

**National**  
**Viral Hepatitis**  
Prevention Conference



**Washington, D.C.**  
**December 5-9, 2005**

# **Advanced Viral Hepatitis Serology Workshop**

**National Viral Hepatitis Prevention Conference  
Washington DC  
December 8, 2005**

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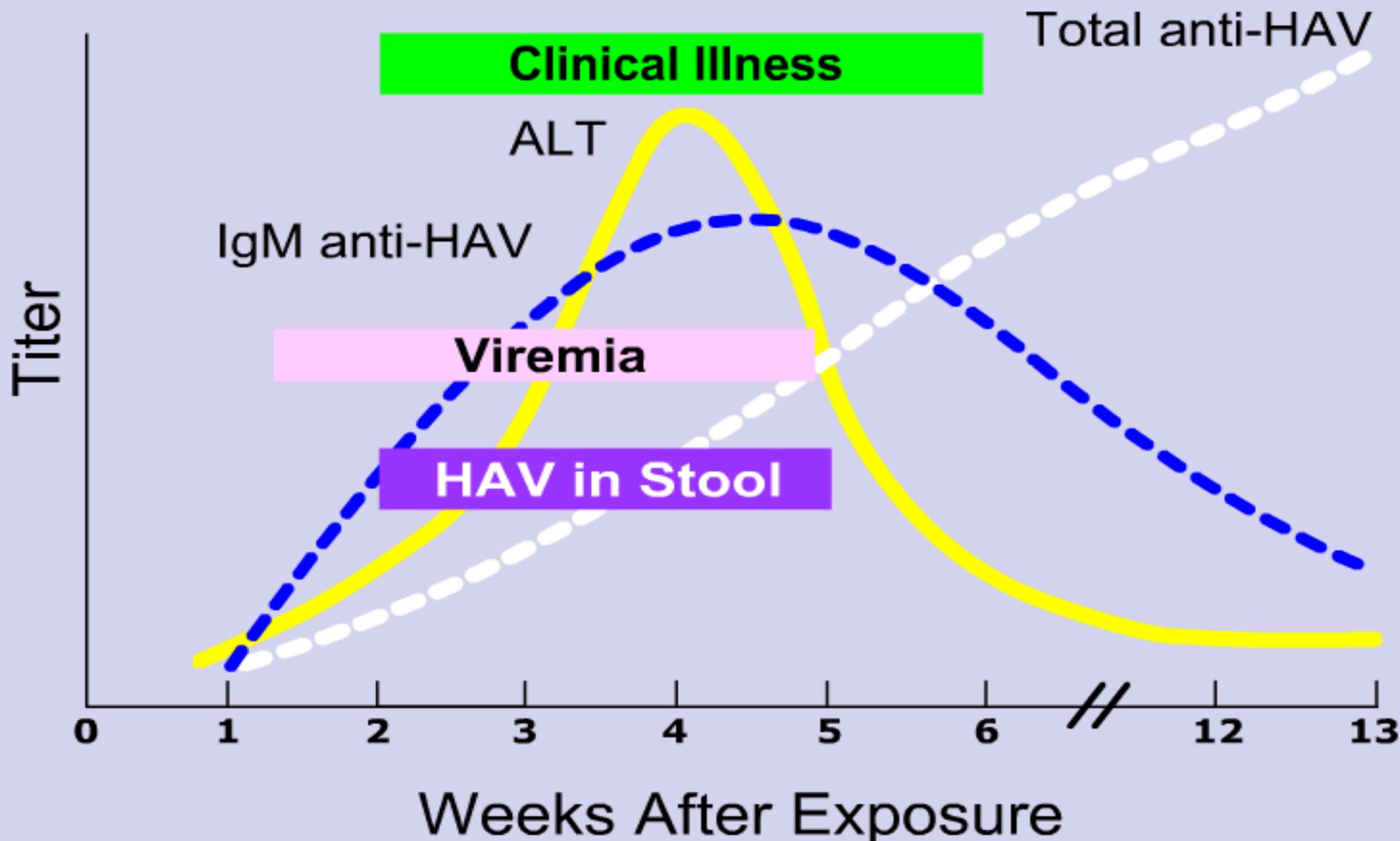
# Agenda

