Viral Hepatitis Prevention: Overview

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VIRAL HEPATITIS

VIRUS	Nucleic Acid	FAMILY	TRANSMIT	CHRONIC	TREATMENT	VACCINE
Hep A	+ssRNA	Picornavirus	Fecal-oral	No	Supportive	Yes Ig
Hep B	DNA	Hepadnavirus	Blood	Yes	Interferon Lamividine	Yes HBIG
Hep C	+ssRNA	Flavivirus	Blood	Yes	Interferon-ribavirin	No
Hep D	-ssRNA	Defective	Blood	Yes	Interferon Lamividine	Yes (HepB)
Hep E	+ssRNA	Picornavirus	Fecal-oral	No	Supportive	No
Hep G	+ssRNA	Flavivirus	Blood	?	None	No

Viral Hepatitis Prevention

Primary prevention be achieved either through
immunization (i.e., HAV or HBV)
behavioral interventions to reduce risk factors for infection (i.e., HCV).

Prevention of HAV

How is HAV transmitted?

- **Person-to-person transmission through the fecal-oral route.**
- Outbreaks and sporadic cases also can occur from **exposure to fecally contaminated food or water.**

Peak infectivity occurs during the 2-week period before onset of jaundice or elevation of liver enzymes, when concentration of virus in stool is highest therefore the virus is disseminated before the diagnosis is made.

How long does HAV survive outside the body?

HAV can live outside the body for months, depending on the environmental conditions.

How can the virus be killed?

The virus is killed by heating to 185 degrees F (85 degrees C) for one minute. Adequate chlorination greater than 5000 ppm of free chlorine also, kills HAV

Who is at increased risk for acquiring HAV infection?

- Travelers to countries with high or intermediate endemicity of HAV infection
- Men who have sex with men
- Users of injection of illegal drugs
- Persons with clotting factor disorders
- Persons working with nonhuman primates susceptible to HAV infection

How is HAV infection prevented?

Hepatitis A vaccine is the best way to prevent HAV infection in persons 12 months of age and older.

Immune serum globulin is available for short-term protection (approximately 3 months), both pre- and post-exposure.

Good hygiene — including handwashing after using the bathroom, changing diapers, before preparing or eating food. heating to 185 degrees F (85 degrees C) for one minute and adequate chlorination of water

Who should be vaccinated against Hepatitis A?

*All children at age 1 year (i.e., 12–23 months).

*Children and adolescents ages 2–18 who live in high disease incidence.

*Persons traveling to countries that have high or intermediate rates of Hepatitis A.

*Men who have sex with men.

