419: Hepatitis — A to G

Home Study Courses

STOP

BEFORE READING THIS COURSE

PRETEST YOUR KNOWLEDGE OF THIS SUBJECT.

PLACE YOUR ANSWERS IN THE *PRETEST* COLUMN OF THE SEPARATE ANSWER SHEET INCLUDED WITH THIS COURSE BOOKLET.

THE TEST QUESTIONS ARE THE SAME FOR BOTH THE PRETEST AND THE POST-TEST. THE TEST QUESTIONS ARE FOUND AT THE BACK OF THIS COURSE BOOKLET.

AFTER COMPLETING THE PRETEST
THEN
READ THE COURSE
THEN
TAKE THE POST-TEST FOR CREDIT AND SEE HOW MUCH YOU HAVE LEARNED.

TO GET THE MOST OUT OF THIS GSC HOME STUDY COURSE USE THE PSQ4R LEARNING SKILLS TECHNIQUE DESCRIBED ON THE FOLLOWING PAGES.
GOOD LUCK.

How to get the most out of your GSC Home Study Course using the PSQ4R technique!

Continuing education should provide the licensee with timely information that can be recalled for day to day use. Each GSC Home Study CE Course was planned and produced in accordance with the PSQ4R method described in the following paragraphs. GSC Home Study has found the PSQ4R method useful for retention of new or updated information.

PSQ4R, a method for improving reading comprehension, has been used by dozens of colleges and universities.

P = Purpose
S = Survey
Q = Question
4Rs = Read Selectively, Recite, Reflect, and Review.

1. Determine your **purpose** for reading this course. For many of you it may be merely to obtain continuing education credit to maintain your license. But, take a moment and look beyond this reason, what is it about this particular course topic that interests you? How does it relate to your current practice? (Est. Time– 5 minutes)

2. Test your knowledge of the course subject matter prior to reading the course by answering the course examination questions at the back of the booklet. Use the pretest column of the answer sheet to write your answers. (Est. Time-20 minutes)

3. **Preview** the course by surveying or skimming the course objectives, subject headings, illustrations, graphics and test questions. Pay attention to the first sentences, introductions, conclusions or summaries in the course. Write down any words that are unfamiliar to you. (Est. Time-15 minutes)

4. Make up **questions** using the section headings as a guide. Write the questions on a blank sheet of paper and leave space for your answers (2-3 inches). For example, if the section heading states "Diagnosis of Alzheimer's Disease", write the question "What are the current criteria used to diagnose Alzheimer's disease?" leaving space for the answer later on. (Est. Time-15 minutes)

5. **Read selectively** to find the answers to your "section-heading" questions. Write your answers in the space you provided. Be sure to write down and/or look up any words that are or were unfamiliar to you. Also, as you continue to read don't forget to look for ideas and information that are in alignment with your purpose for taking the course. (Est. Time- 80 minutes)

6. **Recite** the answers to your questions, by reading the question aloud with the answer covered up. Use your own words as much as possible. If you don't recall the answers, look over that section again. (Est. Time-5 minutes)

7. **Reflect** on the information in the section you've just read. Try to make a simple outline, table, flow diagram or "doodle". (Est. Time-5 minutes)

8. **Review** "section-heading" questions and answers, diagrams and outlines. (Est. Time- 20 minutes)

9. Take the Course Examination. Place your answers on the detached answer sheet posttest column inserted with your course packet. (Est. Time-30 minutes)

Normal Estimated Time to Complete this GSC Home Study CE Course Activity

Taking pretest	20	minutes
Reading course	90	minutes
Taking posttest	30	minutes
Re-reading course to locate answers	40	minutes
TOTAL time	180	minutes

Estimated Time to Complete this GSC Home Study CE Course Activity Using the PSQ4R Method for Improving Your Reading Comprehension

Determine the Purpose for taking the course	5	minutes
Take the pretest	20	minutes
Preview the course	15	minutes
Make up Questions	15	minutes
Read Selectively	80	minutes
Recite the answers to your questions	5	minutes
Reflect the information you just read in the course	5	minutes
Review questions, diagrams, and outlines	20	minutes
Take the posttest	30	minutes
TOTAL time using the PSQ4R method	195	minutes

Use the method you think will be the better use of your time.

