissible and serves as a preventive measure.



Is a booster dose of the hepatitis B vaccine necessary five years after completing the vaccination series?

Generally, there is no need for a booster dose (booster) five years after completing the three-dose hepatitis B vaccination series. Studies have shown that healthy individuals who receive the full hepatitis B vaccine series maintain long-term immunity even if antibody levels decrease over time.

● Key Points

●● Long-Term Immunity

The hepatitis B vaccine provides long-term immunity (at least 20 years) in most healthy individuals. Even if antibody levels decrease, the body can produce a sufficient immune response upon exposure to the virus.

●● Situations Requiring a Booster Dose

People at high risk of hepatitis B, such as healthcare workers, dialysis patients, or those with weakened immune systems, may need their antibody levels (Anti-HBs) checked. If antibody levels are below 10 IU/L, a booster dose may be recommended. Spouses of hepatitis B-positive individuals should undergo testing every five years and receive a booster dose if antibody levels are low.

●● Antibody Level Testing

Routine testing of antibody levels is unnecessary for most individuals unless they are in high-risk groups or have compromised immune systems.

For most individuals, no booster dose is needed after completing the vaccination series. However, for those at high risk, periodic testing and booster doses may be recommended if required.



After completing the three-dose hepatitis B vaccine series, there is no need for a booster dose five years later.

HEPATITIS B



Chapter 8

Treatment and Management of Hepatitis B

Treating hepatitis B requires a thorough evaluation of the patient's condition and involves multiple stages based on various factors, such as the severity of the disease, the patient's age, gender, family history, and other health-related factors. The primary goals of hepatitis B treatment are to suppress viral replication, prevent liver damage progression, and improve liver function. By controlling the virus, the likelihood of preventing the disease from progressing to cirrhosis or liver cancer increases.

● Factors Influencing Treatment

●● Stage and Severity of the Disease:

Hepatitis B exists in acute and chronic forms, and the stage of the disease determines when to start treatment.

●● Age and Gender

Younger individuals and women may respond differently to antiviral medications.

●● Time of Infection

The exact time of infection and the duration of being a carrier are key factors in determining the type and intensity of treatment.

●● Family History

A family history of advanced liver diseases, such as cirrhosis or liver cancer, may indicate the need for early treatment initiation.

●● Obesity and General Health

The patient's overall health, including factors like obesity, can affect their response to treatment.

● Follow-Ups and Periodic Testing

To monitor the efficacy of treatment and prevent side effects, the following periodic tests are recommended:

Liver Enzyme Tests: To evaluate liver health.

Viral Load Measurement (PCR): To assess the amount of virus in the blood.

FibroScan: To evaluate the degree of fibrosis and liver stiffness and track disease progression.

● No Treatment in Specific Cases

In some cases, avoiding treatment and focusing on dietary adjustments, abstaining from alcohol, and managing other risk factors may be more beneficial than medical therapy. This approach is particularly suggested for patients with low viral loads or those whose liver has not sustained significant damage.

● Current Treatments for Chronic Hepatitis B

The most common treatments for chronic hepatitis B involve oral antiviral medications, such as **Tenofovir** and **Entecavir**, which are highly effective and have fewer side effects. These medications help reduce viral replication, control the disease, and prevent progression to cirrhosis or liver cancer.

Tenofovir: Available in 300 mg and 10 mg doses, it is considered an effective treatment due to its low resistance profile.

Entecavir: Another widely used medication that is effective for long-term prevention of disease progression.

Older medications, such as **Lamivudine** and **Adefovir**, are still used in some cases but have limited application due to drug resistance issues.

Another treatment approach involves injectable alpha-interferon. While it was more commonly used in the past, its use has declined due to side effects such as fever, fatigue, and loss of appetite. Interferon is generally reserved for cases where the patient is also co-infected with hepatitis D virus.

● Treatment Selection and Duration

The choice of treatment depends on the patient's condition, viral load, and liver response. Some patients may require lifelong treatment, while others may recover after several years of medication use.

Through periodic testing (e.g., monitoring viral load and liver function), physicians can assess treatment success and adjust medications if necessary.