***Users of illegal injection.**

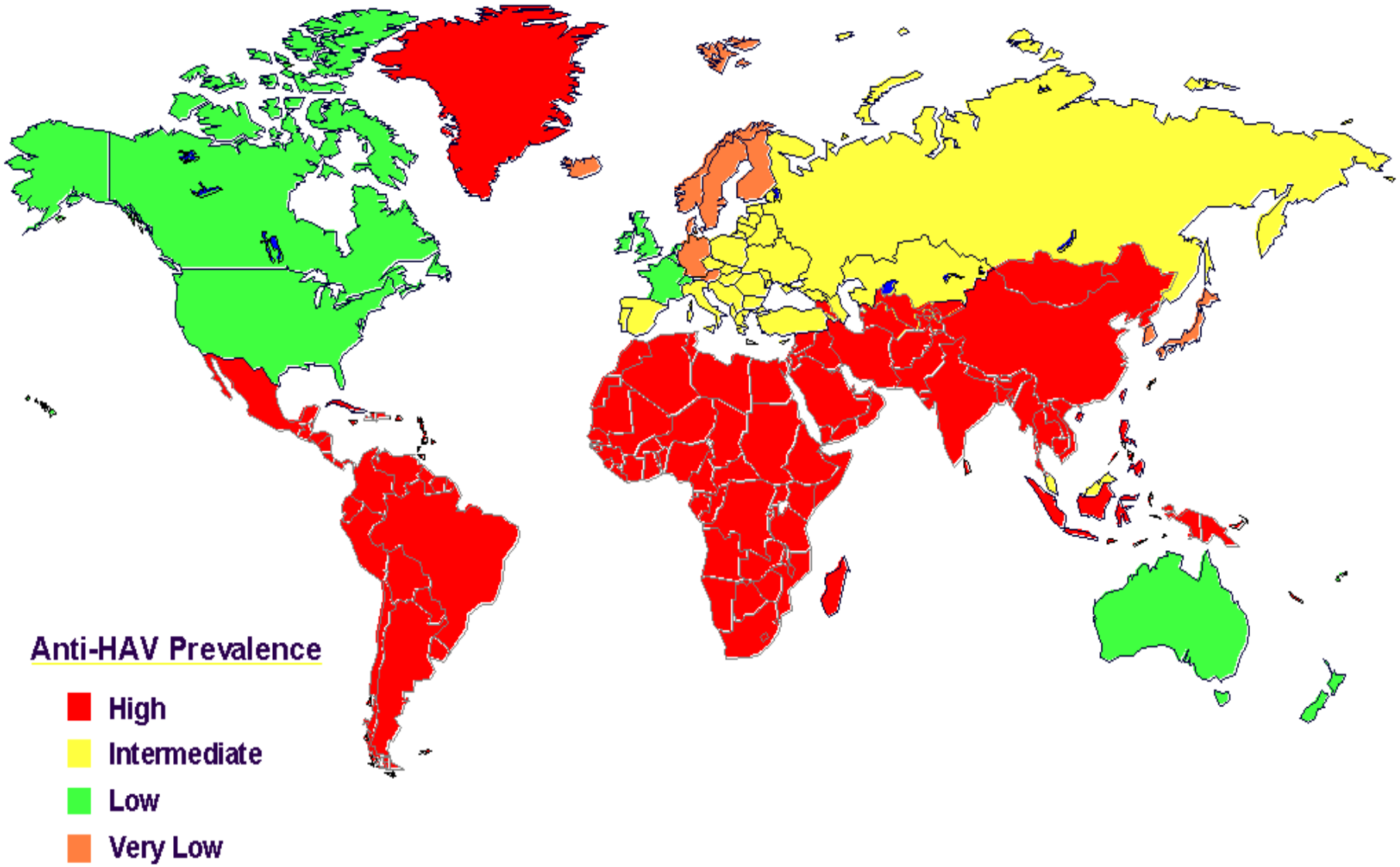
***Persons who have occupational risk for infection**

***Persons who have chronic liver disease**

*Persons who are either awaiting or have received liver transplants

***Persons who have clotting-factor disorders.**

Geographic Distribution of HAV Infection



Which Hepatitis A vaccines are licensed for use in the United States?

single-antigen Hepatitis A vaccines, HAVRIX® and VAQTA®.

A combination vaccine, TWINRIX®), contains both HAV and Hepatitis B virus antigens. All are inactivated vaccines.

Licensed dosages and schedules for HAVRIX ® [1]

Age	Dose (ELISA units)[2]	Volume (mL)	No. of doses	Schedule (mos)[3]
12 mos–18 yrs	720	0.5	2	0,6-12
≥19 years	1,440	1.0	2	0,6-12

How long does protection from Hepatitis A vaccine last?

protective levels of antibody to HAV could be present for at least 25 years in adults and at least 14–20 years in children.

Can Hepatitis A vaccine be administered concurrently with other vaccines?

Yes. Hepatitis B, diphtheria, poliovirus (oral and inactivated), tetanus, oral typhoid, cholera, Japanese encephalitis, rabies, and yellow fever vaccines and immune globulin can be given at the same time that Hepatitis A vaccine is given, but at a different injection site.

Can Hepatitis A vaccine be given during pregnancy?

The safety of Hepatitis A vaccination during pregnancy has not been determined. The risk associated with vaccination, however, should be weighed against the risk for Hepatitis A in women who might be at high risk for exposure to HAV.

Can Hepatitis A vaccine be given to immunocompromised persons (e.g., persons on hemodialysis or persons with AIDS)?

Yes. Because Hepatitis A vaccine is inactivated, no special precautions need to be taken when vaccinating immunocompromised persons

How soon before travel should the first dose of Hepatitis A vaccine be given?

The first dose of Hepatitis A vaccine should be administered as soon as travel is considered.

Previously, Hepatitis A vaccination was recommended to be administered at least 2–4 weeks before departure to an area with intermediate or high rates of Hepatitis A.

Travelers who were departing in less than 2 weeks were recommended to receive IG for short-term protection.

What should be done if a traveler cannot receive Hepatitis A vaccine?

should receive a single dose of immune globulin (0.02 mL/kg), which provides effective protection against Hepatitis A virus infection for up to 3 months. Travelers whose travel period exceeds 2 months should be administered immune globulin at 0.06 mL/kg; administration must be repeated if the travel period exceeds 5 months.

