

### A Pre-Test Questionnaire (HBV Infection Case Example)

1. Which of the following descriptions of the complete hepatitis B virus (HBV) particle is correct?

- A. Small spherical particle, 22 nm in diameter
- B. Tubular particle, 22 nm in diameter
- C. Dane particle, 42 nm in diameter, with a double-layered capsid
- D. Core particle, 27 nm in diameter
- E. Filamentous particle, 20 nm in diameter

2. HBV belongs to which of the following?

- A. Single-stranded positive-sense RNA virus
- B. Single-stranded negative-sense RNA virus
- C. Double-stranded RNA virus
- D. Double-stranded circular DNA virus with a reverse transcription process
- E. Single-stranded DNA virus

3. Regarding the description of the HBV genome structure and function, which is incorrect?

- A. Composed of partially double-stranded circular DNA
- B. The S region encodes HBsAg
- C. The C region encodes HBcAg and HBeAg
- D. The X region encodes the X protein, which is associated with liver cancer development
- E. The HBV genome does not contain a P region

4. A positive HBeAg indicates that

- A. HBV infection has entered the recovery phase
- B. Active HBV replicates in the body, with high infectivity
- C. The body has produced protective immunity
- D. The virus has been cleared
- E. The vaccination has been successful

5. Which antibody is protective and can resist HBV reinfection?

- A. Anti-HBc
- B. Anti-HBe
- C. Anti-HBs
- D. Anti-HBc IgM
- E. Anti-PreS2

**6.** The primary transmission route for HBV is

- A. Fecal-oral transmission
- B. Respiratory transmission
- C. Blood, blood products, and mother-to-child transmission
- D. Mosquito bites
- E. Daily contact

**7.** The main component of the hepatitis B vaccine is

- A. Inactivated whole virus particles
- B. Live attenuated virus
- C. HBsAg
- D. HBcAg
- E. HBeAg

**8.** Regarding the resistance of HBV, which of the following descriptions is incorrect?

- A. Strong resistance to physical and chemical factors
- B. 70% ethanol can effectively inactivate HBV
- C. Heating at 100°C for 10 minutes can inactivate it
- D. Autoclaving at 121°C can inactivate it
- E. 0.5% peracetic acid can render it non-infectious

**9.** Which serological marker indicates active HBV replication and infectivity?

- A. HBsAg positive
- B. Anti-HBs positive
- C. Anti-HBc positive
- D. HBeAg positive
- E. Anti-HBe positive

**10.** Regarding the pathogenic mechanism of HBV, which of the following is correct?

- A. HBV directly destroys hepatocytes leading to liver damage
- B. Liver cell damage is mainly caused by CTL-mediated immunopathological reactions
- C. HBV infection does not become chronic
- D. HBV infection is unrelated to liver cancer
- E. HBV does not cause extrahepatic symptoms

### **A Post-Test Questionnaire (HBV Infection Case Example)**

- 1. Which of the following statements about HBV cccDNA (covalently closed circular DNA) is correct?**
  - A. cccDNA exists only during the acute infection phase and is cleared during the chronic phase
  - B. cccDNA is the original template for viral replication, has a long half-life, and is difficult to completely eliminate from infected cells
  - C. cccDNA is directly synthesized by the protein encoded by the viral P region without requiring host cell participation
  - D. cccDNA is mainly found in the cytoplasm and is a primary target for antiviral therapy
  - E. Nucleoside analogs can directly eliminate cccDNA
- 2. Which of the following descriptions of occult HBV infection is correct?**
  - A. Serum HBsAg positive, HBV DNA negative
  - B. Serum HBsAg negative, but HBV DNA can be detected in liver tissue or serum
  - C. Serum anti-HBs positive indicates the virus has been completely cleared
  - D. Occult infection is not infectious
  - E. Occult infection is only seen during the recovery phase of acute infection
- 3. A patient with chronic hepatitis B received entecavir treatment for 2 years. Serum HBV DNA is below the lower detection limit, but HBeAg remains positive. This result most likely suggests that**
  - A. HBeAg seroconversion has occurred
  - B. The virus has been completely cleared and is no longer infectious
  - C. Viral replication is suppressed, but seroconversion has not occurred; treatment needs to be continued
  - D. The treatment is ineffective; the medication should be changed
  - E. The condition has progressed to cirrhosis
- 4. Regarding the biological significance of HBV DNA integration into the host genome, which of the following statements is incorrect?**
  - A. Integration is a necessary step in the HBV replication cycle
  - B. Integration is closely related to the development of HCC
  - C. Integration events can occur early in HBV infection
  - D. Integration may be mediated by the HBx protein
  - E. Integrated viral sequences may lead to the activation of host proto-oncogenes
- 5. A 30-year-old male patient has HBV serological test results: HBsAg (+), HBeAg (+), anti-HBc IgM (+), anti-HBs (-), anti-HBe (-). This result most likely suggests**

