Anatomy

- Stores sugar needed for energy
- Absorbs good nutrients
- Largest internal organ in the body

Function

- Breaks down poisons (toxins) and drugs
- Makes important proteins that help build new tissue and repair broken tissue
- Produces bile, which helps remove waste from the body
What Is Hepatitis?

It is an inflammation (infection) of the liver.

**Acute Hepatitis:**
- Sudden onset
- Short-term hepatitis
- Body’s immune system clears the virus from the body within 6 months

**Chronic Hepatitis:**
- Long-term hepatitis.
- Infection lasts longer than 6 months because the body’s immune system cannot clear the virus from the body
What Is Hepatitis C?

Viral hepatitis C is caused by the hepatitis C virus (HCV)

HCV can be found in the blood of a person with hepatitis C

The most efficient route of transmission involves percutaneous exposure (direct passage of blood through the skin)

The #1 reason for liver transplant in the US

Most common blood-borne pathogen

Up to 85% of people who are infected to hepatitis C develop chronic infection...they have it forever

Most remain symptom-free for decades

Infects 4 times more people than does HIV

200 million infected world-wide

4 million Americans infected – 1.8%

Significantly higher for inmates versus the US population (10x higher)
What Are the Symptoms of Hepatitis C

- Nausea
- Loss of appetite
- Vomiting
- Fatigue
- Fever
- Dark urine
- Pale stool
- Jaundice
- Stomach pain
- Side pain

3 out of 4 persons have no symptoms and can infect others without knowing it.
What Does Hepatitis C Do to the Liver?

- Makes the liver cells inflamed
- Causes scarring of the liver
  - Cirrhosis
- Some people have no obvious effects from hepatitis C
- Causes the liver to malfunction
- Causes cancer of the liver
- May require you to have a transplant
Symptoms of Cirrhosis

As scar tissue replaces healthy cells, liver function starts to fail with symptoms:

- Exhaustion and fatigue
- Nausea
- Loss of appetite
- Weakness
- Weight Loss
HCV is a blood-borne pathogen. The most efficient route of transmission involves percutaneous exposure (direct passage of blood through the skin).
How Can You Get Hepatitis C?

Exposure to blood of an HCV-infected person through:

- Sharing needles and works (like cookers and water) used to inject drugs, steroids, hormones, or vitamins
- Mother to baby
- Accidental needle stick injuries (mainly to healthcare workers on the job)
- Unprotected sex (sex without a condom)

It is also possible to spread hepatitis C through:

- Sharing razors, toothbrushes, or nail clippers with a person who has hepatitis C
- Tattoos or piercing, especially if it is not done by a professional with sterile equipment
- Sharing straws used to snort cocaine or other drugs
Needle sharing from injection drug use is the greatest risk for HCV.

In the U.S. 70% of those with HCV.

Injection drug use, even once many years ago, is a risk.

90% of IDUs are infected with HCV within 5 years.

IDU accounts for 60% of all new infections.
HCV – Sexual Transmission

- Sexual transmission occurs, but it is not the most efficient route
- Accounts for 10%-15% of HCV+ cases
- Increased risk for persons with many sex partners and other STD
- Monogamous relationships average risk 1.5%
- MSM increased risk in recent studies
HCV Risk – Mom to Baby

- Risk of infected mother to infant at birth is 5%-6%
- HIV co-infection increases risk from mother to fetus 17%-20%
- Breast feeding not a risk
HCV and HIV

- If at risk for HIV, then at risk for HCV
- 1 in 4 people infected with HIV is also infected with HCV (30% prevalence overall in U.S.)
- More rapid progression of HCV liver disease
- Do not know the affects of HCV on HIV disease
- Increases risk of mom-to-baby transmission (14-17%)
- Complications of HIV medication regimes – toxic to the liver
Who Should Get Tested for HCV?

- Ever injected illegal drugs, even once
- Ongoing nasal drug use
- Received clotting factors made before 1987
- Received blood/organs before July 1992
- Ever on chronic hemodialysis
- Evidence of liver disease
- Health care, emergency, public safety workers after needle stick/mucosal exposures to HCV-positive blood
- Children born to HCV-positive women
How is Hepatitis C Diagnosed?

- Blood testing
  1. Hepatitis C antibody test
  2. Hepatitis C PCR test to find virus in blood
Hepatitis C Genotype?

Genotype 1:
- 6 different genotypes
- Most common in U.S.

Genotypes 2 & 3:
- Less common
Other Blood Tests

Liver Function Tests (LFTs)

- Measures substances in your body to look for warnings signs of liver damage
- May normal one day and high the next day
- When elevated, liver cells are being destroyed
- ALT, AST, SGOT, SGPT
- Bleeding time, platelets, albumin, AFP
### Projected Prevalence of Chronic HCV, Cirrhosis, and Complications Over 4 Decades

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
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<tbody>
<tr>
<td>HCV infection</td>
<td>2,940,678</td>
<td>2,870,391</td>
<td>2,681,556</td>
<td>2,433,709</td>
<td>2,177,089</td>
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<tr>
<td>Cirrhosis</td>
<td>472,103</td>
<td>720,807</td>
<td>858,788</td>
<td>879,747</td>
<td>828,134</td>
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<td>Decompensated cirrhosis</td>
<td>103,117</td>
<td>134,743</td>
<td>146,408</td>
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<tr>
<td>Hepatocellular carcinoma</td>
<td>11,185</td>
<td>13,183</td>
<td>13,390</td>
<td></td>
<td></td>
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<tr>
<td>Liver-related death</td>
<td>27,732</td>
<td>36,483</td>
<td>39,875</td>
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</tr>
</tbody>
</table>

What Is a Liver Biopsy?