● Tenofovir in the Treatment of Chronic Hepatitis B

Tenofovir is one of the first-line drugs used in the treatment of chronic hepatitis B and is available in two forms:

●● Tenofovir Disoproxil Fumarate (TDF) 300 mg

●● Tenofovir Alafenamide (TAF) 10 mg

Both formulations are designed to inhibit the replication of the hepatitis B virus in liver cells and are taken daily. Tenofovir functions similarly to lamivudine as a nucleoside analog reverse transcriptase inhibitor. This drug is effective not only against hepatitis B but also in the treatment of HIV.

● Tenofovir Disoproxil Fumarate (TDF) 300 mg

This formulation is taken as a 300 mg daily dose and is highly effective in reducing the replication of the hepatitis B virus in the blood. Studies have shown that TDF significantly normalizes liver enzymes and reduces viral load compared to other oral drugs like lamivudine and adefovir. Fortunately, no resistance to this drug has been reported after three years of use.

● Tenofovir Alafenamide (TAF) 10 mg

This newer form of tenofovir is designed for patients with chronic hepatitis B and is administered at a 10 mg dose. TAF causes fewer kidney and bone-related side effects compared to TDF, making it a better option for patients with renal or bone issues.

● Side Effects of Tenofovir

Common side effects include:

- Headache
- Sore throat
- Back pain
- Nausea
- Fatigue

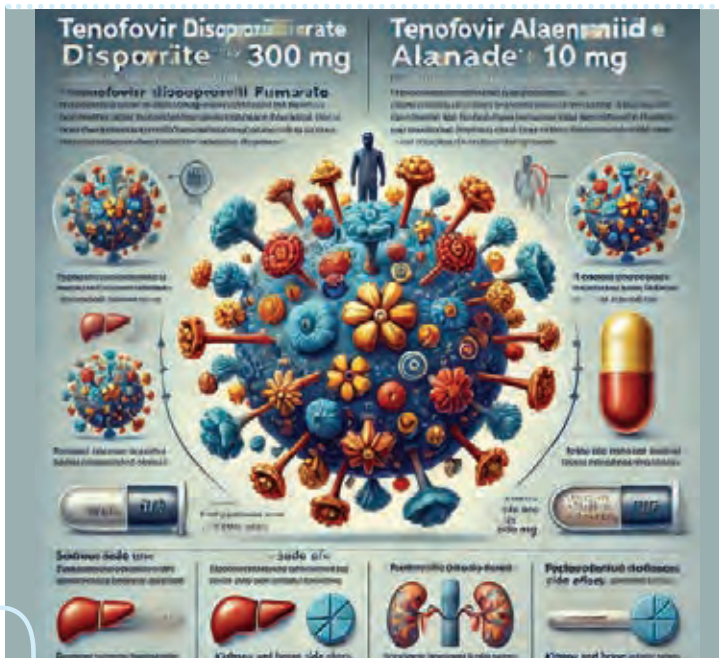
In rare cases, TDF can cause kidney-related side effects. Therefore, kidney function evaluation every 3 to 6 months is recommended.

● Assessing Treatment Effectiveness

To evaluate the effectiveness of tenofovir, a PCR test is recommended 12 weeks after starting treatment. If a significant reduction in viral load (more than 1 log) is not observed, the patient may be considered “treatment-resistant.” If the hepatitis B viral load decreases, the treatment should continue, indicating a good response to the therapy.

● Conclusion

Tenofovir, in both TDF 300 mg and the newer TAF 10 mg formulations, is one of the most effective drugs for managing chronic hepatitis B. The choice between the two depends on the patient’s kidney and bone health.



Tenofovir is used in two different forms for the treatment of chronic hepatitis B: Tenofovir Disoproxil Fumarate (TDF) 300 mg and Tenofovir Alafenamide (TAF) 10 mg. Tenofovir is effective in reducing viral replication and managing hepatitis B. TDF is used at a higher dose and carries a greater risk of kidney and bone-related side effects, while TAF, at a lower dose, causes fewer side effects and is better suited for patients with kidney and bone issues.