What should be done for travelers less than 12 months of age?

Immune globulin is recommended because Hepatitis A vaccine is currently not licensed for use in this age group.

Postexposure Prophylaxis for Hepatitis A

injection of immune globulin (IG)

In June 2007, U.S. guidelines were revised to allow for Hepatitis A vaccine or IG (0.02 mL/kg) as soon as possible, within 2 weeks after exposure.

If a case of Hepatitis A is found in a school, hospital, or office setting, what should be done?

If a single case of Hepatitis A is identified, and if the source of infection is outside the school or work setting, PEP (i.e., injection of IG or Hepatitis A vaccine) is not routinely recommended.; instead, careful hygienic practices should be emphasized.

However, if it is determined that Hepatitis A has been spread among students in a school or among patients and staff in a hospital, PEP (i.e., injection of IG or Hepatitis A vaccine) should be administered to unvaccinated persons who have had close contact with an infected person.

Prevention of HBV

Has the rate of new HBV infections in the United States declined?

The rate of new HBV infections has declined by approximately 82% since 1991, when routine vaccination of children was first recommended.

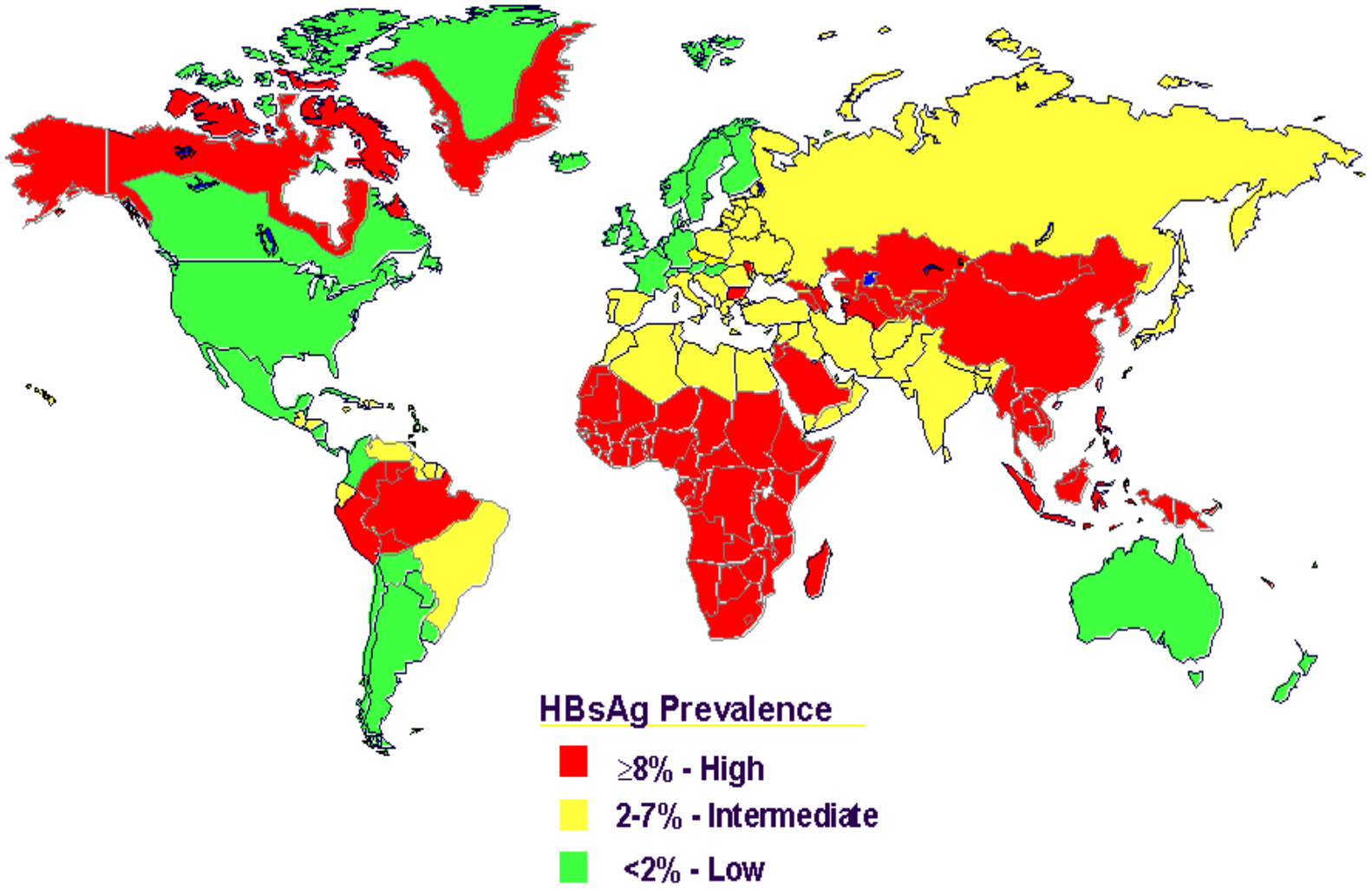
How is HBV transmitted?

