Outline

- Hepatitis A
  - Epidemiology and screening
  - Transmission

- Hepatitis B
  - Epidemiology and screening recommendations
  - Transmission

- Hepatitis C
  - Epidemiology and screening
  - Transmission
The Liver

What is my liver?
Your liver is a large and important organ in your body

Where is my liver?
Your liver is located behind the lower right part of your ribs
The Liver

What does my liver do?

- Stores vitamins, sugars, fats and other nutrients from the food that you eat.
- Builds chemicals that your body needs to stay healthy.
- Breaks down harmful substances, like alcohol and other toxic (poisonous) chemicals.
- Removes waste products from your blood.
- Makes sure that your body has just the right amount of other chemicals that it needs.
Viral Hepatitis

What is hepatitis?
Hepatitis is a disease that affects the liver. It is often caused by viruses such as the
- hepatitis A virus (HAV)
- hepatitis B virus (HBV)
- hepatitis C virus (HCV)

According to government estimates, almost 4 million people in the U.S. have been infected with the hepatitis C virus.
VIRAL HEPATITIS

HISTORICAL PERSPECTIVE

“Infectious”

Viral hepatitis

“Serum”

“NANB”

Enterically transmitted

Parenterally transmitted

other
Prevalence

Relative proportions of acute viral hepatitis by type, United States, 1982–1990

- Hepatitis A: 43%
- Hepatitis B: 32%
- Hepatitis C: 21%
- Hepatitis non-A, non-B, non-C: 4%
<table>
<thead>
<tr>
<th>Disease</th>
<th>Cases</th>
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</thead>
<tbody>
<tr>
<td>Hepatitis A</td>
<td>10,609</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>7,843</td>
</tr>
<tr>
<td>Mumps</td>
<td>266</td>
</tr>
<tr>
<td>Measles</td>
<td>116</td>
</tr>
</tbody>
</table>

Source: NNDSS, CDC
HEPATITIS A VIRUS
HEPATITIS A VIRUS

- RNA Picornavirus
  - Single serotype worldwide
  - Acute disease and asymptomatic infection
- No chronic infection
  - Protective antibodies develop in response to infection - confers lifelong immunity
GEOGRAPHIC DISTRIBUTION OF HEPATITIS A VIRUS INFECTION

Anti-HAV Prevalence
- High
- High/Intermediate
- Intermediate
- Low
- Very Low
REPORTED CASES OF HEPATITIS A, UNITED STATES, 1952-2002

Source: NNDSS, CDC
HEPATITIS A VIRUS TRANSMISSION

- Close personal contact
  (e.g., household contact, sex contact, child day-care centers)

- Contaminated food, water
  (e.g., infected food handlers)

- Blood exposure (rare)
  (e.g., injection drug use, rarely by transfusion)
RISK FACTORS ASSOCIATED WITH REPORTED HEPATITIS A, 1990-2000, UNITED STATES

- Unknown: 46%
- Contact of day-care child/employee: 6%
- Sexual or Household Contact: 8%
- Other Contact: 4%
- Food- or waterborne outbreak: 2%
- Men who have sex with men: 10%
- Injection drug use: 6%
- International travel: 5%
- Child/employee in day-care: 14%

Source: NNDSS/VHSP
PREVENTING HEPATITIS A

• Hygiene  (e.g., hand washing)
• Sanitation  (e.g., clean water sources)
• Hepatitis A vaccine (pre-exposure)
• Immune globulin (pre- and post-exposure)
1999 ACIP RECOMMENDATIONS FOR STATEWIDE ROUTINE HEPATITIS A VACCINATION OF CHILDREN

Rate > 20/100,000* Recommended
Rate 10-20/100,000* Considered
Rate < 10/100,000* Not statewide

* Based on average incidence rate during baseline period (1987-97)
ACIP RECOMMENDATIONS
PERSONS AT INCREASED RISK OF INFECTION, 1996

- Men who have sex with men
- Illegal drug users
- International travelers
- Persons who have clotting factor disorders
- Persons with chronic liver disease
SAFETY OF HEPATITIS A VACCINE

- Most common side effects
  - Soreness/tenderness at injection site - 50%
  - Headache - 15%
  - Malaise - 7%
- No severe adverse reactions attributed to vaccine
- Safety in pregnancy not determined – risk likely low
- Contraindications - severe adverse reaction to previous dose or allergy to a vaccine component
- No special precautions for immunocompromised persons
Global Distribution of Chronic Hepatitis B Infection

- Red: >8% - High
- Yellow: 2% - 7%
- Green: <2% - Low

Intermediate
Hepatitis B Epidemiology

- Transmission
  - perinatal, percutaneous and sexual exposures as well as close person to person contact
- HBV can survive outside the body for prolonged periods.
- The risk of developing chronic HBV after acute exposures
  - 90% in newborns of HBeAg positive mothers to 25-30% in infants and children < 5 and less than 10% in adults.
Fulminant Hepatitis B
Clinical Status - Hepatitis B