- Serology Overview
- Case Study Exercises
- Let's go Fishing

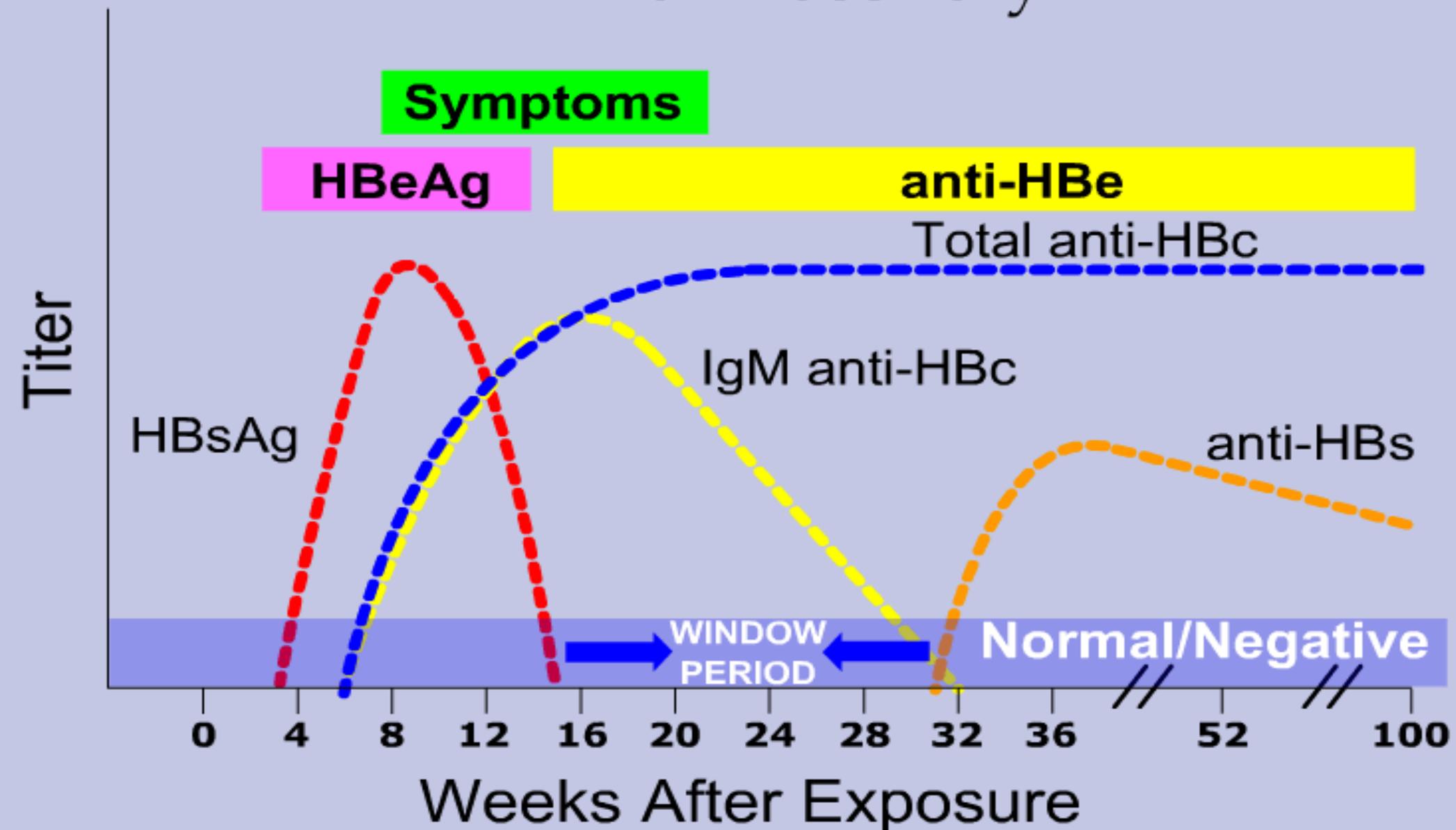


# Events in Hepatitis A Virus Infection

## Typical Serologic Course