Entecavir in the Treatment of Chronic Hepatitis B



Entecavir is a potent antiviral medication used to treat chronic hepatitis B. It belongs to the class of nucleoside analogs and works by inhibiting the hepatitis B virus polymerase enzyme, thereby preventing viral replication and the production of viral DNA. As a result, it reduces the viral load in the body and prevents further liver damage. Entecavir is considered one of the first-line treatments for chronic hepatitis B due to its high efficacy and minimal side effects, making it an excellent choice for many patients.

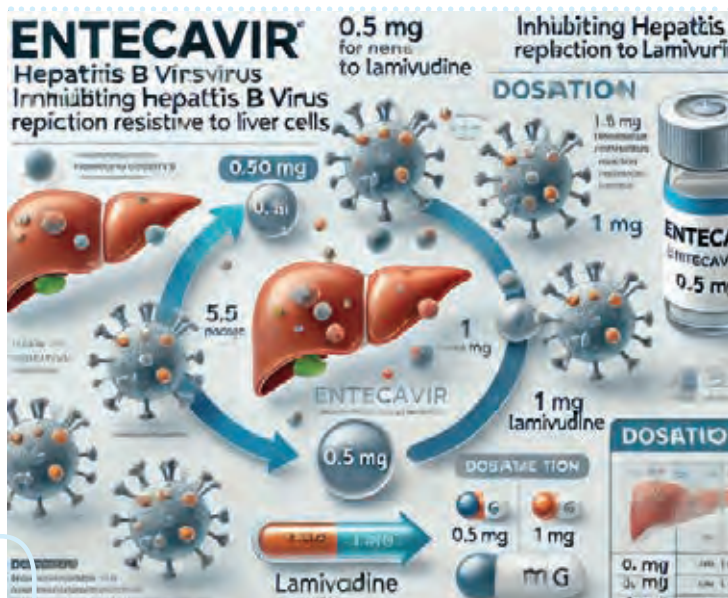
Entecavir is particularly well-tolerated by patients with kidney issues and is more effective than lamivudine and adefovir in reducing HBV DNA levels. However, in patients resistant to lamivudine, the efficacy of entecavir may decrease. For such patients, a higher dose (1 mg instead of 0.5 mg) is usually prescribed.

One of the significant advantages of entecavir is its lower likelihood of drug resistance compared to other antivirals. Although rare, resistance has been reported in about 1% of patients after five years of treatment.

• Common Side Effects of Entecavir

- Headache
- Respiratory infections
- Cough
- Abdominal pain

Entecavir is well-tolerated by most patients and remains one of the most effective treatment options for chronic hepatitis B.



The processes of inhibiting hepatitis B virus replication by the drug Entecavir are illustrated. This image accurately depicts how the medication reduces viral replication in liver cells and provides information about the 0.5 mg dosage for new patients and the 1 mg dosage for patients resistant to lamivudine.

Lamivudine and Adefovir: Older Antiviral Drugs for Hepatitis B

Lamivudine and Adefovir are two older antiviral drugs that were once widely used to manage hepatitis B. Lamivudine works by inhibiting the viral replication enzyme, thereby reducing the viral load in the blood. However, long-term use of lamivudine leads to drug resistance, and the disease often recurs after discontinuation. For this reason, it is no longer recommended as a first-line treatment.

Adefovir was used to treat patients resistant to lamivudine, but prolonged use also resulted in drug resistance. Today, this drug is also no longer part of the treatment regimen.

With the advancement of newer drugs like Tenofovir and Entecavir, these two medications are now rarely used.

Interferon Therapy

Interferons are proteins with antiviral and immune-modulating properties. These proteins are produced by various cells in the body in response to infections, including those caused by the hepatitis virus. There are three types of interferons:

Alpha-interferon: Produced by B lymphocytes and monocytes.

Beta-interferon: Produced by fibroblasts.

Gamma-interferon: Produced by T-helper cells and natural killer (NK) cells.

Among these, only **alpha-interferon** exhibits suitable antiviral effects and is used in the treatment of viral hepatitis. This drug stimulates the body's defense system to control and inhibit the replication of the hepatitis B virus. It is believed that the bodies of patients with chronic hepatitis B are unable to secrete sufficient amounts of interferon, essentially causing a deficiency. Administering interferon in these patients helps address this shortfall.

