

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



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

# **Serology 101: Basic**

**National Viral Hepatitis Prevention Conference  
Washington, DC  
December 6, 2005**

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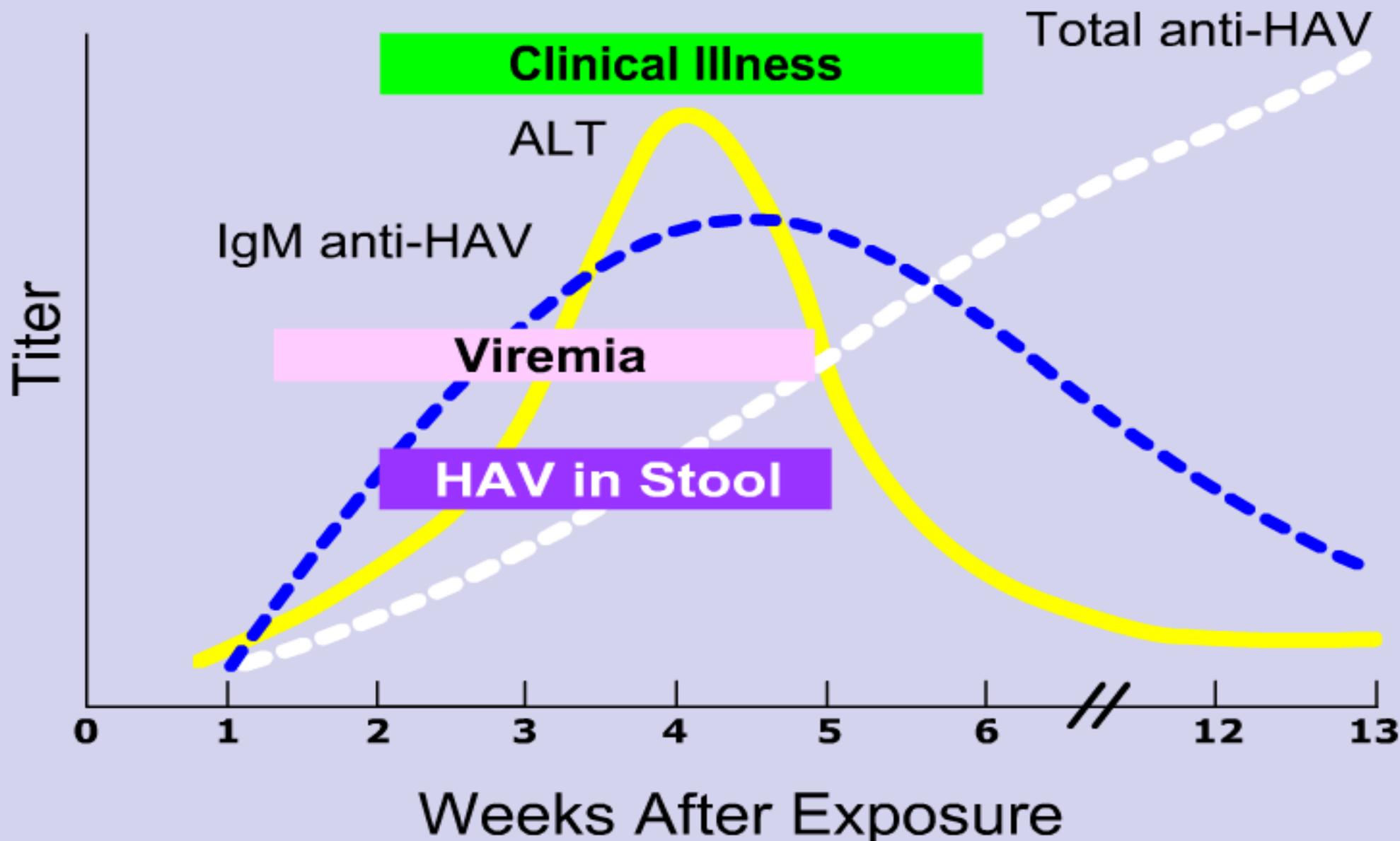
# Agenda