HBV is transmitted through activities that involve percutaneous (i.e., puncture through the skin) or mucosal contact with infectious blood or body fluids (e.g., semen, saliva).

including
*Sex with an infected partner
*Injection drug use that involves sharing needles, syringes, or drug-preparation equipment
*Birth to an infected mother
*Contact with blood or open sores of an infected person
*Needle sticks or sharp instrument exposures
*Sharing items such as razors or toothbrushes with an infected person

HBV is not spread through food or water, sharing eating utensils, breastfeeding, hugging, kissing, hand holding, coughing, or sneezing.

Geographic Distribution of Chronic HBV Infection



How long does HBV survive outside the body?

HBV can survive outside the body at least 7 days and still be capable of causing infection.

What should be used to remove HBV from environmental surfaces?

Any blood spills — including dried blood, which can still be infectious — should be cleaned using 1:10 dilution of one part household bleach to 10 parts of water for disinfecting the area. Gloves should be used when cleaning up any blood spills.

What are the recommended schedules for Hepatitis B vaccination?

The vaccination schedule most often used for children and adults is 3 intramuscular injections, the second and third doses administered 1 and 6 months, respectively, after the first dose. Alternate schedules have been approved for certain vaccines and/or populations.

Can Hepatitis B vaccine be administered concurrently with other vaccines?

Yes. When Hepatitis B vaccine has been administered at the same time as other vaccines, no interference with the antibody response of the other vaccines has been demonstrated. Separate body sites and syringes should be used for simultaneous administration of injectable vaccines.

Recommended doses of currently licensed formulations of Hepatitis B vaccine, by age group and vaccine type

Age Group		Single-antigen vaccine				Combination vaccine					
		Recombivax HB		Engerix-B		Comvax*		Pediarix†		Twinrix§	
		Dose (µg)¶	Vol(mL)	Dose (µg)¶	Vol(mL)	Dose (µg)¶	Vol (mL)	Dose (µg)¶	Vol (mL)	Dose (µg)¶	Vol (mL)
Infants (<1 yr)		5	0.5	10	0.5	5	0.5	10	0.5	NA**	NA
Children (1–10 yrs)		5	0.5	10	0.5	5*	0.5	10†	0.5	NA	NA
Adolescents	11–15 yrs	10††	1.0	NA	NA	NA	NA	NA	NA	NA	NA
	11–19 yrs	5	0.5	10	0.5	NA	NA	NA	NA	NA	NA
Adults (≥20 yrs)		10	1.0	20	1.0	NA	NA	NA	NA	20§	1.0
	<20 yrs§§	5	0.5	10	0.5	NA	NA	NA	NA	NA	NA
Hemodialysis patients and other immuno-compromised persons	≥20 yrs	40¶¶	1.0	40***	2.0	NA	NA	NA	NA	NA	NA

How long does protection from Hepatitis B vaccine last?

Studies indicate that immunologic memory remains intact for at least 20 years among healthy vaccinated individuals who initiated Hepatitis B vaccination >6 months of age. The vaccine confers long-term protection against clinical illness and chronic Hepatitis B virus infection. Cellular immunity appears to persist even though antibody levels might become low or decline below detectable levels.

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Can Hepatitis B vaccine be given during pregnancy or lactation?

Yes. Hepatitis B vaccine contains no live virus, so neither pregnancy nor lactation should be considered a contraindication to vaccination of women.

Can Hepatitis B vaccine be given to immunocompromised persons, such as persons on hemodialysis or persons with HIV infection?

Yes, although a larger vaccine dose is required to induce protective antibody in hemodialysis patients. Larger doses or additional doses might also be necessary for other immunocompromised persons.