- **Chronic Hepatitis B**
  - HBsAg positive > 6 months
  - Serum HBV DNA > $10^5$ copies /ml
  - Elevation in Liver Tests
  - Liver biopsy showing inflammation and injury

- **Inactive HBsAg Carrier State**
  - HBsAg positive > 6 months
  - No detectable HBV DNA
  - Normal Liver Tests
  - Liver biopsy without inflammation and injury
Cirrhosis - Chronic Hepatitis B
Ascites and Other Manifestations of Cirrhosis
Recommendations for screening for HBV infections

- Persons born in hyperendemic areas
- Homosexual
- Injection drug users
- Dialysis patients
- HIV infected individuals
- Pregnant women
- Family members, household members and sexual contacts of HBV infected persons.
Vaccinations for patients with chronic Hepatitis B

- All persons with chronic hepatitis B not immune to hepatitis A should receive 2 doses of hepatitis A vaccine 6 to 18 months apart
Counseling and Prevention of Hepatitis B

- Heavy use of alcohol have been associated with higher ALT levels and development of cirrhosis and HCC at a younger age.
- Carriers of HBV counseled as to the risk of transmission
- Household members should be vaccinated if negative for HBV serologic markers.
- Screening should be performed by testing for HBsAg and anti-HBsAb.
- Steady sexual partners should be tested and vaccinated.
COMBINED HEPATITIS A HEPATITIS B VACCINE

- Approved by the FDA in United States for persons ≥18 years old
- Contains 720 EL.U. hepatitis A antigen and 20 µg. HBsAg
- Vaccination schedule: 0, 1, 6 months
- Immunogenicity similar to single-antigen vaccines given separately
- Can be used in persons ≥18 years old who need vaccination against both hepatitis A and B
Worldwide distribution of HCV Genotypes
How Is the Hepatitis C Virus Spread?

The hepatitis C virus is spread through contact with the blood of an infected person. Some of the ways that people have been infected include having:

- had a blood transfusion or organ transplant before 1992
- a clotting factor problem, and being given a blood product before 1987
- used a contaminated needle to inject drugs like heroin or cocaine, even if it was only once, many years ago
- been on long-term kidney dialysis
How Is the Hepatitis C Virus Spread?

The hepatitis C virus is spread through contact with the blood of an infected person. Some of the ways that people have been infected include having

- been a health care worker and having had contact with blood in the workplace, especially through needle stick injuries
- been born to a woman who had hepatitis C when she gave birth to you
How Can I Decide If I Am at Risk for Hepatitis C?

Talk with your health care provider if:

- you had a blood transfusion before 1992
- you have injected drugs (past or present)
- you have unexplained liver disease
- you have unexplained/abnormal ALT levels
- you have a history of drinking alcohol excessively

[continued]
How Can I Decide If I Am at Risk for Hepatitis C?

Talk with your health care provider if

- your skin or mucous membranes have been exposed to another person's blood
- you have had multiple sexual partners
- you were on hemodialysis
- you have tattoos or repeated body piercings
- you have a history of snorting cocaine
Sources of Infection for Persons with Hepatitis C

- Injecting drug use: 60%
- Sexual: 15%
- Transfusion: 10% (before screening)
- Other*: 5%
- Unknown: 10%

*Nosocomial; Health-care work; Perinatal

Source: Centers for Disease Control and Prevention
Prevalence of HCV Infection by Age and Gender, United States, 1988-1994

Source: CDC, NHANES III
## Prevalence of HCV Infection
### United States, 1988-1994

<table>
<thead>
<tr>
<th>Group</th>
<th>Anti-HCV Positive</th>
<th>Est. Infections millions (95% CI)</th>
<th>Percent of Infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1.8%</td>
<td>3.9 (3.1-4.8)</td>
<td>100%</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>1.5%</td>
<td>2.4 (1.8-3.1)</td>
<td>61%</td>
</tr>
<tr>
<td>Black</td>
<td>3.2%</td>
<td>0.8 (0.6-1.0)</td>
<td>20%</td>
</tr>
<tr>
<td>Mex American</td>
<td>2.1%</td>
<td>0.3 (0.2-0.3)</td>
<td>7%</td>
</tr>
<tr>
<td>Other</td>
<td>2.9%</td>
<td>0.5 (0.3-1.0)</td>
<td>13%</td>
</tr>
</tbody>
</table>

Source: NEJM 1999;341:556-62
Transmission of HCV

- **Nosocomial**
  - Primarily in outbreaks
  - Contaminated equipment
    - hemodialysis*
    - endoscopy
  - Unsafe injection practices
    - plasmapheresis,*
    - phlebotomy
    - multiple dose medication vials
    - therapeutic injections

- **Occupational**
  - Inefficiently transmitted
  - Average incidence 1.8% following needle stick from HCV-positive source
  - Case reports of transmission from blood splash to eye
  - Prevalence 1-2% among health care workers
    - Lower than adults in the general population
    - 10 times lower than for HBV infection

- **Household**
  - Rare but not absent
Percutaneous Exposure in Other Settings

- No reported association between HCV infection and these types of exposures:
  - Tattooing
  - Body piercing
  - Commercial barbering
  - Acupuncture

- Further studies are needed to determine if these types of exposures are risk factors for HCV infection in the United States
What Are Some Ways in Which the Hepatitis C Virus Is NOT Spread?