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COURSE OBJECTIVES

At the completion of this course the provider should be able to do the following:

1. Recognize the three major general functions of the liver.
2. Identify the groups at highest risk for hepatitis A, B, and C.
3. Demonstrate understanding of the three general phases of a viral hepatitis infection.
4. Demonstrate knowledge of the incubation periods and general length of active disease for viral hepatitis A, B, and C.
5. Identify the major symptoms and signs common to people infected with a viral hepatitis.
6. Identify the methods of diagnosis and the rationale for their use.
7. Identify the treatment methods for people with the various viral hepatitis infections.
8. Recognize the three major sequelae of a hepatitis B infection and identify those at greatest risk for dying of it.
9. List the major methods of prevention for the alphabet viruses.

ACKNOWLEDGMENT
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INTRODUCTION

The liver is a marvelous organ. It metabolizes our food, drugs, and hormones; filters out all sorts of used-up and dangerous products; and it stores blood, which the body can use in an emergency, as well as vitamins and minerals. Additionally, when a viral hepatitis infection occurs, in most cases, the liver carries on and even repairs itself.

This course explores the subject of viral hepatitis infections in adults, although slight reference is made to children when it is applicable. It covers transmission of the virus, groups at higher risk for infection, the disease course, and methods of diagnosis and treatment. Because hepatitis from viruses is not curable at this time, there is special emphasis on methods of prevention.

As health professionals, we are obligated to protect our patients, co-workers, and ourselves from harm. Hand washing is a very important activity. Proper adherence to Universal Precautions (see CDC 1998; available online) remains essential in preventing not just hepatitis, but many diseases. Adequate protection by vaccine is now available to us for hepatitis A and B.

Although there are other causes of hepatitis (liver inflammation), the emphasis is on the hepatitis viruses designated as HAV (hepatitis A virus), HBV (hepatitis B virus), HCV (hepatitis C virus), HDV (hepatitis D virus), HEV (hepatitis E virus), and HGV (hepatitis G virus). There are so many subgroupings being researched that some are calling it the alphabet virus. One

of the latest hepatitis viruses, named the TT virus, or TTV, was originally named after the Japanese patients from whom the virus was isolated and cloned. It was designated the “transfusion-transmitted” virus. Research has not established if this virus is a disease-causing agent in humans, and its prevalence among liver-diseased patients is not known. It has been detected in 25 percent of 72 patients with chronic liver disease. Charlton et al (1998) reported a prevalence of TTV of 1 percent among blood donors, 15 percent in patients with cryptogenic cirrhosis, 27 percent in patients having fulminant hepatitis failure, 18 percent in persons exposed to blood products, and 4 percent in persons without parenteral risk factors. At this time, TTV is not clinically significant and does not warrant detailed discussion in this course.

There is a great similarity in the symptoms in the various forms of viral hepatitis, although their modes of transmission, incubation times, antibody and immune responses, disease course, and complications are different.

Hepatitis can be caused by the hepatitis viruses as well as the Epstein-Barr virus (the cause of mononucleosis), and cytomegalovirus, retrovirus, cox-sackievirus, adenovirus, Marburg virus, and the viruses causing herpes simplex, yellow fever, varicella (chicken pox), and rubella (German measles). Drugs, toxins—such as ethanol—some bacteria (mycobacteria, syphilis, and leprosy) as well as some parasites (amoeba and the Toxoplasma species) also cause hepatitis.

Some of the drugs that may contribute to hepatitis and are dose-related include acetaminophen, aspirin, chloroform, methotrexate, and the

tetracyclines. Other drugs that variably contribute to hepatitis include alpha-methyldopa, sulfasalazine, halothane, isoniazid, nitrofurantoin, phenyltoin, quinidine, all-purinol, anabolic steroids, carbamazepine, chlordiazepoxide, chlorpromizine, chlorpropamide, diazepam, erythromycin estolate, flurazepam, and oral contraceptives.

DIAGNOSIS

Many different tests are available to determine both the presence and the extent of hepatic disease and to help rule out other conditions that may mimic hepatitis. Laboratory and serological tests, the history and physical, biopsies, and imaging procedures are employed in coming to a diagnosis.

The presence or absence of specific antibodies, RNA or DNA, and the extent of the viral invasion are used to determine contact with a specific virus. Some of these tests are also used to evaluate therapies and the course of the disease.

The following tests are some of the more common ones used to evaluate liver function and health.

Liver Function Tests

- Alanine Aminotransferase (ALT)—This test is a very sensitive and specific indicator of liver damage. Together with AST (aspartate aminotransferase) these are called the aminotransferases. Their levels

fall as the bilirubin rises. Levels that rise, reach a peak, fall and then rise again indicate serious liver damage and indicate a poor prognosis.