Is there any benefit or risk in vaccinating a person who has been infected with HBV?

Persons who have already been infected with HBV will receive no benefit from vaccination. However, there is no risk to a previously infected person who receives vaccination.

Can Hepatitis B vaccine be given after exposure to HBV?

Yes. soon as possible but preferably within 24 hours, can effectively prevent infection. The mainstay of postexposure immunoprophylaxis is Hepatitis B vaccine, but in certain circumstances the addition of HBIG will provide increased protection.

Hepatitis B Vaccine:

- Composition: Recombinant HBsAg
- Efficacy: 95% (Range, 80%-100%)
- Duration of Immunity: 10 years or more
- Schedule: 3 Doses
- Booster doses: not routinely recommended

Hepatitis B Vaccine Formulations:

- Recombivax HB (Merck):
  - 5 mcg/0.5 mL (pediatric)
  - 10 mcg/1 mL (adult)
  - 40 mcg/1 mL (dialysis)

- Engerix-B (GSK):
  - 10 mcg/0.5 mL (pediatric)
  - 20 mcg/1 mL (adult)

Strategy to Eliminate Hepatitis B Virus Transmission:

- Prevent perinatal HBV transmission.
- Routine vaccination of all infants.
- Vaccination of children and adolescents. in high-risk groups.
- Vaccination of adults in high-risk groups
- behavioral interventions to reduce risk factors for infection

behavioral interventions to reduce risk factors for infection and to prevent passing the virus to others.

- Don't share personal care items that might have blood on them, such as razors or toothbrushes
- Never share needles, syringes, water, or "works" (equipment for intravenous drug use)
- Consider the risks of getting tattoos or body piercings.
- Don't donate blood, organs, or tissue if you have hepatitis B
- Limit number of sex partners and use latex condoms every time.

Hepatitis B Perinatal Transmission

- If mother positive for HBsAg and HBeAg:
  - 70%-90% of infants infected.
  - 90% of infected infants become chronically infected.
- If positive for HBsAg only:
  - 5%-20% of infants infected.
  - 90% of infected infants become chronically infected.

*in the absence of postexposure prophylaxis.

How to prevent perinatal Hep B transmission:

- Identify HBsAg-positive pregnant women through serologic screening.
- Provide prophylaxis for infant born to HBsAg-positive women.
- Provide the birth dose of hepatitis B vaccine to ALL infants.

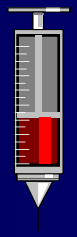
Prevention of Perinatal Hepatitis B Virus Infection:

- Begin within 12 hours of birth.
- Hepatitis B vaccine (first dose) and HBIG at different sites.
- Complete vaccination series at 6 months of age.
- Test for response after completion of at least 3 doses of the Hep B series

Baby Shots for Hepatitis B

if the mother has Hepatitis B

Birth



Hepatitis B Vaccine

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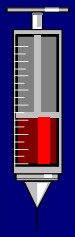

H-BIG

1 - 2 months old

Hepatitis B Vaccine

6 months old

Hepatitis B Vaccine

What if baby does not get these shots?

Up to 9 out of 10 babies born to infected mothers will end up being carriers for the rest of their lives, if they do not get the shots.

Babies who end up as carriers have a 1 out of 4 chance of dying from liver problems.

19 out of 20 babies who get the shots will be protected for life!

Routine vaccination of all infants

Routine Infant Schedule:

Dose+	Usual Age	Minimum Interval
1	Birth	- - -
2	1- 2 months	4 weeks
3	6-18 months*	8 weeks**

Vaccination of adults in high-risk groups.

-Household contacts of persons with chronic HBV infection

-Injection drug users:

-Men who have sex with men and individuals who have had multiple sex partners, or who have been diagnosed with a sexually transmitted disease.

-Persons at risk for occupational exposure to HBV

-Individuals who get tattoos.

-Travel to countries where hepatitis B is common. Although extended-stay travelers are at high risk for hepatitis B, short-stay travelers also are at risk. 3-dose regimen on a 0-,7-, and 21-day schedule give excellent, rapid, and long-term protection.

-Maintenance hemodialysis patients.

-Police, armed forces, emergency services personnel.

-Individuals with chronic liver disease and/or hepatitis C.

-HIV-positive persons.