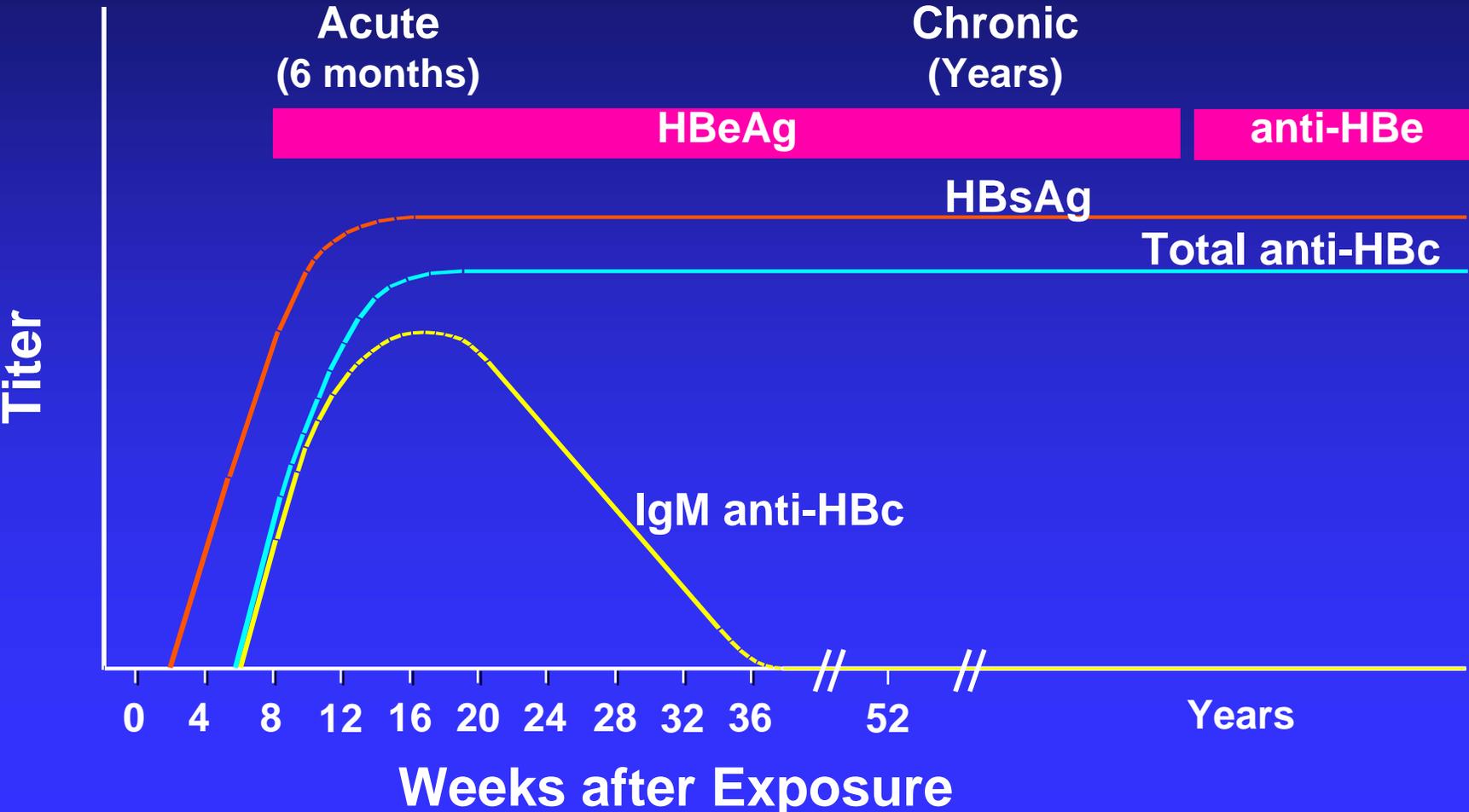


# Acute Hepatitis B Virus Infection with Recovery

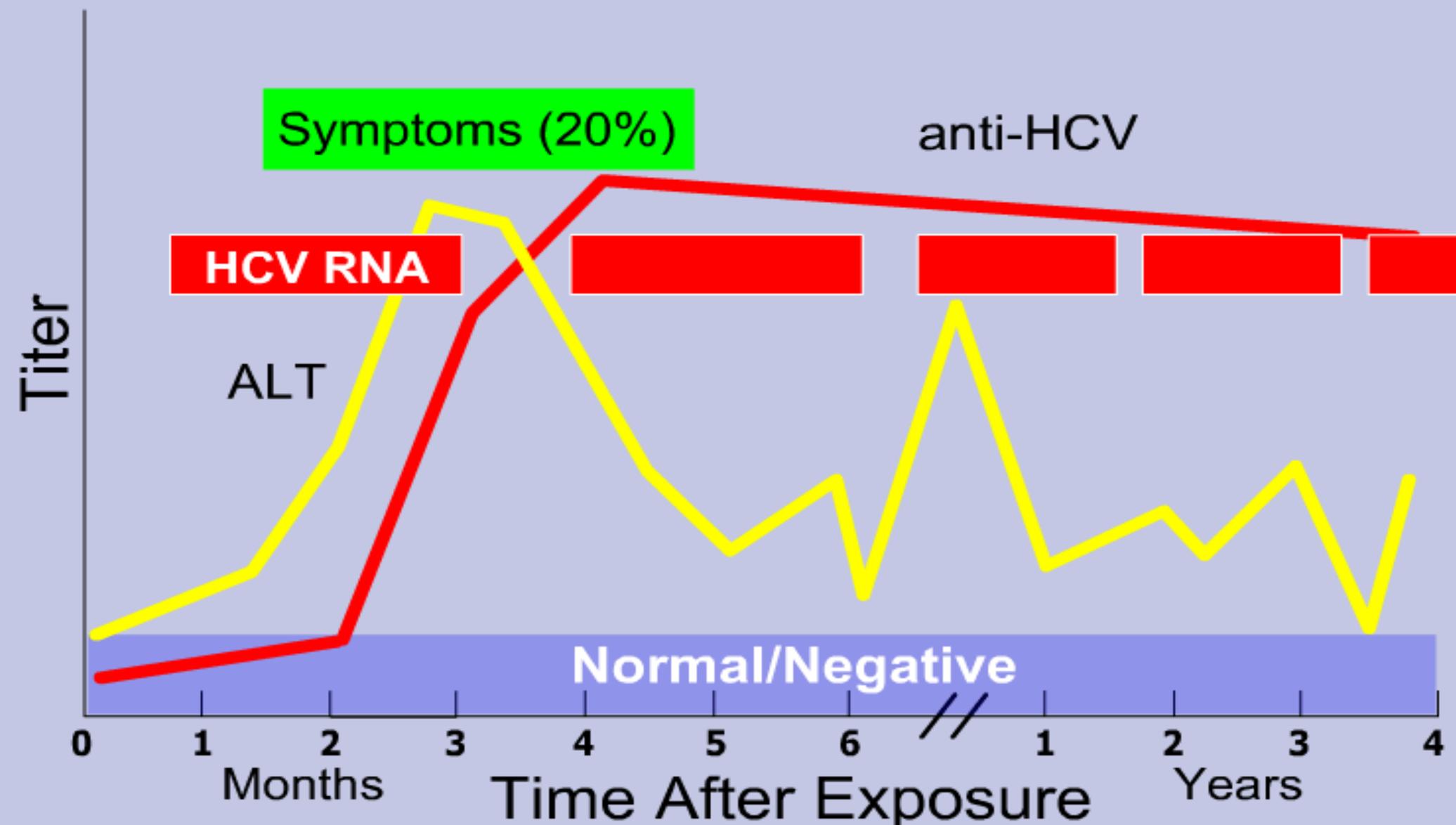


# Progression to Chronic Hepatitis B Virus