- Bilirubin (total)—Direct (conjugated) and indirect (unconjugated). Yellowing of the sclera and the skin occur when the bilirubin is greater than 2.5 mg/100 ml. Bilirubin greater than 20 mg/100 ml—and which remains high—may indicate severe liver disease and corresponding poor prognosis. Conjugated bilirubin is that which has been taken up by the liver and has become water soluble or conjugated. It is then ready to be excreted. If the conjugated bilirubin is up it means that the liver is functioning, but the water soluble form can't get out because of stasis or obstruction. But if the level of the unconjugated form is high, it means that the liver itself is not functioning properly.

Tests that Measure Products of Liver Tissue

- Prothrombin Time—Prolonged prothrombin time indicates that something is wrong with the clotting mechanism, and this may be related to liver function. It also would alert you to take bleeding precautions.
- Albumin—This is a general test that indicates whether or not the liver is adequately putting together and releasing plasma proteins and enzymes.

A thorough history is important in determining contact with the viruses. A travel history might indicate time in an area of endemic hepatitis or one in which there is minimal sanitary concern. Certain occupations and groups of people who are at higher risk can also be identified.

Signs and symptoms of the various types of hepatitis are similar and related to liver pathology. Thankfully, in most people who contract hepatitis, the damage is minor and transient and the liver rebuilds itself rapidly. The liver, like many other organs, has a great deal of reserve and capacity to heal. The majority of patients complain of vague flu-like malaise or symptoms of an upper respiratory tract infection. Lethargy, irritability, muscle aches and pains, and various gastrointestinal (GI) disturbances may also occur.

Jaundice (yellow sclera or skin) and clay-colored stools, as well as darkened urine, are a result of altered bilirubin and urobilin excretion. Bile salts in the skin cause pruritis, which can range from mild to agonizing. Fever is a result of inflammation, while the right upper quadrant discomfort is from the stretched capsule around the liver. Loss of appetite, nausea, and vomiting are a result of changes within the stomach and bowel. An aversion to cigarette smoke also is common.

Injured liver cells are not able to produce enough prothrombin for clotting while the lessened bile in the intestines interferes with vitamin K absorption, causing an increased tendency to bleed (prolonged prothrombin time). Anemia can result from this as well as from the decreased appetite and shortened red blood cell life caused by liver enzyme changes.

Disease Course

Viral hepatitis infections generally follow a three-phase pattern.

- **Prodromal Phase**—Several days to a week or more. Nonspecific flu-like symptoms with arthralgias, anorexia, nausea, and vomiting. May suggest an upper respiratory episode. Loss of taste (even aversion) to coffee and/or cigarettes. May have a mild fever. An enlarged liver would present as abdominal discomfort.
- **Icteric Phase**—Several days to several weeks. The above symptoms, other than the gastrointestinal findings, may recede while jaundice appears as yellow sclera or frank jaundice. Even though it is called the icteric phase (from the Greek word for jaundice), jaundice may be absent. This is very common in all hepatitis types. The urine may be dark and the stools light colored. The GI symptoms may persist or worsen. Pruritis may be present.
- **Convalescent Phase**—Several weeks to months. Although there usually is a gradual decrease in the symptoms and the laboratory values return to more normal levels, weakness and malaise are frequently present.

HEPATITIS A

Hepatitis A, or infectious hepatitis, is more common than hepatitis B and usually milder. Hepatitis A is uniquely and primarily transmitted by the fecal-oral route, but may occur from contaminated food, milk, or water. Worldwide,

incompletely cooked or raw shellfish can be a source. The virus is shed through the feces around the end of the incubation period and for about one to two weeks after signs and symptoms appear.

Although this disorder is relatively benign and almost never progresses to chronic hepatitis, it remains an important cause of morbidity and occasional mortality. It may occur from time to time in epidemic proportions, as outbreaks from infected food preparation.

Transmission

By far the most common route of infection is fecal-oral transmission. It has been clearly demonstrated that enough virus can be picked up (and deposited) from the environment onto fingertips to cause an infection. Because there is no carrier state for the hepatitis A virus, transmission of the virus usually comes from unrecognized cases at a time when the virus is shedding. Because the virus lives for only a very short time in the blood, transmission from blood is rare (less than 1 percent). Although the virus has been found in other body fluids (semen, saliva, and urine), it is thought that they do not transmit the disease. Infection potential is greatest about 14 days before symptoms appear, but lessens considerably after the first week of jaundice.