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

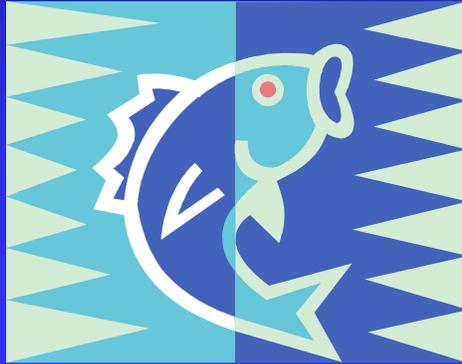


# Events in Hepatitis A Virus Infection

## Typical Serologic Course



# Case Study 1



**Joan recently vacationed in Mexico and Central America. Five weeks after returning home, she began to feel very tired, was nauseated, developed abdominal pain and diarrhea. She also noted that the whites of her eyes were slightly yellow. Joan made an appointment to see her primary care physician.**

# Joan's blood test results were as follows:

**HBsAg – negative**

**Total anti-HBc – negative**

**Total anti-HAV – positive**

**IgM anti-HAV – positive**

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

**AST: 500 (ULN = 55)**

**Anti-HCV - negative**

**HBsAg – negative**  
**Total anti-HBc – negative**  
**Total anti-HAV – positive**  
**IgM anti-HAV – positive**  
**ALT – 1000 (ULN – 45)**  
**AST – 500 (ULN – 55)**  
**Anti-HCV - negative**

**What do Joan's blood test results indicate?**

**Acute hepatitis A**

**How could Joan have prevented her HAV infection?**

**She could have gotten her first dose of hepatitis A vaccine or an injection of immune globulin before she left for her trip.**

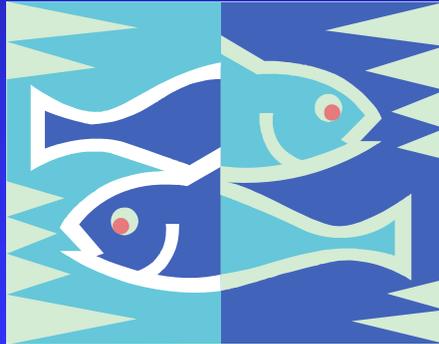
**For optimal protection, when should Joan have received her first dose of hepatitis A vaccine?**

**Four weeks prior to travel**

**When should Joan have received the Immune globulin?**

**Just prior to travel**

# Case Study 2



**Cindy is a 25-year-old female, who was born in Peru, and moved to the United States when she was 16.**

**She is now getting married and is planning to honeymoon in Mexico City. Cindy wasn't sure if she had hepatitis A in the past and whether she needed to get hepatitis A vaccine before leaving for her trip.**

**What test should be used to determine  
past HAV infection?**

**Total Anti-HAV**

**What would Cindy's serologic results look like if she had been infected with hepatitis A virus while she was a child in Peru?**

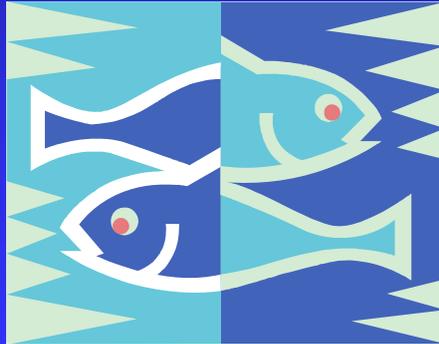
**Total anti-HAV**

**Positive**

**IgM anti-HAV**

**Negative**

# Case Study 3



**Ellen works in a local health department where there had been a recent increase in the number of reported cases of hepatitis A. She received a call from the administrator of a local LTC facility. The administrator told her that the facility's medical director had tested all of the residents (n=100) for immunity to HAV infection in preparation for administering hepatitis A vaccine to those who showed susceptibility.**

**The medical director had ordered both Total anti-HAV and IgM anti-HAV. The administrator reported that as a result of this testing, they had discovered that they had an outbreak of hepatitis A among the residents and they needed advice on what to do next.**

**The serologic results were as follows:**

**10 residents – Total anti-HAV positive and IgM anti-HAV positive**

**30 residents – Total anti-HAV positive**

**60 residents – Total anti-HAV and IgM anti-HAV negative**

**None of the residents were symptomatic for viral hepatitis and there was no indication that their LFTs were elevated.**

**How should Ellen deal with this?**

**All residents who were Total anti-HAV-positive are immune to future HAV infection.**

**All residents who were negative for Total anti-HAV are susceptible.**

**Most likely the 10 residents who were IgM anti-HAV positive and Total anti-HAV positive are not acutely infected and represent residents with immunity to future HAV infection.**

**Why do we think these IgM anti-HAV positive results do not represent acute hepatitis A?**

- Patients are asymptomatic**
- There are no elevated LFTs**
- A % of false positive results can be expected when indiscriminately screening asymptomatic individuals.**