Interferon therapy in these patients leads to:

- A reduction in HBV DNA (actively replicating virus).
- Conversion of HBeAg to HBeAb (indicating reduced viral replication).
- Normalization of liver enzyme levels.

Alpha-interferon exists in two forms

- Interferon alpha-2a.
- Interferon alpha-2b.

Both forms are used in the treatment of chronic hepatitis B. By using alpha-interferon, the body becomes better equipped to combat viral infections, reducing the replication of the virus in the body. This drug strengthens certain types of white blood cells, enabling them to identify and attack virus-infected cells more effectively.

Alpha-interferon is an injectable interferon used for a limited duration (usually 6 to 12 months). It boosts the immune system, enabling it to fight the virus. This method is effective for some individuals and may reduce the virus to a manageable level.

However, interferons often have significant side effects, such as fatigue, depression, and flu-like symptoms.

● Lifestyle Changes for Managing Hepatitis B

Managing hepatitis B involves not only medical treatment but also lifestyle changes that can improve liver function and prevent disease progression. Some key changes include:

● Appropriate Diet

Avoiding Alcohol Consumption: Alcohol severely damages the liver and increases the risk of cirrhosis.

Eating a Healthy, Balanced Diet: Foods rich in fruits, vegetables, whole grains, and healthy proteins support liver function.

Reducing Saturated Fats and Sugars: Excessive consumption of these can exacerbate fatty liver disease and further damage the liver.

● The Importance of Regular Exercise

Regular exercise improves liver function, boosts the immune system, and helps manage weight, all of which are crucial in slowing the progression of hepatitis B:

Strengthening the Immune System: Exercise helps the body's immune system combat the hepatitis virus.

Reducing the Risk of Fatty Liver: Exercise aids in weight management and reduces fat accumulation in the liver.

Improving Liver Function and Circulation: Physical activities enhance blood circulation and facilitate better liver detoxification.

Types of Suitable Exercises

Walking: A simple and effective way to improve cardiovascular health and aid weight loss.

Cycling: Low-impact and great for muscle strengthening and overall fitness.

Swimming: A low-impact exercise beneficial for individuals with hepatitis.

Yoga and Meditation: Helps reduce stress and improve mental and physical balance.

Safety Tips for Exercising

Gradual Start: Exercise should be introduced gradually to avoid placing additional stress on the liver.

Avoiding Strenuous Activities: Intense exercises may strain the liver and should be performed with caution.

Psychological Benefits of Exercise

Reducing Anxiety and Depression: Exercise releases endorphins, improving mood and preventing symptoms of depression and anxiety.

Boosting Self-Confidence: Regular exercise helps maintain physical fitness and overall health, contributing to greater self-esteem.



The image illustrates healthy lifestyle changes for managing hepatitis B. It features activities such as avoiding alcohol, maintaining a healthy diet (including fruits, vegetables, and whole grains), and engaging in exercises like walking, cycling, swimming, and yoga. Additionally, it highlights the psychological benefits of these activities, including stress reduction and increased self-confidence.

- **Avoiding Harmful Medications**

Consulting a Doctor: Always consult a doctor before taking any medication, as some drugs can harm the liver.

- **Vaccination and Prevention**

Vaccinating Family Members: Vaccination of family members and close contacts can help prevent the transmission of the virus.

Avoiding Risky Behaviors: Using personal items and practicing safe sex with protection can help reduce the risk of transmission.