Groups at Risk

Those groups most susceptible to hepatitis A include homosexual persons, those who have had commercial factor VIII transfusions, those who attend or work at day-care centers, those who are users of injected drugs, or those who have traveled in parts of the world that have inadequately treated water and sewage or poor hygiene habits. Military personnel and Native Americans also are at increased risk. Travelers to Africa, Asia (except Japan), the Mediterranean basin, Eastern Europe, the Middle East, and Central and South America should be particularly cautious.

People who test positive for antibodies to hepatitis A are more likely to have lower personal incomes, which probably reflects less effective sanitation and more crowding. Nonetheless, about 40% of those infected are unable to pinpoint an exposure.

Disease Course

Hepatitis A infections have a rapid onset. Classically, hepatitis A infection has a short incubation period of two to six weeks, with 25 days being about the average. Mortality from hepatitis A is about 0.2% of those infected and seems to be age-related, with older postmenopausal women being the most susceptible. There is no carrier state for hepatitis A.

Age also seems to be the major factor in the severity and number of symptoms, with children having a more mild course.

Symptoms of Hepatitis A in Adults

- Jaundice/yellow eyes
- Dark urine
- Malaise/fatigue
- Light-colored stool
- Decreased appetite
- Loss of taste for coffee/cigarettes (even aversion)
- Abdominal pain
- Fever/chills
- Myalgia/arthralgia
- Nausea/vomiting
- Diarrhea

Diagnosis

Diagnosis of hepatitis A relies on a history of exposure, clinical findings, and laboratory tests.

A history of exposure is sometimes hard to determine, and the clinical picture is not at all definitive as it is the same as the other viral hepatitis infections.

Rarely does the acute infection recur, but it may come one to three months after a seeming recovery. Even more rare is the progression to liver failure.

The laboratory findings include low white cell counts and abnormal

hepatic function test results. Antibody studies will show IgM anti-HAV at the beginning of symptoms, and this elevation continues for up to six months after the acute infection. The antibody IgG anti-HAV (which provides lifelong immunity) usually is present in the first two months of the convalescence.

Agent	Terminology	Definition	Significance
Hepatitis A HAV	Anti-HAV IgM type Acute illness	Antibody to HAV	Indicates recurrent or recent infection or recovering
	IgG type Immune status		Indicates previous infection

IgM—Acute antibody response 2–6 weeks after infection
IgG—Long-term antibody appears 4–6 weeks after infection

Treatment

Treatment is symptomatic because hepatitis A rarely becomes a chronic condition. Alcohol use is discouraged, and a high-carbohydrate, moderate-fat, and moderate-protein diet is recommended. Bed rest is not required, but fatigue and malaise may dictate more rest than usual. In a very few cases, hospitalization is necessary for rehydration or if there are mental status changes or hypoglycemia.

A short course of corticosteroid therapy has been thought helpful in relieving the symptoms associated with hepatitis A, but only after other possible disorders (biliary stones, strictures, and tumors) have been completely ruled out.

People infected with the hepatitis A virus should be able to return to school or work two or three weeks after the appearance of signs and symptoms without fear of passing the infection to others.

Prevention

Caution concerning food and drink and hand washing are important in preventing hepatitis A, especially in areas where sanitation and poverty go hand in hand. Avoidance of illicit drug injections and high-risk sexual intercourse should be paramount.

Hepatitis A vaccine is now available and provides active immunity. (All immune globulins are in short supply due to uncertainties in the blood pool and an inability to assure absolute safety in immune compromised patients—now used with caution!) It provides 99% to 100% immunity after two doses, although three doses may be recommended. It does not appear to have maximum effectiveness in those patients with cirrhosis, on dialysis, or who are immunosuppressed.

Families and others having close contact with a person infected with hepatitis A should have both passive and then active immunizations as soon as possible. The passive immune pooled serum globulin appears to last at least six months. The two can be given at the same time, although they should be injected in different areas. Mild soreness at the site of the injection is the major complaint in 50% of the adults and 15% of the children. Casual contacts probably do not need the immunization unless there has been mutual handling

of food, fluids, or articles which might act as fomites.

Travelers into areas where sanitation is casual are advised to plan ahead and get immune protection before they leave. They also should be advised to avoid fresh water, fresh vegetables, fruits, and shellfish.

HEPATITIS B

The hepatitis B virus (HBV) is a particularly vicious DNA virus that is a major contributing factor in the development of acute and chronic hepatitis, cirrhosis, and liver cancer for over 300 million infected people in the world.