## **Other additional points:**

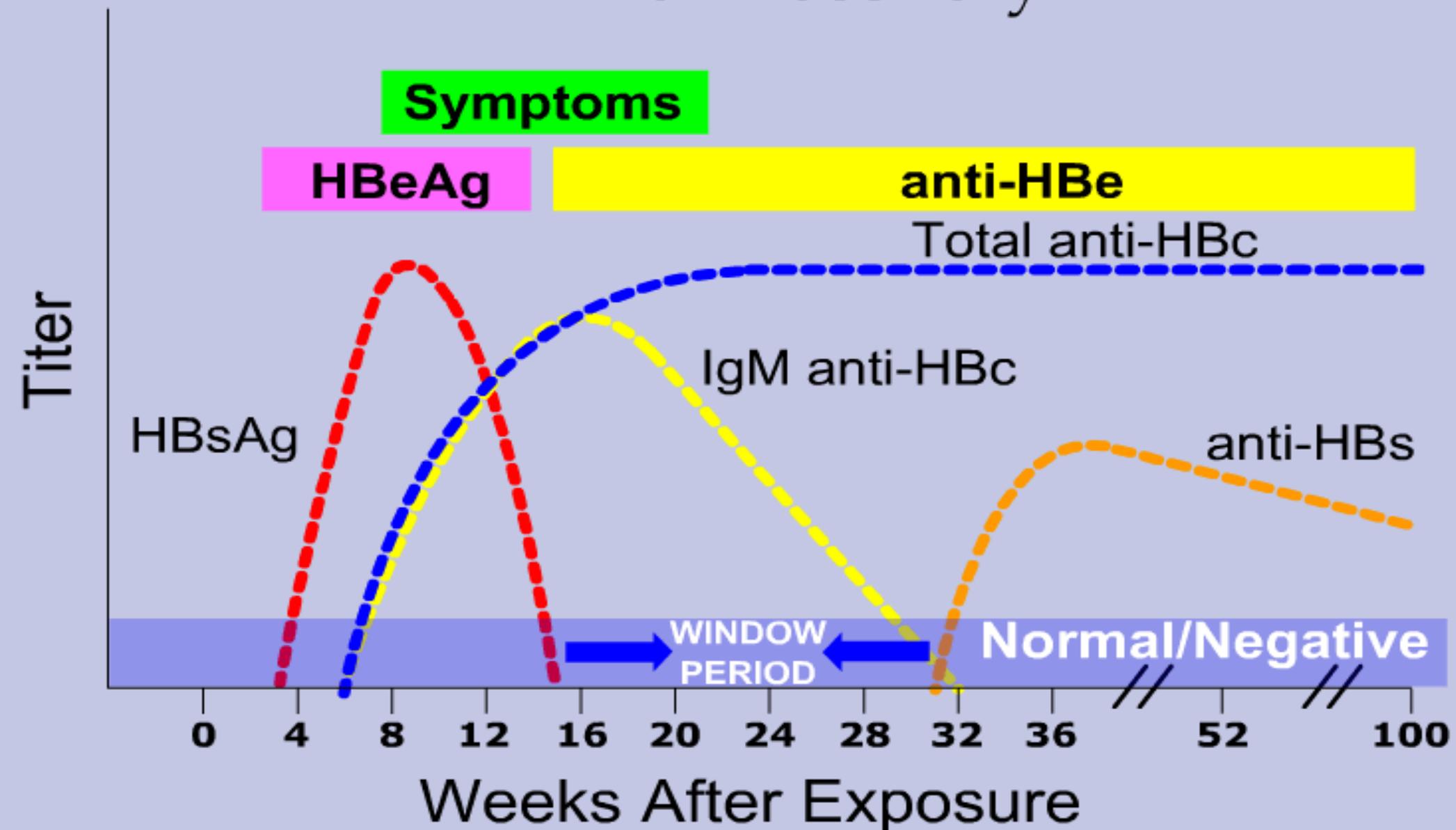
**Results are not reportable (pts are asymptomatic)**

**Consider repeating the IgM anti-HAV test, using another format/brand**

**No IG is recommended – even if repeat is positive as there are no symptoms and one could not determine the 2 week window.**