The hepatitis C virus is not spread by:

- holding someone’s hand
- hugging or kissing someone
- being coughed or sneezed on
- sharing eating utensils or food
- eating food or drinking water
- donating blood
What Are the Symptoms of Hepatitis C?

Symptoms of hepatitis C are usually very mild. You may not have any symptoms at all. Even though hepatitis C might not make you feel sick, it is still a serious illness. In most cases, hepatitis C never goes away. Over time, it can cause other problems, including cirrhosis and liver cancer.
Can I Get a Vaccine Against Hepatitis C?

There is **not** a vaccine that will keep you from getting hepatitis C. There are vaccines that can keep you from getting *other* kinds of hepatitis, such as *A* and *B*.

Ask your health care provider about getting vaccinated against hepatitis A and B.
How Can I Prevent Myself from Getting or Spreading the Hepatitis C Virus?

- Don’t inject drugs
  If you can’t stop, use a clean needle every time, and never share your needle or works with anyone else.

- Practice safe sex
  Use a latex barrier, such as a rubber (condom), to prevent the spread of other sexually transmitted diseases.

- Don’t share personal items that might have blood on them
  Don’t share items such as razors, toothbrushes, or personal medical supplies.

- Talk with your health care provider about hepatitis C
Reduce or Eliminate Risks for Acquiring HCV Infection

- Screen and test donors
- Virus inactivation of plasma-derived products
- Risk-reduction counseling and services
  - Obtain history of high-risk drug and sex behaviors
  - Provide information on minimizing risky behavior, including referral to other services
  - Vaccinate against hepatitis A and/or hepatitis B
- Infection control practices

MMWR 1998;47 (No. RR-19)
Postexposure Management for HCV

- Follow-up after needlesticks, sharps, or mucosal exposures to HCV-positive blood
  - Test source for anti-HCV
  - Test worker if source anti-HCV positive
    - Anti-HCV and ALT at baseline and 4-6 months later
    - For earlier diagnosis, HCV RNA by PCR at 4-6 weeks
  - Confirm all anti-HCV results with RIBA
- Refer infected worker to specialist for medical evaluation and management
HCV Counseling

- Prevent transmission to others
  - Direct exposure to blood
  - Perinatal exposure
  - Sexual exposure
- Refer to support group
Preventing HCV Transmission to Others

Avoid Direct Exposure to Blood

- Do not donate blood, body organs, other tissue or semen
- Do not share items that might have blood on them
  - personal care (e.g., razor, toothbrush)
  - home therapy (e.g., needles)
- Cover cuts and sores on the skin
Persons Using Illegal Drugs

- **Provide risk reduction counseling, education**
  - Stop using and injecting
  - Refer to substance abuse treatment program
  - If continuing to inject
    - Never reuse or share syringes, needles, or drug preparation equipment
    - Vaccinate against hepatitis B and hepatitis A
    - Refer to community-based risk reduction programs
Mother-to-Infant Transmission of HCV

- Postexposure prophylaxis not available
- No need to avoid pregnancy or breastfeeding
  - Consider bottle feeding if nipples cracked/bleeding
- No need to determine mode of delivery based on HCV infection status
- Test infants born to HCV-positive women
  - Consider testing any children born since woman became infected
  - Evaluate infected children for CLD
Sexual Transmission of HCV

Persons with One Long-Term Steady Sex Partner

- Do not need to change their sexual practices
- Should discuss with their partner
  - Risk (low but not absent) of sexual transmission
  - Routine testing not recommended but counseling and testing of partner should be individualized
    - May provide couple with reassurance
    - Some couples might decide to use barrier precautions to lower limited risk further
HCV Counseling

Sexual Transmission of HCV

Persons with High-Risk Sexual Behaviors

- At risk for sexually transmitted diseases, e.g., HIV, HBV, gonorrhea, chlamydia, etc.
- Reduce risk
  - Limit number of partners
  - Use latex condoms
  - Get vaccinated against hepatitis B
  - MSMs also get vaccinated against hepatitis A
Are There Medicines to Treat Hepatitis C?

There are treatments for hepatitis C. However, these treatments are not right for everyone. Treatments for hepatitis C that have been approved by the Food and Drug Administration (FDA) include:

- interferon combined with ribavirin (called combination therapy)
- long-acting interferon (called pegylated interferon)