Some 75% of the 300,000 new cases of hepatitis B each year are among young adults between the ages of 18 and 39.

Transmission

The hepatitis B virus is passed to others by infected persons through blood products, infected needles, or sexual contact (especially if it includes multiple partners, those with sexually transmitted diseases, or involves receptive anal intercourse). Still, about 40% of the patients with acute hepatitis B infections are not in any recognized group at risk for this disease.

Hepatitis B is particularly contagious. It can be transmitted in tiny amounts of a body fluid—especially blood. Moreover, it can live outside of the body—in dried blood, for instance—for a week or more.

Mothers can transmit the disease to newborns, and 70% to 90% of

mothers testing positive for hepatitis Be antigen (HbeAg) infect their infants.

Because blood for transfusions has been tested for the hepatitis B virus for over 20 years in the United States, the chances of receiving contaminated blood this way are very small. However, there are some questions about the safety of pooled plasma derivatives (immunoglobulins or Ig concentrates) which include those administered to prevent hepatitis A and hepatitis B.

Groups at Risk

- Intravenous drug users
- People with percutaneous punctures (tattoos)
- People who participate in receptive anal intercourse or with multiple sexual partners
- Babies born to mothers with hepatitis B
- People exposed to blood and blood products
- Patients in institutions
- People who undergo hemodialysis
- People who live in Australia, Asia, or Africa or who travel there
- Nonwhite persons

Disease Course

The incubation period is 45 to 180 days with the average being 2 to 3 months. The ability of the virus to spread to others begins even before any symptoms and may last up to 6 months after the acute period.

About 95% of the people infected with hepatitis B do not develop serious problems and do not become carriers of the virus. Indeed, about half of all patients who have hepatitis B have no idea that they have it.

Of the other 50% of patients with hepatitis B, 25% have flu-like symptoms similar to those of hepatitis A (fever, nausea, vomiting) or muscle, joint, or stomach pain. The acute phase is often more severe than with hepatitis A. The other 25% develop more serious liver involvement. Interestingly enough, the patient who does not develop jaundice is more likely to develop a chronic infection.

About 5% to 10% of those with hepatitis B infection go on to become carriers and are capable of infecting others. It is estimated that chronic carriers make up 0.1% to 0.5% of the United States population. There is some thought that the chronic active state may be due to an aberrant immune response to the virus itself. Children who are infected at birth have a 9 in 10 chance of becoming a carrier, and half of the children who get hepatitis before the age of five become carriers. Very rarely, chronic hepatitis B carriers develop immune complex disorders such as polymalgia rheumatica, polyarteritis, essential mixed cryoglobulinemia, glomeruli-nephritis, and myocarditis.

In addition to becoming chronic carriers, people with hepatitis B infections can have reactivation of the acute phase (even after treatment), progress to cirrhosis, or develop liver cancer. Approximately 20% of the patients with chronic infections die before the age of 50. Those who acquired their chronic hepatitis B infections in childhood have a much higher chance of

developing liver cancer later. This is especially true if they are male, have cirrhosis, or have had the disease for a long time.

The elderly and people who have been infected through blood or blood product transfusions have a 10% to 15% mortality risk from this disease. Four thousand people with hepatitis B infections die each year from liver damage. More than 800 die each year worldwide of liver cancer related to hepatitis B.

Diagnosis

Specific serologic tests that are helpful in diagnosing hepatitis B and in plotting the course of the disease are as follows:

Terminology	Definition	Significance
HbsAg	Surface antigen (viral coat)	+ in most cases of acute or chronic infection shows infectivity —through sexual/blood exposure
HbcAg	Core protein	+ in acute infection Not usually tested
Anti-Hbe	Antibody to core protein	+ in all acute, chronic cases and carriers Marker for HBV infection
Anti-HBs	Antibody to surface antigen	+ late in convalescence in most acute cases; protective + in most immunized patients

Treatment

As with hepatitis A, treatment of the patient with hepatitis B is symptomatic. Meals should cater to the patient's preferences and should be in small amounts four to six times a day.

Antinausea medications are indicated before meals if nausea is a problem. Avoidance of alcohol and other high-risk behaviors is also important.

Recombinant interferon-alfa-2b has been introduced in the treatment of chronic hepatitis B. Although the exact action is unknown, it is thought that the drug interferes with replication of the virus and gives the immune system a boost to seek out and destroy the virus. Similar drugs are becoming available that are more efficacious with fewer side effects. All have serious interactions and side effects, necessitating good patient/family teaching.