Postvaccination Serologic Testing

- Not routinely recommended following vaccination of infants, children, adolescents, or most adults.
- Recommended for:
  - Infants born to HBsAg+ women.
  - Hemodialysis patients.
  - Immunodeficient persons.
  - Sex partners of persons with chronic HBV infection.
  - Certain healthcare personnel.

Management of Nonresponse to Hepatitis B Vaccine:

- Complete a second series of three doses.
- Should be given on the usual schedule of 0, 1 and 6 months.
- Retest 1-2 months after completing the second series.

Persistent Nonresponse to Hepatitis B Vaccine:

- Less than 5% of vaccinees do not develop anti-HBs after 6 valid doses.
- May be non- or hyporesponder.
- Check HBsAg status.
- If exposed, treat as nonresponder with postexposure prophylaxis.

Hepatitis D

HDV is an incomplete virus that requires the helper function of HBV to replicate and only occurs among people who are infected with the HBV.

HDV can be acquired either as a coinfection with HBV or as superinfection in persons with HBV infection.

There is no vaccine for Hepatitis D, but it can be prevented in persons who are not already HBV-infected by Hepatitis B vaccination.

Hepatitis D - Prevention

- HBV-HDV Coinfection

  Pre or postexposure prophylaxis to prevent HBV infection.

- HBV-HDV Superinfection

  Education to reduce risk behaviors among persons with chronic HBV infection.

Hepatitis C

How is HCV transmitted?

HCV is transmitted through activities that involve percutaneous (i.e., puncture through the skin) or mucosal contact with infectious blood or body fluids (e.g., semen, saliva).

How is HCV transmitted?

HCV is transmitted primarily through large or repeated percutaneous (i.e., passage through the skin) exposures to infectious blood, such as

Injection drug use

Receinpt of donated blood, blood products, and organs

Needlestick injuries in health care settings

Birth to an HCV-infected mother

HCV can also be spread infrequently through

Sex with an HCV-infected person (an inefficient means of transmission)

Sharing personal items contaminated with infectious blood, such as razors or toothbrushes (also inefficient vectors of transmission)

Other health care procedures that involve invasive procedures, such as injections (usually recognized in the context of outbreaks)

Can HCV be spread within a household?

Yes, but this does not occur very often. If HCV is spread within a household, it is most likely a result of direct, through-the-skin exposure to the blood of an infected household member.

Why do most persons remain chronically infected with HCV?

A person infected with HCV mounts an immune response to the virus, but replication of the virus during infection can result in changes that evade the immune response. This may explain how the virus establishes and maintains chronic infection.

Can persons become infected with a different strain of HCV after they have cleared the initial infection?

Yes. Prior infection with HCV does not protect against later infection with the same or different genotypes of the virus. This is because persons infected with HCV typically have an ineffective immune response due to changes in the virus during infection. For the same reason, no effective pre- or postexposure prophylaxis (i.e., immune globulin) is available.

Is there a Hepatitis C vaccine?

No vaccine for Hepatitis C is available. Research into the development of a vaccine is under way.