A. Chronic HBV carrier, low infectivity

B. Early acute HBV infection, active viral replication, high infectivity

C. Recovery phase of HBV infection with established immunity

D. Past infection, resolved

E. Normal response after vaccination

**6.** Regarding the natural history stages of HBV infection, which of the following descriptions is correct?

A. Immune tolerance stage: HBeAg positive, high level of HBV DNA, normal ALT, no significant liver inflammation

B. Immune clearance stage: HBeAg positive, low level of HBV DNA, normal ALT

C. Inactive HBsAg carrier stage: HBeAg positive, HBV DNA undetectable

D. Reactivation stage: HBeAg negative, anti-HBe positive, persistently normal ALT

E. Sequential progression through all four stages in all individuals with chronic HBV infection

**7.** Regarding the relationship between HBV and liver cancer, which of the following statements is incorrect?

A. Chronic HBV infection is a major risk factor for hepatocellular carcinoma

B. Integration of HBV DNA into the host genome is a possible mechanism for liver cancer development

C. The HBx protein has transactivating activity and can activate oncogene expression

D. All individuals with chronic HBV infection will eventually develop liver cancer

E. Cirrhosis is a precancerous lesion for HBV-related liver cancer

**8.** Which of the following statements about the relationship between HDV and HBV is correct?

A. HDV is a complete RNA virus that can replicate independently without HBV assistance.

B. HDV infection absolutely requires HBsAg provided by HBV for assembly and spread as an envelope protein

C. HDV infection can suppress HBV replication, so co-infection always leads to less severe liver disease

D. The satellite virus nature of HDV means it does not cause severe liver disease

E. HDV can only co-infect simultaneously with HBV; super-infection does not occur

**9.** Which of the following statements about HBeAg is incorrect?

A. It is co-encoded by the Pre-C region and the C region of the C gene

B. It is a soluble non-structural protein

C. A positive serum HBeAg indicates active viral replication and high infectivity

D. HBeAg is present on the outermost layer of the Dane particle

E. Infants born to HBeAg-positive mothers are prone to becoming chronic carriers

**10.** A patient with chronic hepatitis B received antiviral therapy for 6 months. Serological test results show:

HBsAg (+), HBeAg (-), anti-HBe (+), HBV DNA below the lower detection limit. The best interpretation of this result is that

- A. The treatment is ineffective; the virus is still actively replicating
- B. HBeAg seroconversion has occurred; viral replication is suppressed
- C. The condition has progressed to cirrhosis
- D. The virus has been completely cleared
- E. Co-infection with HDV has occurred

### **Reliability and Validity Results**

The Cronbach's  $\alpha$  coefficients for internal consistency reliability of the pre-class and post-class test items were 0.87 and 0.89, respectively, indicating excellent internal consistency (threshold:  $\alpha \geq 0.8$ ).

The split-half reliability coefficients, corrected by the Spearman–Brown formula, were 0.81 (pre-class) and 0.83 (post-class), respectively, both exceeding the acceptable threshold of 0.7.

The item homogeneity correlation coefficients ranged from 0.57 to 0.73 for the pre-class, and from 0.62 to 0.78 for the post-class, both indicating satisfactory scale homogeneity.

The content validity indices (S-CVI) were 0.95 (pre-class) and 0.96 (post-class), respectively, both exceeding the acceptable threshold of 0.78.

The construct validity KMO values were 0.82 (pre-class) and 0.85 (post-class), respectively, both  $P < 0.001$  from Bartlett's test of sphericity. The construct validity KMO values were 0.82 (pre-class) and 0.85 (post-class), respectively, with both Bartlett's tests of sphericity yielding  $P < 0.001$ .

The criterion-related validity Pearson correlation coefficients were 0.82 (pre-class) and 0.85 (post-class), respectively, both indicating strong positive correlations.

Collectively, all reliability and validity indicators of this set of HBV test items met the required psychometric standards.