Prevention

Hepatitis B immunoglobulin (HBIG) should be given as soon as possible after exposure (needle stick, sexual contact), ideally within 24 hours of exposure. The recombinant HBV vaccine should follow.

Pre-exposure immunization with recombivant HBV vaccine should be considered for high-risk groups such as homosexuals or promiscuous heterosexuals, intravenous drug abusers, hemodialysis patients, institutionalized patients, close family and sexual contacts of chronic hepatitis B patients, and health-care workers. It has been recommended by the Centers for Disease Control that vaccination against the hepatitis B virus be given to all children, and it is now required for most school children in K–8 grades.

Complete adherence to Universal Precautions is highly advised as the hepatitis B virus can enter even the small cracks of dry skin, eye conjunctiva, and mucous membranes.

HEPATITIS C

According to the United States Centers for Disease Control (CDC), it is estimated that 3.9 million Americans, or 1.8%, are chronically infected with the hepatitis C virus. In the late 1980s, hepatitis C virus, or HCV, was discovered. Since then, the rate of infection has declined dramatically from an average of 230,000 infections a year to 36,000 infections per year by 1996. However, many individuals, mostly those at high risk, were not included in the national surveys conducted by the CDC to establish prevalence of HCV. Injection drug users make up the largest infected group at 60 percent of all new infections. Even though the prevalence of HCV infection through sexual transmission is slight, it still contributes to a large number of HCV infections.

Estimated Prevalence of HCV Infection in the United States	
Hemophiliacs treated prior to 1987	87%
Current injection-drug users	79%
People with abnormal alanine aminotransferase levels	15%
Chronic hemodialysis patients	10%
People with 50 or more sex partners (lifetime)	9%
People with 10 to 49 sex partners (lifetime)	3%
People with 2 to 9 sex partners (lifetime)	2%
People reporting a history of sexually transmitted diseases	6%
People receiving blood transfusions before 1990	6%
Infants born to HCV-infected mothers	5%
Men who have sex with men	4%
General population	1.8%
Health-care workers	1%

The term “non-A, non-B” was previously used to designate forms of hepatitis other than A or B. It has since been discovered that this category includes a number of hepatitis virus forms that appear to mutate fairly readily. Most of the cases formerly called “non-A, non-B” are now termed hepatitis C. Hepatitis C is now one of the most common liver diseases. It is thought to infect about 1.4% of the United States population—about 150,000 new cases each year. Even within this group, several subgroups have been identified. This may explain, in part, why infection with hepatitis C does not provide immunity against reinfection.

Transmission

Although hepatitis C is readily transmitted when there is a large volume of infected material involved, HCV is found in much lower concentrations in body fluids than hepatitis B. It is less likely to be passed from mother to neonate, to other family members, or through sexual contact. In health-care workers who have been exposed to the disease through needle sticks, 2% to 10% develop a HCV infection. However, as with hepatitis B, 40% have no discernible source of infection. It is estimated that 1% to 2% of the world’s population have chronic HCV infection.

Blood and blood product transfusion is the more common method of transmission, but even this is decreasing due to the refinement of tests that identify the virus before transfusion and by avoiding the use of the commercially available blood and blood products.

Groups at Risk

As with other forms of hepatitis, HCV is transmitted when there is intravenous drug abuse that includes needle sharing, in the process of dialysis, and from tissue/organ transplants when the donor is HCV positive. HCV has been demonstrated with intravenous immune globulin injections. Babies born to mothers who are positive for both anti-HCV and HCV RNA have a greater risk of getting the disease than if the mothers have only HCV RNA. Transmission of the disease is more likely if the mother is HIV positive.

Health-care workers who deal with patients who are positive or work with blood or blood products are at risk (although there is some evidence that the risk is not much greater than that of the general population), as are patients who need blood or blood products (hemophiliacs) and those who engage in high-risk sexual behaviors.

Disease Course

The incubation period, after exposure, is 2 to 7 weeks. The acute illness of hepatitis C is very like the other acute hepatitis forms. Sometimes a liver biopsy shows changes characteristic of hepatitis C.

Approximately 80% of patients with an HCV infection are usually asymptomatic or only mildly symptomatic, even though jaundice may be present in 25% following the incubation period.

In hepatitis C, acute infection rarely causes a massive hepatic necrosis or the syndrome of fulminant hepatic failure. However, HCV infection is more

likely to become persistent (up to 90%) and chronic in a majority of those infected than in HBV, even though the patient was healthy to start with.