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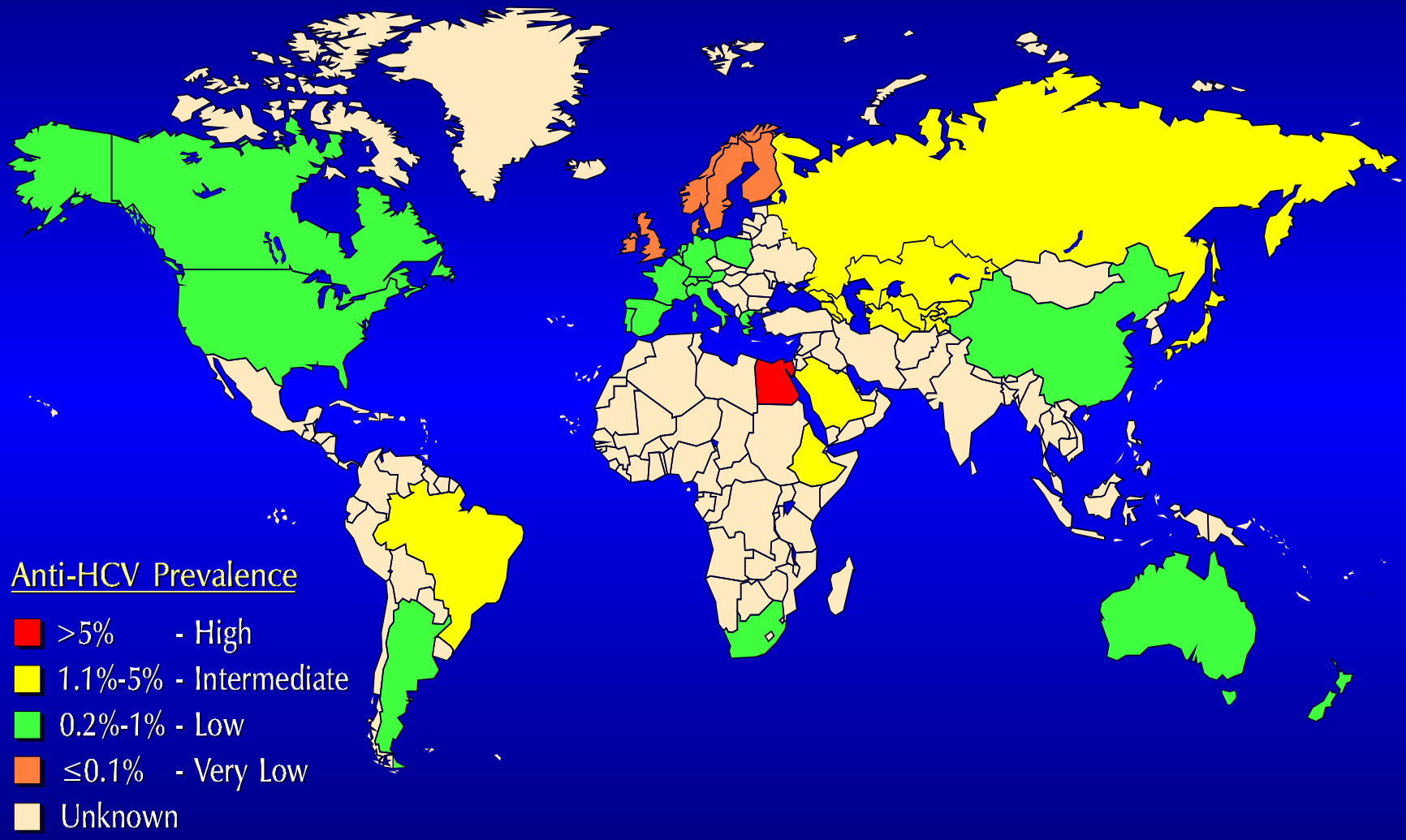
Should HCV-infected persons be restricted from working in certain occupations or settings?