Infection

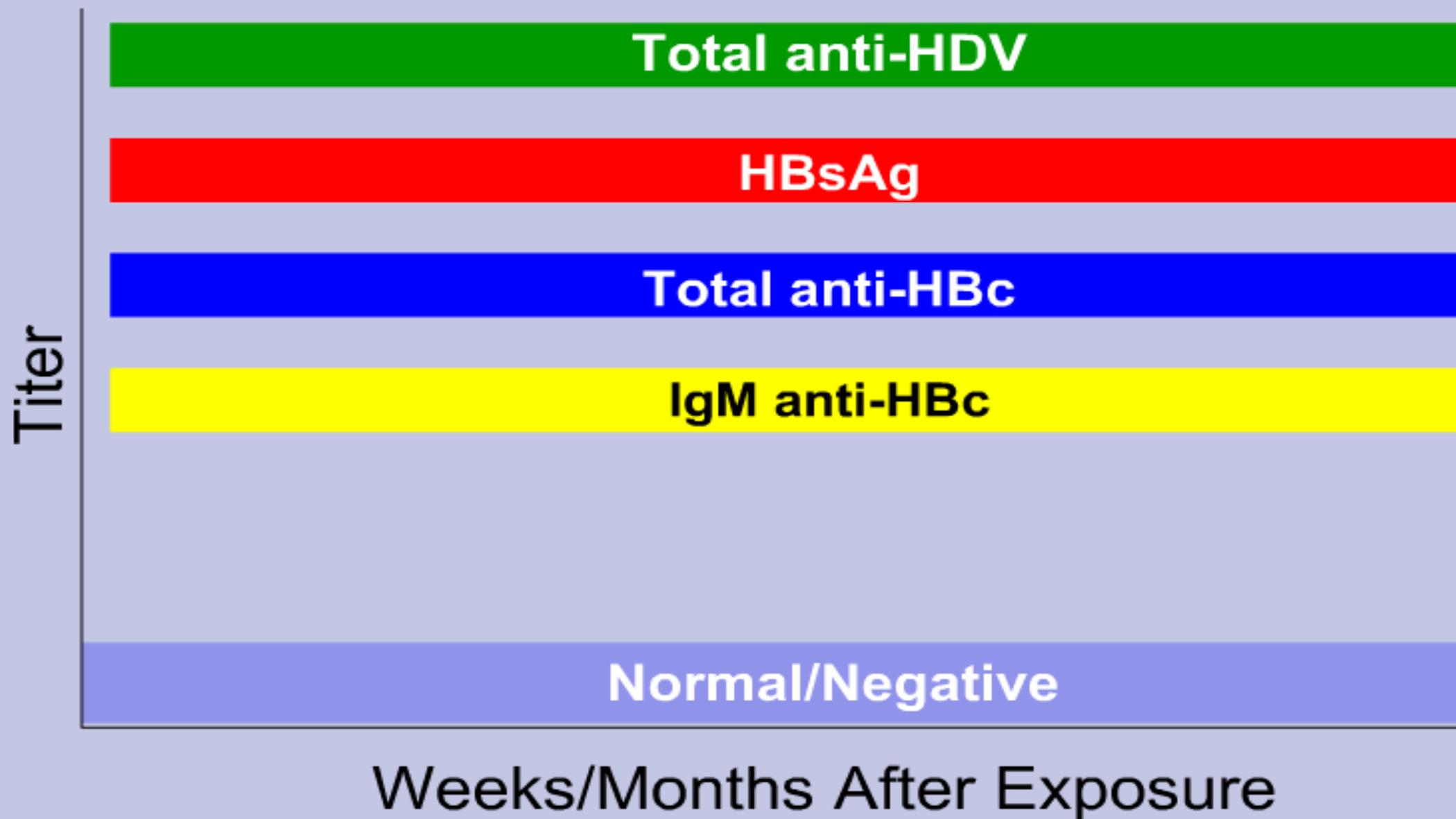
## Typical Serologic Course



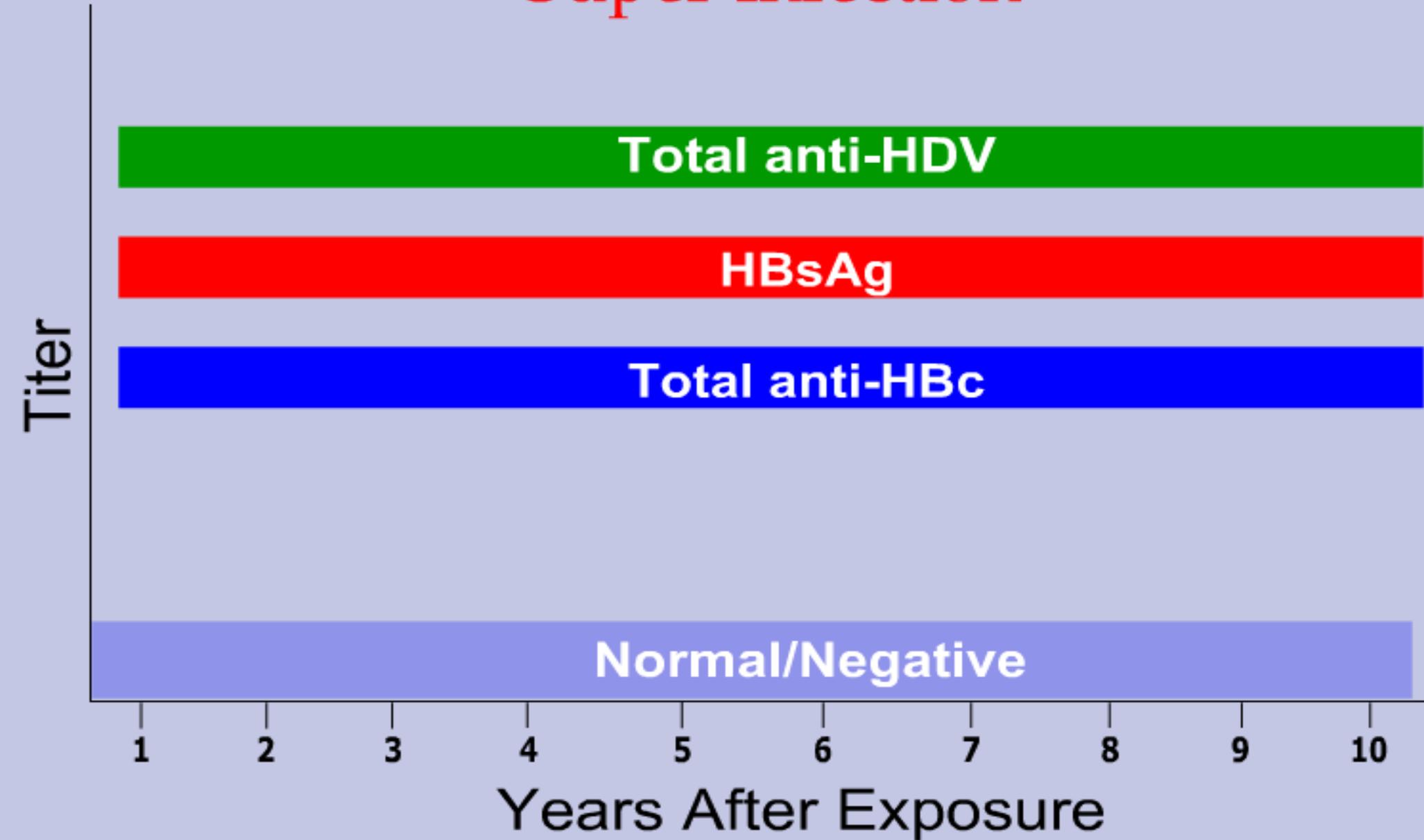
# Acute HCV Progressing to Chronic HCV Infection