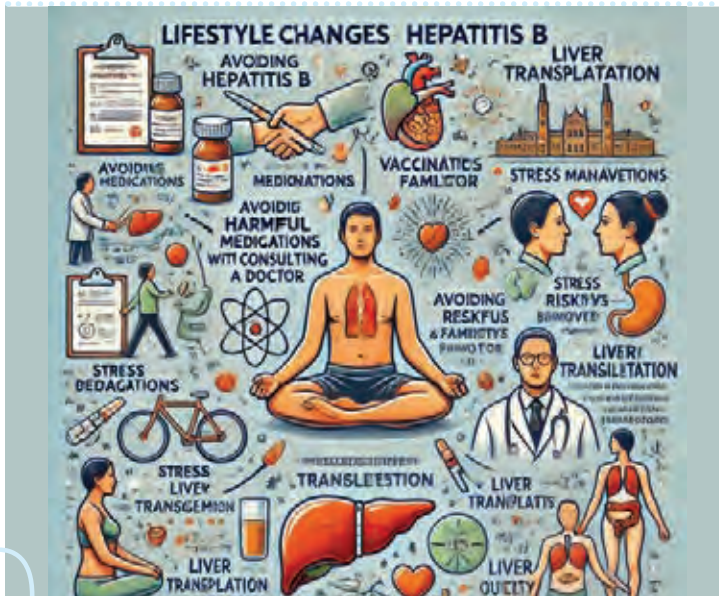
- **Stress Management**

Reducing Stress: Chronic stress can negatively impact overall health and the immune system. Relaxation techniques like yoga and meditation are beneficial.

Psychological Support: Receiving support from counseling services and support groups can aid in better disease management.

- **Regular Medical Follow-Ups**

Regular Check-Ups: Patients should undergo regular medical examinations and periodic tests to monitor the progression of the disease.



Lifestyle changes for managing hepatitis B are emphasized, including avoiding harmful medications without consulting a doctor, vaccinating family members, avoiding risky behaviors, managing stress through yoga and meditation, and maintaining regular medical follow-ups to monitor the disease. In advanced cases where the disease progresses to cirrhosis or liver failure, liver transplantation is considered the last resort. By following these recommendations, patients can prevent disease progression and improve their quality of life.

● **Conclusion**

The treatment of hepatitis B infection aims to reduce viral load, prevent liver damage, and lower the risk of serious complications. The selection of appropriate treatment should be made by a physician based on the patient’s specific condition and may include antiviral drugs, interferons, and, in severe cases, liver transplantation. This field of treatment is rapidly evolving, with at least six drugs introduced to the market over the past 15 years and around ten more currently under investigation.

The use of medications may be associated with side effects, and the development of drug resistance is also a possibility. In some cases, antiviral treatment is necessary, while in others, managing the condition without antiviral drugs through hygiene, dietary adjustments, and controlling obesity and diabetes is essential.

Given the low likelihood of eradicating the hepatitis B virus, affected individuals should be prepared for long-term follow-up, potentially for the rest of their lives.

● **The Role of Liver Transplantation in Advanced Hepatitis B**

Liver transplantation is a critical and life-saving treatment for patients in advanced stages of hepatitis B who have developed liver cirrhosis or severe

liver failure. When the liver can no longer perform its vital functions and complications such as liver failure or liver cancer arise, liver transplantation becomes the final treatment option. Hepatitis B, particularly when it leads to cirrhosis or hepatocellular carcinoma (liver cancer), is one of the primary reasons for requiring a liver transplant.

In this procedure, the damaged liver is replaced with a healthy liver from a donor (usually brain-dead). Liver transplantation can save the patient's life and restore normal liver function. However, this treatment requires careful follow-ups and supportive therapies post-transplant.

● Preparation for Liver Transplantation

Preparing for a liver transplant involves a meticulous and step-by-step process, including evaluating the patient's physical condition, assessing the severity of liver failure, and ensuring both physical and psychological readiness for surgery. During this process, physicians:

- Conduct thorough examinations of the patient's overall health and the progression of liver disease.
- Evaluate the patient's heart, lungs, and other vital organs to determine if they can withstand the transplant procedure.
- Perform blood tests to check blood type, hepatitis B viral load, and other related factors.
- Provide psychological preparation, as liver transplantation is a stressful and critical phase requiring family support and counseling.

After these evaluations, the patient is placed on the liver transplant waiting list, awaiting a suitable donor. The waiting time depends on the patient's condition and the availability of a compatible donor.

● Post-Transplant Follow-Up

After the liver transplant, post-operative care and follow-ups are crucial. These include:

●● Antiviral Therapy

Since the hepatitis B virus can reactivate post-transplant, patients must continue regular antiviral treatments. Medications like tenofovir and entecavir are essential to prevent viral recurrence after the transplant.

●● Immunosuppressive Drugs

Post-transplant, the body may recognize the new liver as foreign and attack it. To prevent organ rejection, patients must take immunosuppressive drugs.