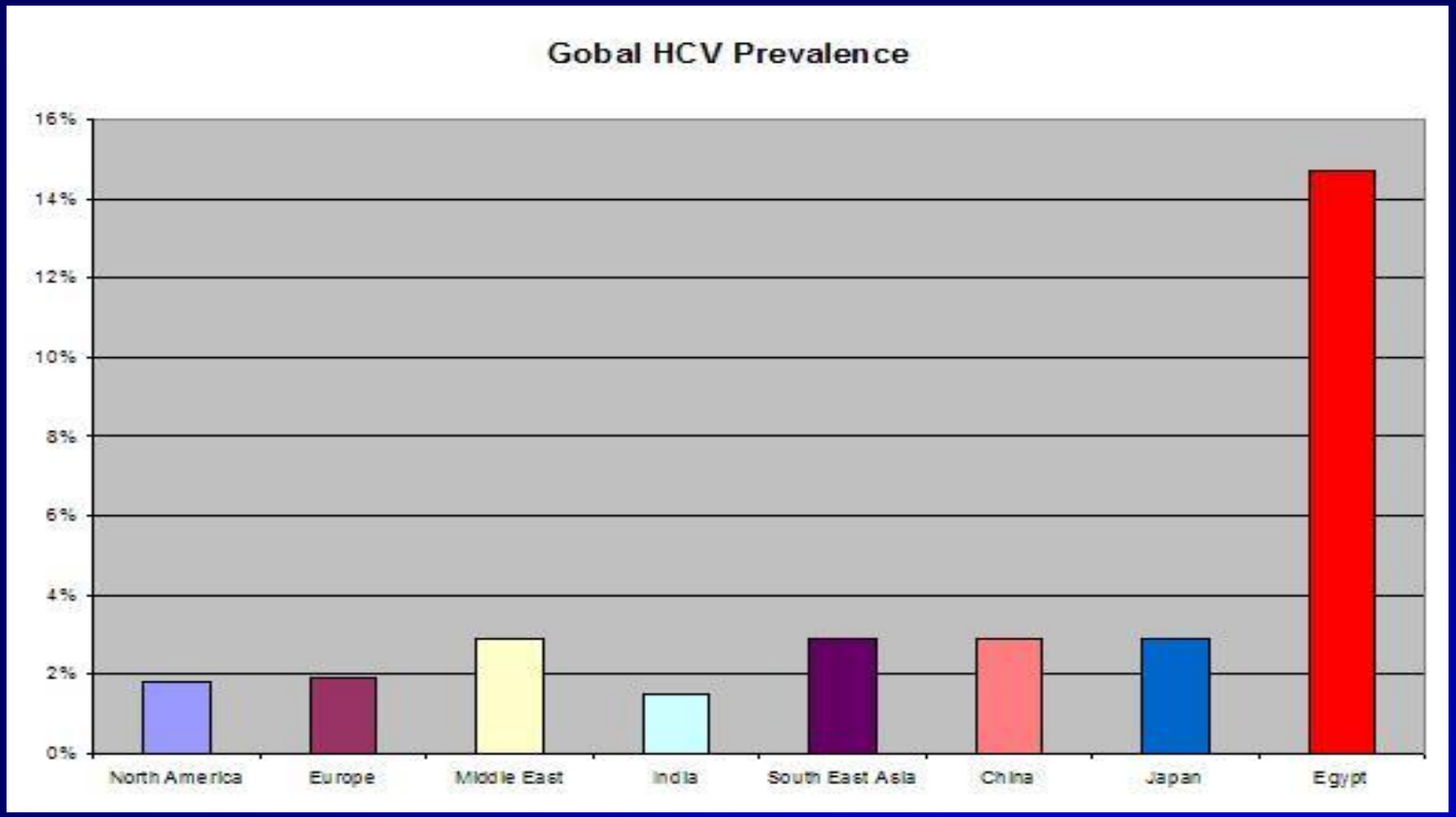
CDC's recommendations for prevention and control of HCV infection specify that persons should not be excluded from work, school, play, child care, or other settings on the basis of their HCV infection status. There is no evidence of HCV transmission from food handlers, teachers, or other service providers in the absence of blood-to-blood contact.

Prevalence of HCV Infection Among Blood Donors*



* Anti-HCV prevalence by EIA-1 or EIA-2 with supplemental testing; based on data available in January, 1995.

CDC



14.7% of Egyptians are positive for HCV antibody

El-Zanaty, Fatma and Ann Way. 2009.
Egypt Demographic and Health Survey 2008. Cairo, Egypt.

The percentage of Egyptians with HCV is 14.7%. This is ~ten times greater than any other country in the world.

The prevalence of HCV varies throughout our country. The Nile Delta appears to have the highest prevalence, ~28%. The population of Upper Egypt, seems to have the lowest HCV prevalence.

Prevention

Currently, there is no vaccine to prevent hepatitis C infection.

The Centers for Disease Control and Prevention recommends:

- Don't share personal care items that might have blood on them, such as razors or toothbrushes
- Never share needles, syringes, water, or "works" (equipment for intravenous drug use) Consider the risks of getting tattoos or body piercings.
- Don't donate blood, organs, or tissue if you have hepatitis C

Prevention of Hepatitis C

- Screening of blood, organ, tissue donors
- High-risk behavior modification
- Blood and body fluid precautions

Postexposure Management for HCV

After a percutaneous or permucosal exposure to blood, the source person should be tested for anti-HCV. If the source person is anti-HCV--positive, the exposed person should be tested for anti-HCV and ALT activity at baseline and 4--6 months later. For earlier diagnosis, testing for HCV RNA can be performed at 4--6 weeks .

IG and antiviral agents are not recommended for postexposure prophylaxis of hepatitis C

Hepatitis E is a serious liver disease caused by the Hepatitis E virus (HEV) that usually results in an acute infection. It does not lead to a chronic infection. Transmission: Ingestion of fecal matter, even in microscopic amounts; outbreaks are usually associated with contaminated water supply in countries with poor sanitation. Vaccination: There is currently no FDA-approved vaccine for Hepatitis E.

HEPATITIS E

Prevention:

Avoid drinking water of unknown purity, uncooked shellfish, and uncooked fruit/vegetables not peeled or prepared by traveler

HEPATITIS G (GB)

Blood borne flavivirus, related to HCV

Benign clinical course

No treatment required

No vaccines available

Diagnose with HGV RNA


Thank you