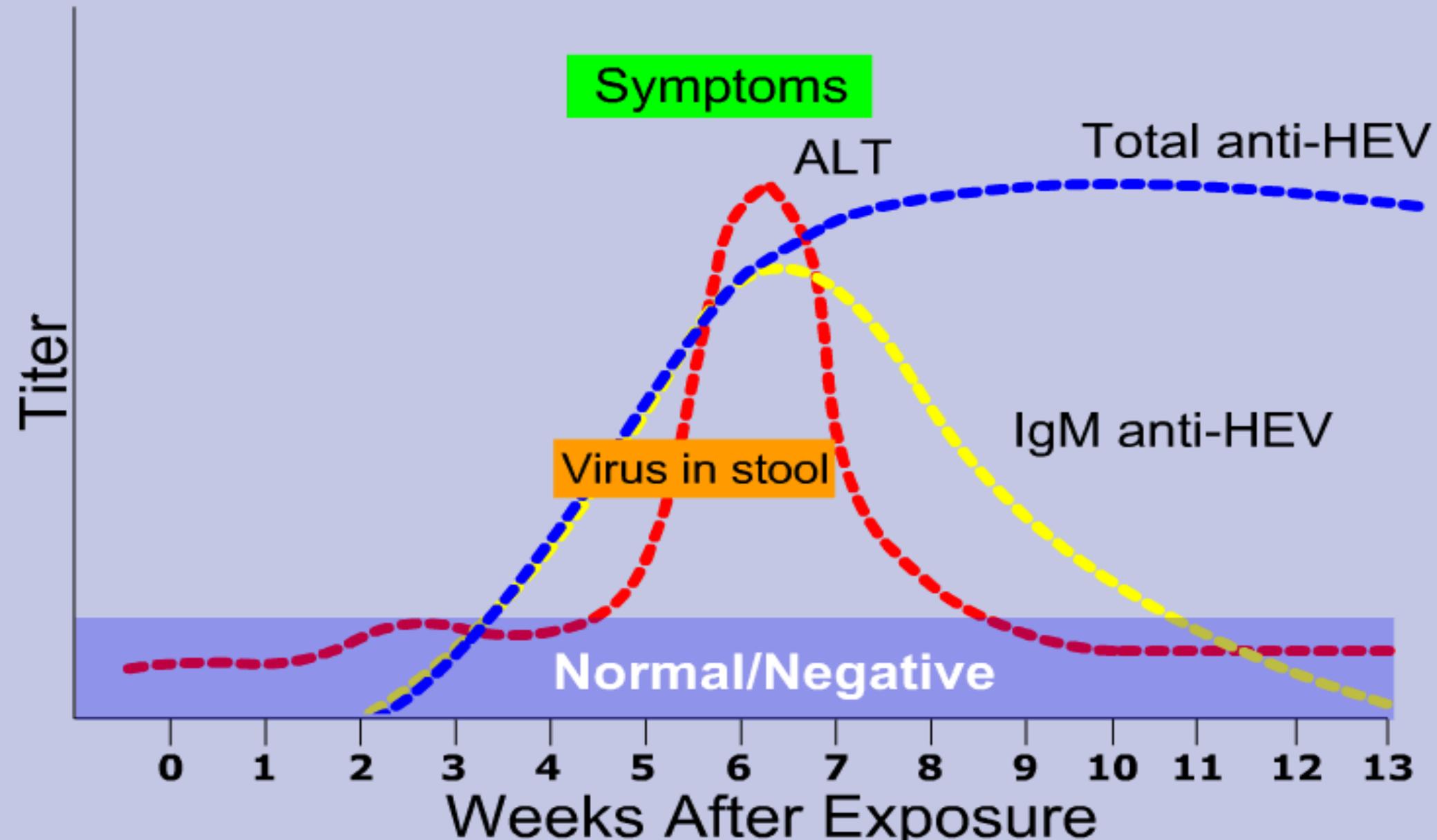
# HBV-HDV Infection Co-Infection



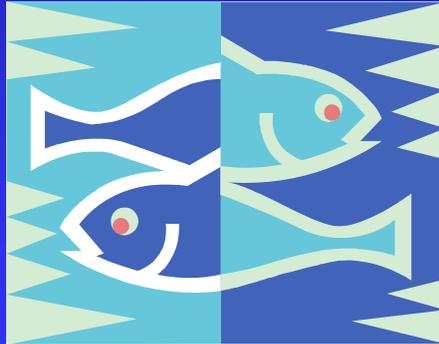
# HBV-HDV Infection Super Infection



# Hepatitis E Virus Infection



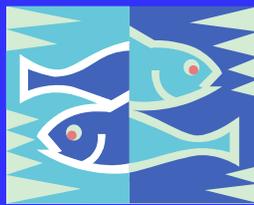
# Case Study 1



**A 32 year old white female has been an injection drug user for many years. She is now pregnant and is seeing her obstetrician for her first prenatal visit. She has no history of hepatitis A or hepatitis B vaccination.**

**Considering her history, what viral hepatitis serologic tests would be appropriate to order?**

**HBsAg  
Total anti-HBc  
Total anti-HAV  
Anti-HCV**



**The results showed:**

**HBsAg - negative**

**Total anti-HBc - positive**

**Total anti-HAV - negative**

**EIA anti-HCV- positive**

**RIBA - positive**

**What do these serologic results indicate?**

**Probable chronic HCV infection  
and history of HBV infection**

**HBsAg - negative**  
**Total anti-HBc - positive**  
**Total anti-HAV - negative**  
**EIA anti-HCV- positive**  
**RIBA- positive**

**What about her hepatitis A status?**

**She is susceptible to HAV infection. Hepatitis A  
vaccination is recommended as  
she is an IDU**

**Is her case reportable to the HD?**

**Yes**

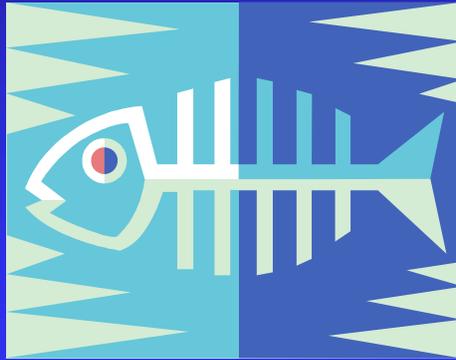
**Another pregnant woman was found to be HBsAg-positive in her first trimester. Referral to a specialist found that she was chronically infected with HBV.**