In patients with a chronic infection, cirrhosis is a sequelae in from 20% to 30%. On the bright side is the understanding that about one-fourth of these patients remain stable without serious progression. However, end-stage liver failure and liver cancer, while usually slow to develop (even taking decades), do progress from chronic infection.

Diagnosis

Although the peak number of virus occurs in the preacute or early acute phase, viral presence can be detected quite quickly after exposure.

Serological Tests in Viral Hepatitis C

Agent	Terminology	Definition	Signficance
Hepatitis C HCV	Anti-HCV	Antibody to cloned	+ 5–6 weeks after signs and symptoms; not protective; shows infectivity
Hepatitis C RNA HCV RNA	HCV RNA by PCR	Polymerase chain reaction	Indicates acute or chronic HCV infection

Treatment

Although the mechanisms are not well understood, the following factors are thought to influence the course of the disease: viral genotype, level of viremia, severity of liver disease, and the hepatic iron content.

Interferon-alfa-2b is used in the treatment of hepatitis C, although the relapse rate is about 50%. There are several contraindications to its use and

many side effects. Treatment is given three times a week subcutaneously for six months at the present time.

Newer treatments are becoming available as others are in trials. The current interferon treatment costs about $350 per month.

Treatment is contraindicated in patients who persist in using intravenous drugs or excessive alcohol. Depression, pregnancy, severe thrombocytopenia or neutropenia, and decompensated liver disease also are reasons to withhold treatment.

There is discussion as to whether or not people under the age of 60 with mild hepatitis should be treated in the hope that the disease could be slowed or halted, even though the efficacy of the treatment is not fully understood.

Prevention

There is no vaccine, at present, against hepatitis C. Accurate screening of blood donations, avoiding blood exposure, and maintaining good hygienic practices are important preventive measures.

HEPATITIS D

Not as much is known about hepatitis D as some of the other infections. Hepatitis D (delta virus) must have the HBV in order to survive. It is never seen alone. HDV can be contracted at the same time as HBV or it may occur as a superinfection after the patient has gotten HBV. The usual incubation period is

35 days.

Serological Tests in Hepatitis D

Agent	Terminology	Definition	Significance
Hepatitis D HDV	Anti-HDV (Igm of IgG)	Antibody to HDV	Indicates infection; not protection

Co-infection by HDV and HBV seems to cause a more serious acute condition and carries with it a higher risk of developing fulminant liver disease. Co-infection survivors do not seem to become HBV or HDV chronic carriers. Carriers of chronic HBV who then become infected with HDV (superinfection) have from 70% to 80% greater incidence of chronic liver disease with cirrhosis, and the progression is more rapid than in other hepatitis infections.

Transmission of HDV is mainly through blood products (the same as HBV), although HDV seems to be less often passed through sexual transmission. Intravenous drug users and hemophiliacs are at increased risk for the HDV. Patients with HBV need to be cautioned about the risks of continuing drug abuse to help prevent the HDV superinfection.

Interferon therapy has been tried without overwhelming success, and further studies are in progress. Being vaccinated against HBV prevents HDV infection, but only if the person has not already been infected with HBV.

HEPATITIS E

Hepatitis E is another of the former "non-A, non-B" viruses. Although some cases have been reported in the United States from world travelers, this virus mainly resides in Southeast and Central Asia, the former Soviet Union, Africa, and Mexico. Contaminated water has been the usual cause of large outbreaks in the developing countries.

Household members of infected persons do not seem to readily contract this virus, so the current thinking is that the usual oral-fecal route is not a major factor.

Serological Testing in Hepatitis E

Agent	Terminology	Definition	Significance
Hepatitis E	Anti-HEV IgM type	Antibody to HEV antigen	Current or recent infection of convalescence
	IgG type		Current or previous infection indicates immunity

To date there is little information as to groups at risk for the HEV virus. HEV infection is similar to that of hepatitis A virus. It is more often noted among adults, but this may be because the clinical course in children is so mild. The average incubation period is about 40 days.

Hepatitis E has a death rate of about 1%, although in infected pregnant women, that rate goes up to 20%.

There is no immunization—active or passive—for HEV at this time.

HEPATITIS G

In January 1996, hepatitis G was formally acknowledged. It had previously been labeled as hepatitis X. There appear to be at least three variations called GBV-A, GBV-B, and GBV-C.