●● Regular Medical Check-Ups

Patients need regular medical follow-ups to monitor the performance of the new liver and overall health. These follow-ups include blood tests, ultrasounds, and other diagnostic procedures.

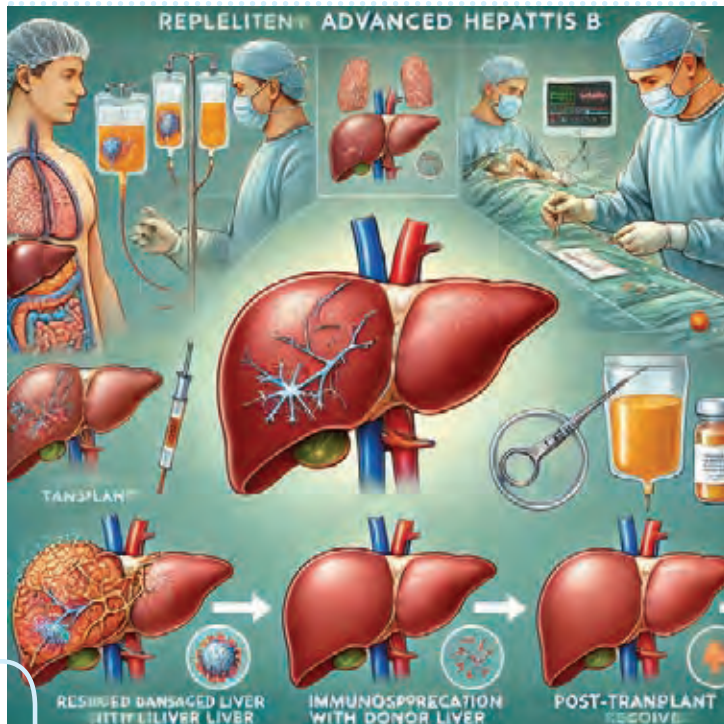
●● Healthy Lifestyle

Patients must adopt a healthy lifestyle post-transplant. This includes a proper diet, regular exercise, and avoiding alcohol and liver-damaging drugs. Additionally, meticulous hygiene and infection prevention are vital.

● Life After Liver Transplantation

A liver transplant can help patients return to normal life, but it requires ongoing care and commitment to maintaining the health of the new liver. Patients can usually resume daily activities after a recovery period, but they must remain under medical supervision and take their prescribed medications regularly. The quality of life after transplantation depends significantly on the patient's adherence to post-operative follow-ups and lifestyle changes.

Liver transplantation, although a complex procedure, offers a significant ray of hope for patients struggling with advanced liver problems. This treatment not only assists patients suffering from severe complications of hepatitis B but also greatly enhances their quality of life.



This image depicts the stages of liver transplantation for patients with advanced hepatitis B who require a liver transplant. Liver transplantation involves replacing the damaged liver with a healthy one from a donor. This life-saving procedure is used for patients suffering from severe liver failure or cirrhosis, especially in cases where hepatitis B has progressed to liver cancer or cirrhosis. Post-transplant, patients require specialized care and the use of immunosuppressive medications to prevent organ rejection.

HEPATITIS B



Chapter 9

Latest Research and Advances in Hepatitis B



● Recent Scientific Research and Novel Treatments

In recent years, significant advancements have been made in the research and treatment of hepatitis B. Researchers are striving to develop more effective treatments and even eradicate the disease using cutting-edge technologies and genetic approaches. Some of the latest scientific achievements include:

●● Targeted Molecular Therapies

Recent studies have demonstrated that antiviral drugs such as tenofovir and entecavir remain effective first-line treatments for chronic hepatitis B. However, new advancements in nucleotide and nucleoside analogs aim to achieve better viral replication control. The goal is to suppress the hepatitis B virus and reduce its viral load to a level that prevents liver damage.

●● Genetic Research

The use of CRISPR technology for genetic editing of viruses in the body is one of the most promising therapeutic approaches. This technique has the potential to edit the virus's genes and eventually eradicate it.

●● New Immunoglobulins and Vaccines

In addition to existing vaccines, new research is focused on developing more advanced and effective vaccines for individuals who have not yet been exposed to the virus. Studies also show that specific immunoglobulins can help prevent the recurrence of the virus following liver transplantation.