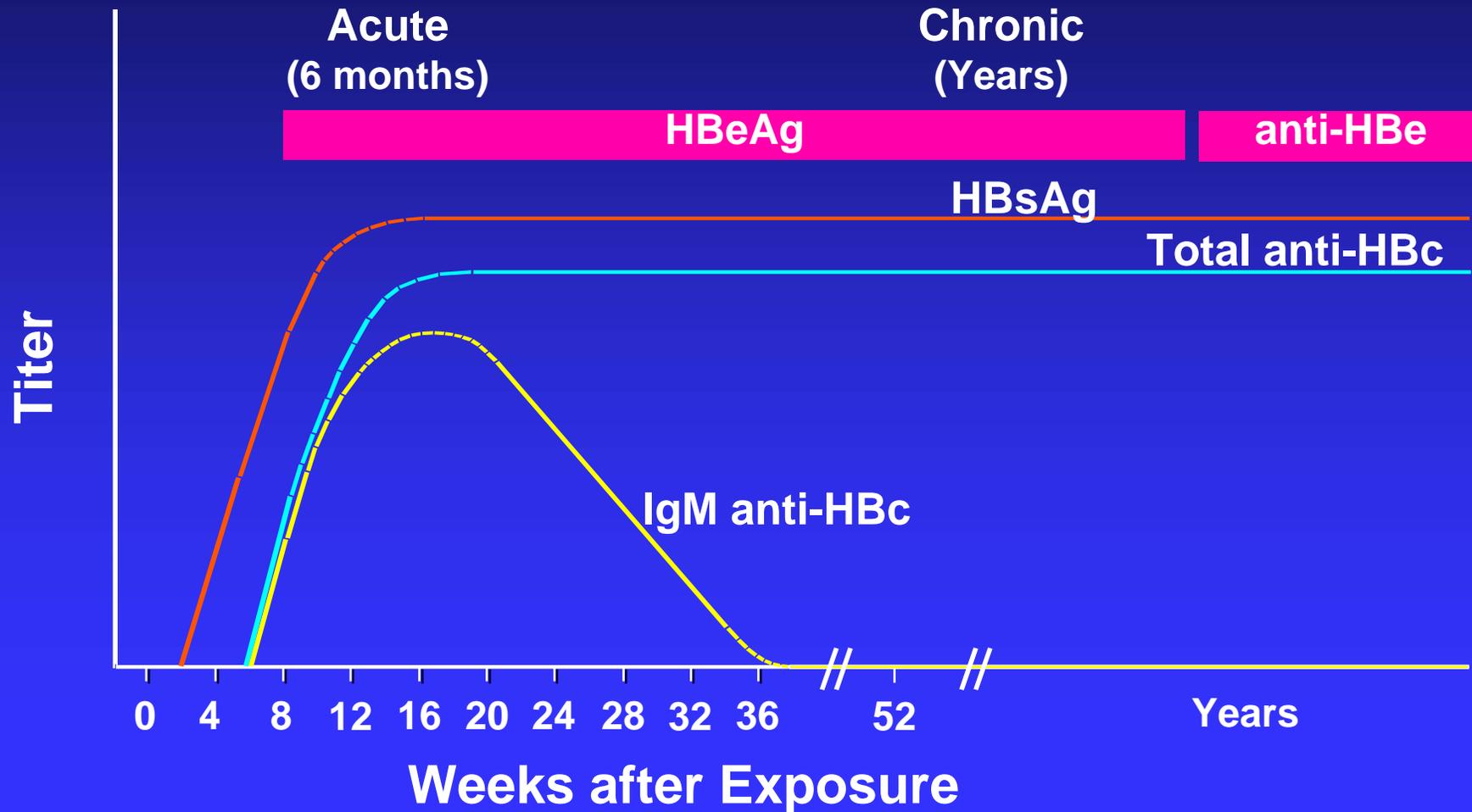
**Tell the facility director that IgM anti-HAV should not have been done for this purpose.**

# Acute Hepatitis B Virus Infection with Recovery

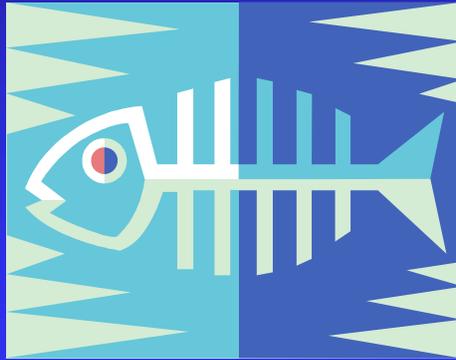


# Progression to Chronic Hepatitis B Virus Infection

## Typical Serologic Course



# Case Study 4



**Paul, a 42-year-old male, went to his doctor complaining of fatigue and abdominal pain. On examination, the physician noted that he was jaundiced and was tender when palpated in the RUQ of his abdomen.**