**In doing the medical evaluation of this patient, an HBV DNA was done. The HBV DNA result was reported as negative. Her HBsAg result was still positive.**

**Since the HBV DNA is negative, does the newborn need to receive HBIG in addition to a birth dose of hepatitis vaccine?**

**Yes, all infants born to HBsAg-positive women, irrespective of their HBV DNA status, should receive postexposure prophylaxis with both HBIG and the first dose of hepatitis B vaccine.**

# Case Study 2



**A 27 year old woman presented to the ER with a 4-5 day history of malaise, fatigue, low-grade fever and nausea. Yesterday, she noted that her urine was very dark. She is sexually active and had injected street drugs in college.**

**What serologic tests would you consider appropriate for an acute viral hepatitis panel?**

**HBsAg**

**IgM anti-HBc**

**IgM anti-HAV**

**EIA anti-HCV**

## The results were as follows:

<b>HBsAg</b>	<b>positive</b>
<b>IgM anti-HBc</b>	<b>positive</b>
<b>IgM anti-HAV</b>	<b>negative</b>
<b>EIA anti-HCV</b>	<b>positive</b>

<b>HBsAg</b>	<b>positive</b>
<b>IgM anti-HBc</b>	<b>positive</b>
<b>IgM anti-HAV</b>	<b>negative</b>
<b>EIA anti-HCV</b>	<b>positive</b>

**Based on these serologic findings, what is her diagnosis?**

**Acute hepatitis B, possible HCV infection**

**What is the next step regarding the initial positive EIA anti-HCV result?**

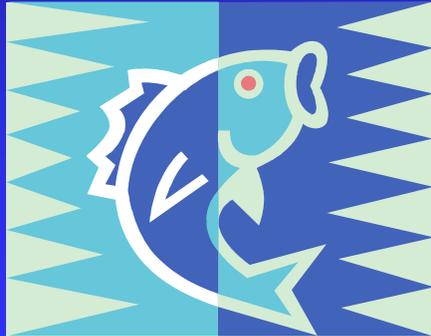
**A supplemental assay, such as a recombinant immunoblot assay (RIBA) or a nucleic acid test (NAT) for HCV RNA should be done.**

**HCV RNA was done and was reported as negative.**

**What does this mean?**

**Unclear. One negative HCV RNA is not adequate. She should have another HCV RNA done in a few months to better ascertain whether she has chronic hepatitis C. Her physician will also need to do follow-up HBsAg testing to be sure that she doesn't remain chronically infected with HBV.**

# Case Study 3



**Jim recently gave blood at a company blood drive. Two weeks later he received a letter from the blood bank that stated he was anti-HCV- positive and should contact his health professional. He immediately called his physician and had blood work that showed the following:**

**HBsAg – negative**

**anti-HBc – negative**

**EIA anti-HCV- positive**

**RIBA - indeterminate**

**What should be done next?**

**Additional laboratory evaluation (e.g., HCV RNA, ALT)**

**His HCV RNA was negative,  
his ALT was 150 (ULN – 45).**

**What should be done next?**

**Consultation with a specialist, who will  
repeat the PCR.**

**The specialist repeated the PCR and it  
showed the presence of virus.**

**What if his RIBA test was initially positive  
what should have been done?**

## **Medical Evaluation**

**What if his RIBA were negative?**

**His anti-HCV test result would be interpreted as  
a false positive and nothing more needs to be  
done.**

# Case Study 4

**A 44 year-old woman became ill with nausea, vomiting, and abdominal pain. She had been on a trip to India about six weeks prior to the onset of her symptoms. Her physician noted that she was jaundiced and the right upper quadrant of her abdomen was painful when palpated. The physician suspects acute viral hepatitis.**