●● Combination Therapies

The use of combination therapies involving antiviral drugs alongside immune system boosters is another area being explored in recent research. These approaches aim not only to reduce viral levels but also to prevent disease progression to cirrhosis and liver cancer.

● Future Advances in Treatment and Prevention

In the future, advancements in gene editing and gene therapy-based treatments may lead to the complete eradication of hepatitis B. Current research on molecules capable of degrading the virus's RNA could lead to the development of new therapies with the ability to entirely eliminate the virus from the body.

A long-term goal is to leverage advancements in genetic engineering and biotechnology to design personalized treatments tailored to individual patients. These methods aim to eliminate the hepatitis B virus from the body completely.

● Hope for New Therapeutic Approaches to Eradicate the Disease

While current treatments primarily focus on controlling the virus and preventing its progression, researchers are working to develop therapies capable of completely eradicating the virus. One promising avenue is cell therapy, which aims to enhance the immune system's natural responses to the virus, enabling the body to combat the infection independently.

HEPATITIS B



Chapter 10

Living with Hepatitis B and Final Message

● Psychological and Social Challenges of Patients

Living with hepatitis B is not limited to the physical aspects of the disease; patients face numerous psychological and social challenges. One of the most significant challenges is stigma and social discrimination. Due to insufficient awareness about hepatitis B, patients often encounter unfounded fears and concerns about virus transmission from society. These attitudes can lead to social isolation and feelings of shame in patients.

● Coping with Discrimination and Stigma

To mitigate the negative effects of such discrimination, raising public awareness and providing accurate information about the transmission and non-transmission methods of the virus are crucial. Patients can also benefit from family support and professional counseling to boost their self-confidence and acceptance of their condition.

● The Role of Family and Social Support in Improving Quality of Life

The role of family in supporting individuals with hepatitis B is invaluable. Emotional and psychological support from family members can significantly reduce stress and anxiety in patients. Family members should be well-informed about the real risks of the disease and maintain empathy and support to strengthen relationships and prevent the patient's isolation.

In addition to family, social support and the establishment of counseling and support groups can play a key role in improving patients' psychological and social well-being. These networks allow patients to connect with others who have similar experiences, providing a valuable source of information, advice, and support.

● The Importance of Support Networks and Counseling Groups

Social support networks and counseling groups for individuals with hepatitis B can provide a safe and supportive environment. These groups facilitate information exchange, offer opportunities to share feelings and experiences, and provide professional advice, ultimately improving the psychological and social quality of life for patients.

● Dr. Seyed Moayed Alavian's Contributions to Hepatitis B Research and Management

Dr. Seyed Moayed Alavian has played a pivotal role in advancing the treatment and management of hepatitis B in Iran. In 1994, Dr. Alavian established the first hepatitis clinic at the Iranian Blood Transfusion Organization, taking the first systematic steps toward combating this disease. These specialized clinics became central facilities for treating hepatitis patients and significantly contributed to providing therapeutic services.

One of Dr. Alavian's notable achievements is the establishment of the Iranian Hepatitis Network. This national network has fostered collaboration among treatment and research centers, enhancing therapeutic services and raising public awareness about hepatitis B. Specialized hepatitis centers under this network provide state-of-the-art treatment to patients.

Dr. Alavian's efforts in public education and the publication of scientific articles have raised awareness within the medical community and the general public about this disease. These actions have significantly reduced new cases of hepatitis B and improved the quality of life for affected individuals in Iran.

Dr. Alavian's experiences and initiatives have set standards for hepatitis B treatment in Iran and continue to serve as a model for other medical centers in the country and the region.

● **Final Message and Social Responsibility**

Living with hepatitis B is a continuous challenge, but with proper hygiene and management, patients can lead healthy and long lives. One of the significant responsibilities of every individual is to prevent the spread of viral diseases like hepatitis B.

● **Individual and Collective Roles in Combating the Spread of the Disease**

Prevention through vaccination, the most effective method for stopping the spread of hepatitis B, should be promoted. Educating the public about virus transmission and reducing stigma around this disease are particularly important. Everyone must actively participate in combating the spread of infectious diseases like hepatitis B by adhering to personal and public health principles.