**Next Slide >**

**Blood tests were ordered that included an acute viral hepatitis panel. After reviewing the patient's blood test results, the physician diagnosed him with acute hepatitis B. Paul was told to inform his sexual contacts about his diagnosis.**

**What would Paul's test results most likely be, given that he has acute hepatitis B?**

<b>HBsAg</b>	<b>positive</b>
<b>HBeAg</b>	<b>positive/negative</b>
<b>Total anti-HBc</b>	<b>positive</b>
<b>IgM anti-HBc</b>	<b>positive</b>
<b>Anti-HBe</b>	<b>positive/negative</b>
<b>Anti-HBs</b>	<b>negative</b>
<b>ALT</b>	<b>2,000 (ULN – 45)</b>

**Paul's friend Jeff saw the same physician and reported that he was aware of Paul's hepatitis B diagnosis. Jeff was concerned, as he had an on-going sexual relationship with Paul.**

**The physician ordered serologic tests on Jeff and found the following:**

**HBsAg – positive**

**HBeAg - positive**

**Total anti-HBc – positive**

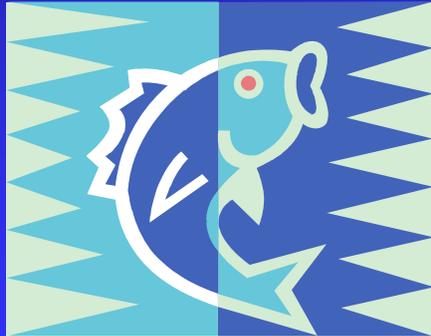
**IgM anti-HBc – negative**

**Anti-HBs – negative**

**What do Jeff's results indicate?**

**Chronic hepatitis B**

# Case Study 5



**In September 2005, a woman of southeast Asia descent gave birth to a seemingly healthy baby girl. The woman was reported to have tested HBsAg-negative during her first trimester of pregnancy. The baby did not receive a birth dose of hepatitis B vaccine. In December, the infant was hospitalized following 5 days of fever, diarrhea, and jaundice.**

**The infant's blood test results on admission included:**

**HBsAg - positive**

**IgM anti-HBc - positive**

**ALT – 693**

**Total bilirubin - 16.6**

The mother was tested at the same time and was found to be **HBsAg-positive and IgM anti-HBc negative.**

What does the mother's blood tests indicate?

**The mother has chronic hepatitis**

What do the infant's blood tests indicate?

**Acute hepatitis B**

## How could this have happened?

The pregnant woman is tested and found to be hepatitis B surface antigen (HBsAg) positive, but her status is not communicated to the newborn nursery. The infant receives neither hepatitis B vaccine nor HBIG protection at birth.

## How could this have happened? (con't)

**A chronically infected pregnant woman is tested but with the wrong test, Anti-HBS (sometimes referred to as HBsAb), instead of HBsAg. This is a common mistake since these two test abbreviations differ by only one letter. Her incorrectly ordered test result is "negative," so her doctor believes her infant does not need postexposure prophylaxis.**

## **How could this have happened? (con't)**

**The pregnant woman is HBsAg-positive, but her test results are misinterpreted or mis-transcribed into her prenatal record or her infant's chart. Her infant does not receive HBIG or hepatitis B vaccine.**

## **How could this have happened? (con't)**

**The pregnant woman is not tested for HBsAg either prenatally or in the hospital at the time of delivery. Her infant does not receive hepatitis B vaccine in the hospital, even though it is recommended within 12 hours of birth for infants whose mothers' test results are unknown.**