## **Blood tests found the following:**

**HBsAg - negative**

**IgM anti-HBc - negative**

**IgM anti-HAV - negative**

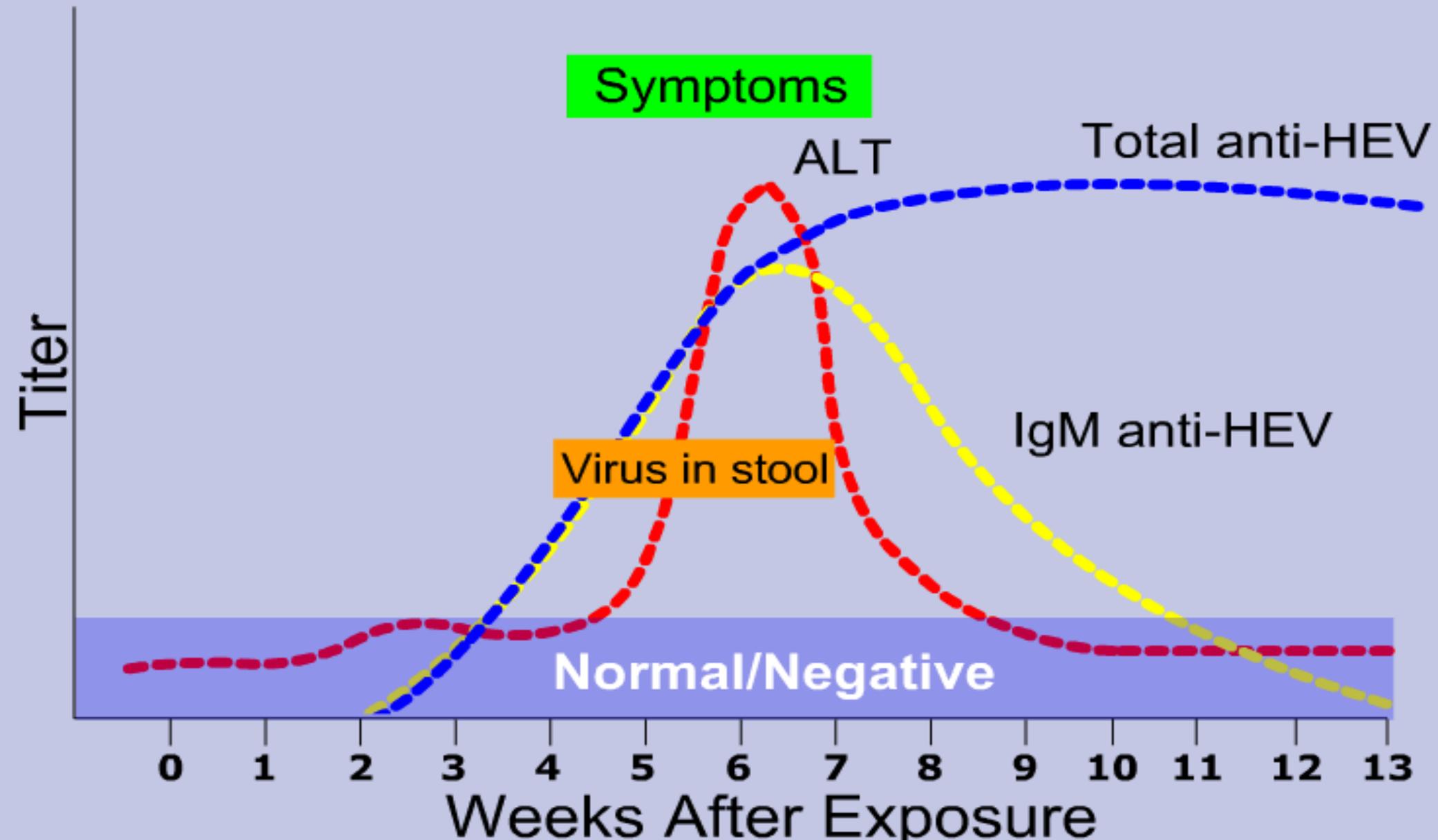
**Anti-HCV - negative**

**ALT - 1000 (ULN:45)**

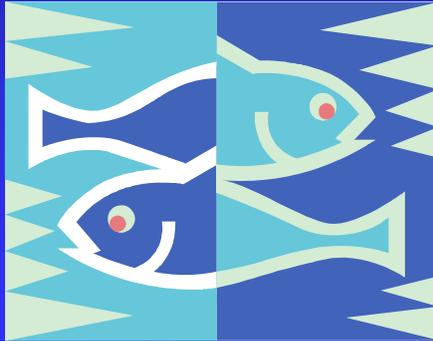
**Considering her travel history and her blood test results, what other type of viral hepatitis should be considered?**

**Hepatitis E**

# Hepatitis E Virus Infection



# Case Study 5



**A 40 year old white male with history of injection drug use for many years presented to the emergency room. He appeared extremely ill with severe abdominal pain, jaundice, and mental confusion. Physical exam revealed "track" marks on both arms.**

**Viral hepatitis testing was performed and results were as follows:**

**HBsAg - positive**

**IgM anti- HBc - positive**

**IgM anti-HAV - negative**

**EIA anti-HCV – positive**

**HCV RNA - positive**

**Based upon the serologic results, what is the diagnosis for this patient?**

**IgM anti-HBc and HBsAg are positive which indicates that he has acute hepatitis B.**

**HCV RNA is positive which indicates that he is currently infected with HCV.**

**IgM anti-HAV is negative which indicates that he does not have acute hepatitis A.**

**Considering the severity of his symptoms and his history of injection drug use, what other hepatitis tests should be considered?**

**Total anti-HDV**

**Total anti-HAV**

**Results were as follows:**

**Total anti-HDV - Positive**

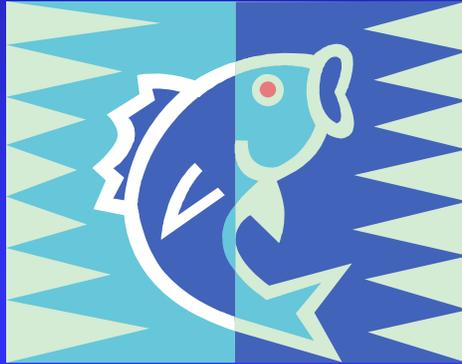
**Total anti-HAV – Positive**

**What do these results indicate?**

**His Total anti-HDV is positive and his IgM anti-HBc is positive indicating coinfection with HBV and HDV.**

**Total anti-HAV is positive indicating past HAV infection.**

# Case Study 6



**A 43 year old registered nurse was hired to work in the emergency room at a large tertiary care center. She was given the full 3-dose hepatitis B vaccine series followed by post-vaccination testing (done two months after the last dose). Her post vaccination testing was reported as: Anti-HBs = 5 mIU/mL.**

## What should be done next?

**She should be revaccinated with a full 3 dose hepatitis B vaccine series followed by postvaccination testing 1-2 months after the last dose.**

**Note - Up to 75% of people develop seroprotection after an additional series.**

**She was revaccinated. Her post-vaccination anti-HBs test result was 150 mIU/mL. She is now protected from HBV infection. The result was placed in her occupational health record.**

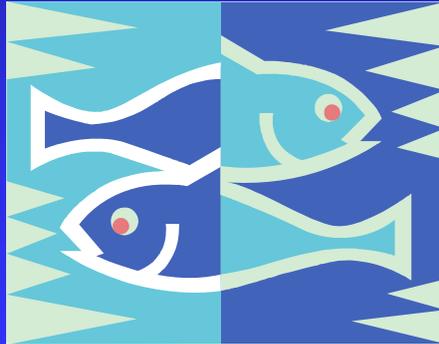
**Six years later, she had a needlestick. The source patient was HBsAg-positive.**

**What should she do regarding the needlestick?**

**No hepatitis B serologic testing or re-vaccination needs to be done as she has documented evidence of seroprotection from HBV infection**

**Once a person responds to hepatitis B vaccination with anti-HBs at least 10 mIU/mL, that person is protected, even if anti-HBs falls below measurable levels.**

# Case Study 7



**A 23 year-old male ESRD patient was admitted to a free-standing hemodialysis center for chronic hemodialysis treatment. His hepatitis B serologic results on admission were as follows:**