These viruses have been found in the at-risk people—as in hepatitis B—as well as in patients with acute and chronic hepatitis. Early research shows that it can be transmitted from an infected mother to the neonate. Little else is known about these viruses at this time.

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COURSE EXAMINATION

Hepatitis A to G

Test Completion Date_____
(Always keep a copy of your answer sheet for your records.)

DO NOT REMOVE THIS EXAMINATION FROM THIS COURSE BOOKLET.

Please Read the Following Instructions Before Beginning the Examination.

Fill in your answers on the detached answer sheet inserted with your course packet. Return the completed answer sheet/course evaluation to GSC Home Study Courses at the address listed on the detached answer sheet OR submit your answers on the web at *www.gscce.com* for instant grading. Receive your certificate of completion immediately. A 75% passing grade is required.

1. Which of the following is **NOT** a major function of the liver?

   A. Metabolism
   B. Filtering
   C. Storage
   D. Production of red blood cells

2. There is a great similarity in the symptoms in the various forms of viral hepatitis. However, there are also differences. How are these differences identified?

   A. Modes of transmission and incubation times
   B. Disease course and complications
   C. Antibody and immune responses
   D. All of the above

3. Many tests are available to determine the presence and extent of hepatic disease. Which of the following tests are used as an indicator of liver damage?

   A. Bilirubin (total)
   B. Albumin
   C. Prothrombin Time
   D. Alanin Aminotransferase (ALT)

4. Which of the following is **NOT** an ordinary sign or symptom of hepatitis?

   A. Darkened urine
   B. Jaundice
   C. Severe liver necrosis
   D. Vague flu-like malaise

5. Viral hepatitis usually follows a three-phase disease course pattern. Which of the following statements contain **FALSE** information regarding the three-phase disease course pattern?

   A. Prodromal phase-lasts several days to a week
   B. Icteric phase-pruritis may be absent
   C. Prodromal phase-nonspecific flu-like symptoms with arthralgias,
   D. Convalescent phase-weakness and malaise are frequently present

6. Hepatitis A or infectious hepatitis is uniquely and primarily transmitted by which of the following routes?

   A. Water
   B. Blood Transfusion
   C. Fecal-oral routes
   D. Eating incompletely cooked or raw shellfish

7. People infected with the hepatitis A virus should be able to return to school or work _____ after the appearance of signs and symptoms without fear of passing the infection to others.

   A. Two to six weeks
   B. One or two months
   C. Two or three weeks
   D. Four to seven days

8. What should you do when traveling to a third-world country to avoid contacting Hepatitis A?

   A. Wear gloves when using restroom facilities
   B. Stay away from tourist attractions where exposure may be greater
   C. Avoid fresh water, vegetables, fruits, and shellfish
   D. Avoid eating beef and chicken

9. Which of the following is at the least risk for hepatitis B?

   A. Those with multiple sex partners
   B. People undergoing blood transfusions
   C. Babies born to hepatitis B patients
   D. Intravenous drug users

10. Which of the following is the average incubation period for hepatitis B?

   A. 2–3 months
   B. 2–3 weeks
   C. 20–30 days
   D. 4–6 months

11. Those who acquired chronic hepatitis B infections in childhood have a much greater chance of developing liver cancer.

   A. True
   B. False

12. The Centers for Disease Control does not recommend that all children be vaccinated against the hepatitis B virus.

   A. True
   B. False

13. Besides Hemophiliacs treated prior to 1987, Hepatitis C (HCV) is most prevalent in the United States in infants born to HCV-infected mothers.

   A. True
   B. False

14. Which of the following is the incubation time range for hepatitis C (HCV?

   A. 20–30 days
   B. 5–10 weeks
   C. 1–6 months
   D. 2–7 weeks

15. Of the health care workers who have been exposed to Hepatitis C (HCV) through needle sticks 25% to 35% have a chance to develop an HCV infection.

   A. True
   B. False

16. There is no current drug being used in the treatment of Hepatitis C (HCV).

A. True
B. False

17. Which of the following practices are important preventative measures for Hepatitis C (HCV)?

A. Screening of blood donations
B. Avoiding exposure to blood
C. Practicing good hygiene in the dental office
D. All of the above

18. The incubation period for Hepatitis D is which of the following?

A. 35 days
B. 4-6 weeks
C. 1-25 days
D. 8-10 weeks

19. Transmission of HDV is mainly through blood products?

A. True
B. False

20. Which of the following was originally labeled Hepatitis X?

A. Hepatitis D
B. Hepatitis G
C. Hepatitis A
D. Hepatitis C