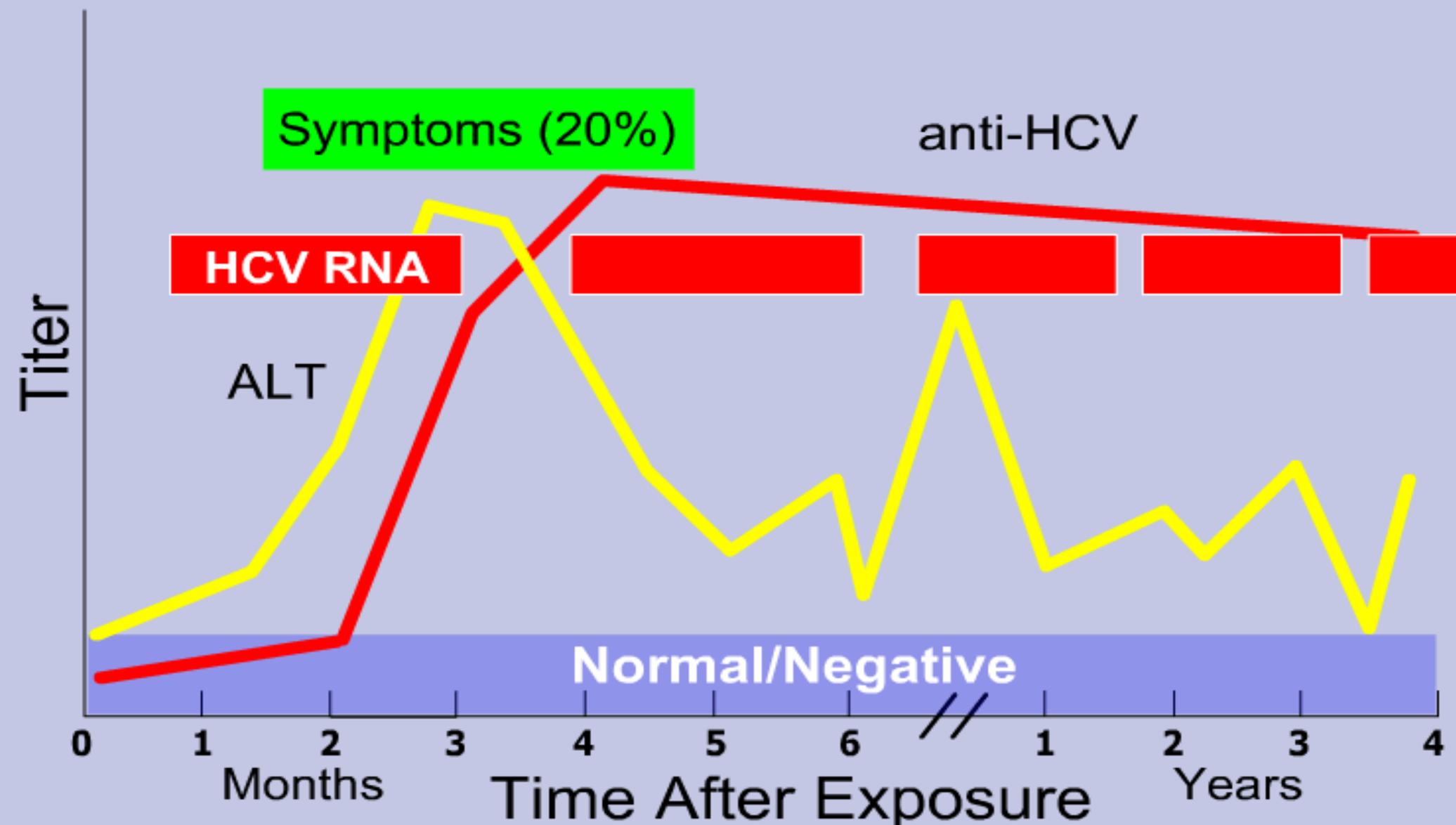
## **How could this have happened? (con't)**

**The woman is tested in early pregnancy for HBsAg and is found to be negative. She develops HBV infection later in pregnancy, but it is not detected, even though it is recommended by CDC that high-risk women be retested later in pregnancy. Because the infection is not clinically detected by her healthcare provider, her infant does not receive hepatitis B vaccine or HBIG at birth.**

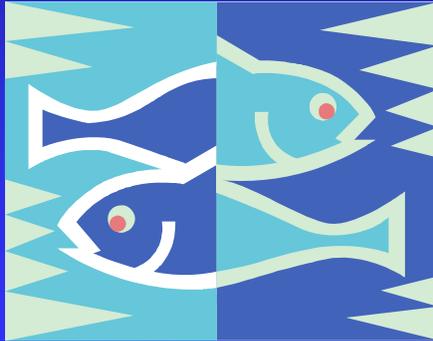
## How could this have happened? (con't)

**The mother is HBsAg negative, but the infant is exposed to HBV postnatally from another family member or caregiver. This occurs in two-thirds of the cases of childhood transmission.**

# Acute HCV Progressing to Chronic HCV Infection



# Case Study 6



**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 experimented with injection drug use in college. Blood tests were ordered.**

## The results were as follows:

HBsAg	negative
IgM anti-HBc	negative
IgM anti-HAV	negative
EIA anti-HCV	positive

Based on these serologic findings, what is her diagnosis?