**HBsAg- negative  
Anti-HBc – positive  
Anti-HBs – negative**

**What should be done next?**

**Re-test Total anti-HBc on a separate sample,  
and if positive, test for IgM anti-HBc**

**Why should we do these tests?**

**His Total anti-HBc re-tested positive  
and his IgM anti-HBc result was negative.**

**What should be done next?**

**He should be vaccinated with hepatitis B vaccine in the dosage and preparation recommended for hemodialysis patients. Anti-HBs should be checked 1-2 months postvaccination.**

**What should be done if total anti-HBs is  $<10$  mIU/mL even after revaccination?**

### **Test for HBV DNA**

**What if HBV DNA were negative?**

**Consider patient susceptible (i.e., the anti-HBc result is a false positive), and test monthly for HBsAg.**

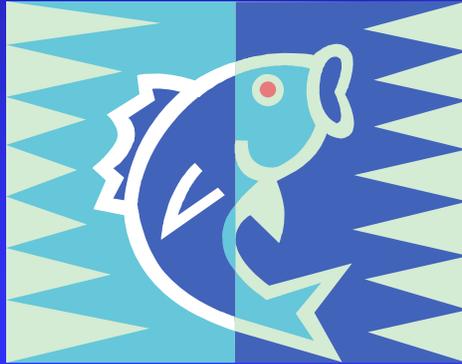
## **What if HBV DNA were positive?**

**Consider patient as having past infection or "low-level" chronic infection (i.e., the anti-HBc result is a true positive); no further testing is necessary. Isolation is not necessary because HBsAg is not detectable.**

## **What if Total anti-HBc and IgM anti-HBc were both positive?**

**Consider patient recently infected and test for anti-HBs in 4-6 months; no further routine testing is necessary. Isolation is not necessary because HBsAg is not detectable.**

# Case Study 8



**A 42 year-old single white male went to his physician with complaints of fatigue, abdominal pain and loss of appetite.**

**Past medical history:**

- **He had no history of hepatitis A or hepatitis B vaccination**
- **He reported one male sex contact in the recent past**

**Physical examination:**

- **The whites of his eyes were yellow**
- **Liver was slightly enlarged and tender to palpation**



**Viral hepatitis was suspected and hepatitis testing was ordered.**

**For the diagnosis of acute viral hepatitis, what serologic tests would be the most appropriate to order?**

**IgM anti-HAV**

**HBsAg**

**IgM anti-HBc**

**Anti-HCV**

**The patient returned in one week for a follow-up visit.  
The serologic results were as follows:**

**IgM anti-HAV - negative**

**HBsAg - positive**

**IgM anti-HBc - positive**

**anti-HCV – negative**

**Based on the serologic results, what is the diagnosis?**

**Acute hepatitis B**

**IgM anti-HAV - negative**

**HBsAg - positive**

**IgM anti-HBc - positive**

**anti-HCV – negative**

**Identify the public health actions that should be taken in response to this case.**

**1. Acute hepatitis B is a reportable disease in all of the states. Reporting of acute hepatitis B cases is needed so the health department can determine if the case is part of an outbreak and can assess whether other public health actions are needed.**

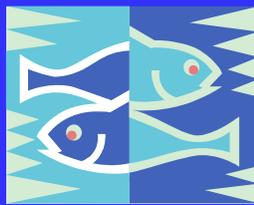
**2. The patient should be advised to inform his sex and household contacts that they might have been exposed to hepatitis B virus and that they should see a health care professional for medical evaluation.**

**3. Prevaccination testing for anti-HAV might be warranted for persons older than aged 40 years because of the higher prevalence of infection in this group. Hepatitis A vaccine is recommended for sexually active men who have sex with men.**

**The patient notified the person with whom he had sex within the past four months.**

**The sexual contact had no signs or symptoms of viral hepatitis. He had no history of having received hepatitis A or hepatitis B vaccine.**

**What serologic tests should be done before vaccination of this sexual contact?**



**Total anti-HAV, pre-vaccination testing with Total anti-HAV to determine HAV infection status is likely to be cost-effective because MSM have a high risk of HAV infection.**

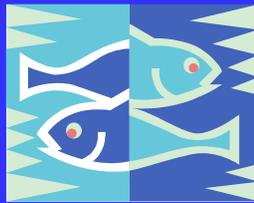
**Total anti-HBc, pre-vaccination testing with Total anti-HBc to determine HBV infection status is likely to be cost-effective because MSM have a high risk of HBV infection.**

**Serologic results for the sex contact  
were as follows:**

**Total anti-HBc – positive**

**Total anti-HAV – negative**

**What further advice should be given to this  
patient regarding his Total anti-HBc result?**



**Total anti-HBc – positive**  
**Total anti-HAV – negative**

**He has been infected with HBV in the past. Thus, he doesn't need hepatitis B vaccine. Additional testing for HBsAg is needed to determine whether he is currently infected with HBV. This test can be done on the same specimen that was collected for anti-HBc testing.**

**Total anti-HBc – positive**  
**Total anti-HAV – negative**

**What further advice should be given to this patient regarding his Total anti-HAV result?**

**He has no evidence of immunity to HAV infection and should be vaccinated against hepatitis A, as MSM are at increased risk for HAV infection.**

**Should he get tested for hepatitis C?**

**No, not according to his current history, as MSM are at no greater risk of HCV infection than the general population.**

**Subsequent testing showed:  
HBsAg – positive**

**What does this result indicate and how should the patient be managed?**

**1. He is likely to have chronic HBV infection. The absence of IgM anti-HBc in a single sample or the persistence of HBsAg for at least 6 months indicates chronic HBV infection.**

- 2. Unvaccinated sex partners and household contacts should be tested for susceptibility to HBV infection and should be vaccinated if they are susceptible.**
- 3. An HBsAg-positive test result is a reportable condition in most states.**

**4. HBsAg-positive persons should receive further assessment and on-going monitoring of chronic liver disease by a physician experienced in the management of chronic liver disease.**