● **Encouraging Participation in Community Education and Awareness**

Raising public awareness is one of the most effective ways to prevent and combat viral diseases. Organizations, healthcare institutions, and individuals should work to promote awareness and education about hepatitis B and its prevention methods. These educational efforts can be delivered through media, schools, and workshops to enhance understanding and prevent disease spread.

Ultimately, the social responsibility of every individual and organization in improving public health not only aids in preventing viral diseases but also contributes to creating a healthy and safe society.



Sources and References

This book has been developed using a combination of verified scientific resources, expert insights, and educational content generated through the ChatGPT AI platform. Below is a breakdown of the references and sources used:

Primary Medical and Scientific Sources

1. World Health Organization (WHO): Reports and guidelines on hepatitis B prevention, treatment, and management.
WHO Hepatitis B Factsheet

2. Centers for Disease Control and Prevention (CDC): Comprehensive data on hepatitis B, including vaccination schedules and transmission methods.
CDC Hepatitis B Information

3. National Institutes of Health (NIH): Research articles and updates on the latest advances in hepatitis B treatment and prevention.
NIH Hepatitis B Research

4. PubMed and Scientific Journals: Peer-reviewed articles on hepatitis B management, antiviral medications, and vaccine efficacy.

Contributions by Experts

Dr. Seyed Moayed Alavian: Prominent Iranian expert in hepatology whose work has significantly contributed to the treatment and awareness of hepatitis B in Iran. Publications and efforts in patient care and community education were used as a reference for related sections.

Text and Visual Contributions

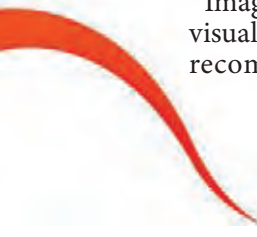
Text Generated by ChatGPT:

All chapters and summaries were developed using the ChatGPT AI platform, which integrated up-to-date medical knowledge with a user-friendly writing style.

The content adheres to the latest clinical guidelines and research findings available up to 2023.

Illustrations and Visualizations:

Imagery created with OpenAI's DALL·E 2 platform to support educational visuals, such as the mechanisms of hepatitis B, liver function, and lifestyle recommendations.



Additional Educational Content

1. Patient Support Organizations: Material from patient advocacy and support organizations like the Hepatitis B Foundation.

2. Books and Textbooks on Hepatology:

“Hepatology: A Textbook of Liver Disease” by Zakim and Boyer.

“Liver Disease: Diagnosis and Management” by Sherlock and Dooley.

Acknowledgment of AI and Visual Tools

This book incorporates modern tools such as ChatGPT for content creation and DALL·E for imagery. These tools facilitated the creation of clear, concise educational materials while maintaining accuracy and consistency across all chapters.





Seyed Moayed Alavian, MD

Professor of Gastroenterology and Hepatology

President of the Iranian Association for the Study of Liver Diseases
Director of the Middle East Liver Disease Center, Tehran, Iran
Founder of Hepatitis Monthly Journal

Dr. Seyed Moayed Alavian is a globally recognized expert in liver diseases, renowned across Iran, the Middle East, and internationally. He has established multiple medical centers, founded the Tehran Hepatitis Conferences, and chaired 10 international conferences.

With over 600 PubMed and ISI-indexed articles, more than 50,000 citations, and an H-Index of 75, Dr. Alavian is a prolific researcher. He graduated in medicine and internal medicine from Tehran University of Medical Sciences, ranking second in the national subspecialty board exam. In 1996, he founded Iran's first Hepatitis Clinic and co-founded a charity supporting liver disease patients.

Dr. Alavian has authored over 850 papers and 75 books, focusing on viral hepatitis, public health policies, and clinical trials for emerging hepatitis drugs. He has treated over 18,000 specialized hepatitis C patients and led the Tehran International Hepatitis Conferences for 15 years.

He founded Hepatitis Monthly in 2006, which was indexed in ISI in 2007. In 2015, he was recognized by the Academy of Sciences as the Top Scientist of the Decade in hepatitis research and received the Fereydoon Azizi Award.

Currently, Dr. Alavian serves as the President of the Iranian Association for the Study of Liver Diseases