**Possible HCV infection**

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

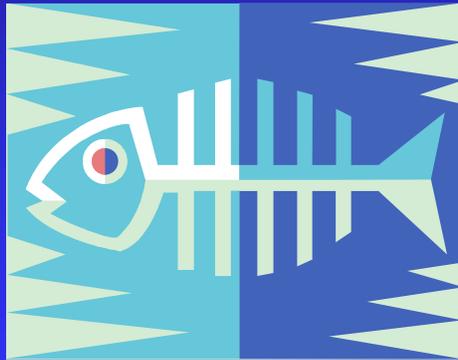
**A supplemental assay, such as a recombinant immunoblot assay (RIBA) or a nucleic acid test (NAT) for HCV RNA should be done.**

**The RIBA assay result was positive.**

**What does this mean?**

**She probably has hepatitis C and should be referred for medical evaluation.**

# Case Study 7



**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 care provider. He immediately called his physician and went in for a physical.**

**His blood work showed the following:**

**HBsAg – negative**

**Anti-HBc – negative**

**Anti-HCV EIA – positive**

**RIBA – positive**

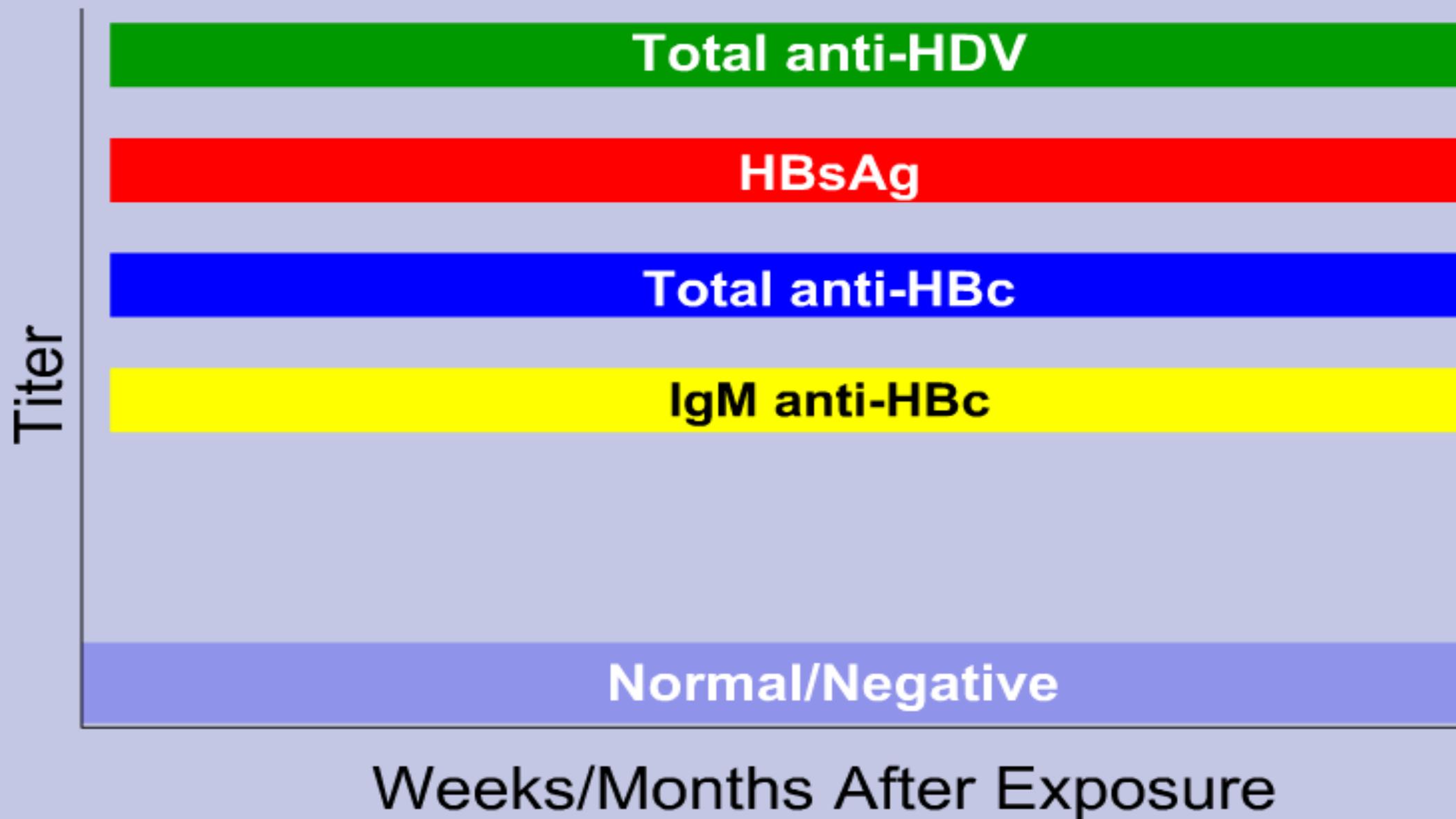
**What should be done next?**

**Medical Evaluation**

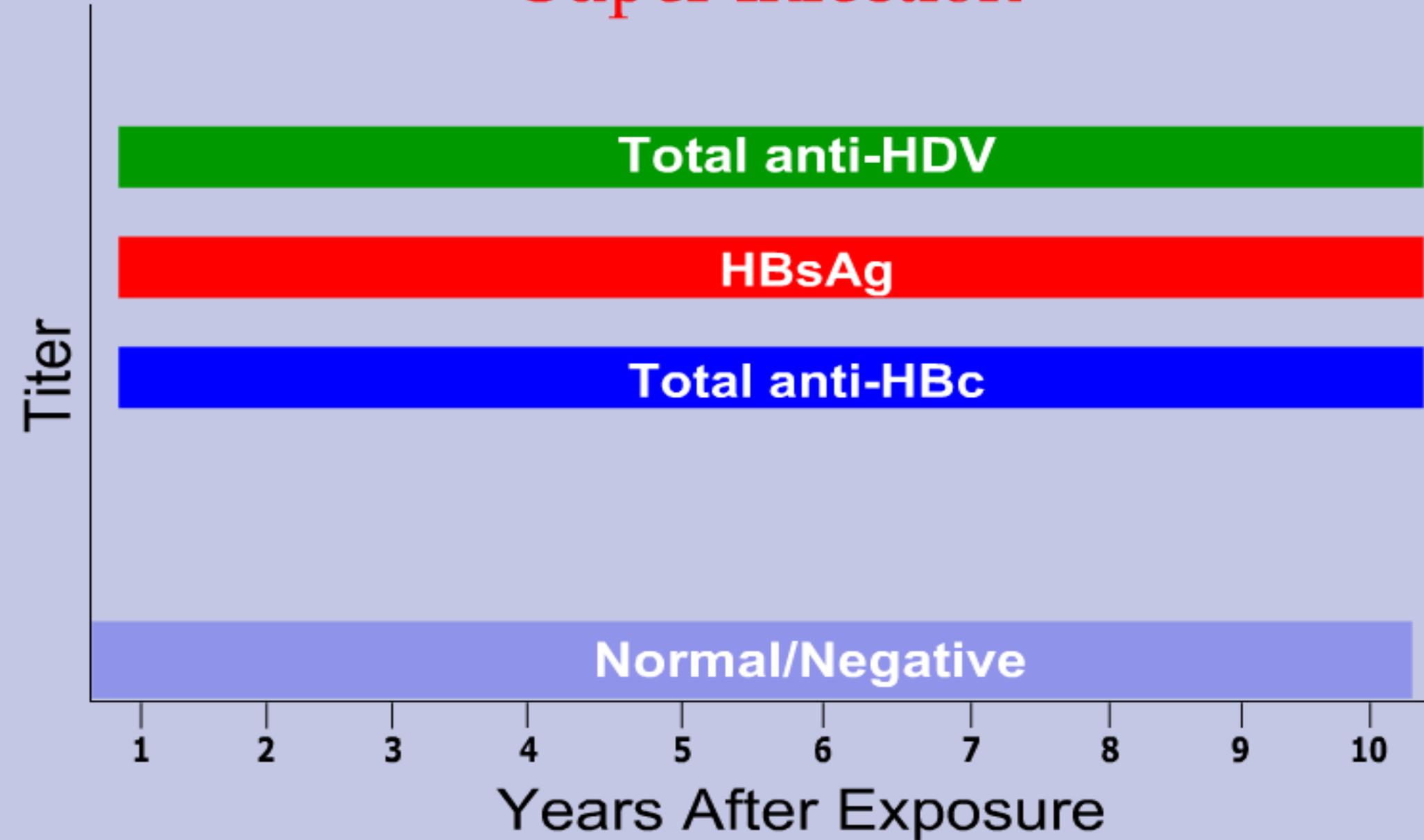
**What if his RIBA test was negative?**

**His hepatitis C test would be  
considered a false positive.  
Nothing more needs to be done.**

# HBV-HDV Infection Co-Infection



# HBV-HDV Infection Super Infection



# Hepatitis E Virus Infection