Best way to measure how much damage has been done to your liver

Looks for inflammation, fibrosis (scarring) and cirrhosis (scar tissue between the liver cells)

Not everyone needs one

Helpful if you and your doctor are thinking about treatment

How is it done?

- It is not very painful
- You do not need to be knocked out. The skin on your stomach will be numbed
- A long, thin needle is inserted into your liver to remove some liver tissue
- After procedure you will need to rest at the hospital to prevent any bleeding
Risk of Fatal Outcome in Persons Who Develop Hepatitis C Virus Infection

Time (accelerated with co-infections/leading cause of death)
20-30 years

Resolve 15
Chronic 85
Cirrhosis 17
Mortality 4
Stable 68
Stable 13

100

Courtesy of Seeff, LB and Alter, HJ.
End-stage Liver Disease (ESLD): Liver-related Mortality and Hepatitis Infection Status

- Number of liver-related deaths = 181 (15% of 1,246)

![Bar chart showing percentage of liver-related deaths by hepatitis infection status]

- **HCV/HIV**: 66%
- **HBV/HIV\(^a\)**: 17%
- **HBV/HCV/HIV\(^a\)**: 7%

\(^a\)Active HBV infection (HBsAg-positive or HBeAg-positive) or HBV DNA positive.

How Can I Protect Myself From Becoming Infected?

If you are injecting drugs
- Stop injecting!
- Enter and complete a substance abuse treatment program.
- If you choose to continue to inject
  - Never reuse or share syringes, needles, water or drug preparation equipment (cotton, cooker, water)
  - If you must reuse, be sure to clean with bleach and water first
  - Use only sterile syringes obtained from a reliable source,
  - Use a new sterile syringe to prepare and inject drugs
  - Use sterile water to prepare drugs or clean tap water

- Use a new or disinfected cooker and a new piece of cotton,
- Clean injection site before injection with alcohol swab
- Always dispose syringes safely after one use

If you are having sex
- Have sex with one uninfected person or not at all
- Use a latex condom correctly each time
If You Are Infected…

- 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
- Practice safe sex – use condoms

- Avoid or reduce drinking alcohol.
- Seek advice before any new over-the-counter medication or dietary supplement
  - Tylenol, Motrin, vitamins
- Be informed of the potential for sexual transmission and discuss with sexual partners
- Practice safer sex.
- Discuss the importance of diet, nutrition and rest
What If I Am Pregnant?

- 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
How Can You Keep Your Liver Healthy?

- Get vaccinated against hepatitis A and B
- Avoid alcohol
- Avoid *tylenol* products
- Eat healthy
- Avoid herbs that are toxic
- Do not take iron supplements
- Exercise regularly and reduce your stress
Diet and Nutrition

Eat a balance of fresh fruit, vegetables, lean protein, and whole grains.

Drink plenty of water and avoid high fat foods. i.e.- fast food.

Take vitamins and supplements only in consult with health care provider.
Alcohol and Your Liver

- Alcohol is the most commonly abused drug in the US
- Alcohol is toxic to the liver
- One of the leading causes of liver disease in the US
- Continuous use of alcohol weakens your immune system

If you are HCV positive you should
- Stop drinking or at least cut back on your intake
- Seek treatment and support for alcohol problem

HCV and alcohol are a deadly combination
- Cirrhosis
- Liver cancer
- Need for transplant
- Death
HCV not spread by kissing, hugging, sneezing, coughing, food or water, sharing eating utensils or drinking glasses, or casual contact,

There is NO vaccine to prevent hepatitis C!

You can not be excluded from work or school because of your infection.
HCV Screening Algorithm

Anti-HCV Test

Stop testing*

NEGATIVE

Stop testing; no evidence of active HCV infection, diagnosis of prior HCV infection likely

Repeat testing in 3–6 months

NEGATIVE

POSITIVE

Quantitative test for HCV RNA

Medical evaluation for active infection and liver disease

POSITIVE

HCV, hepatitis C virus; anti-HCV, antibody to hepatitis C virus.
CDC Division of Viral Hepatitis. www.cdc.gov/hepatitis
**Hepatitis C Timeline**

- **1973**: NANB Hepatitis described
- **1989**: Hepatitis C Virus is isolated
- **1990**: First HCV Antibody test. Begins screening blood supply
- **1991**: Alpha Interferon for HCV approved
- **1993**: Supplemental HCV test developed
- **1998**: Combination therapy approved
- **2001**: FDA approves Pegylated Interferon
- **2011**: DAAs approved
CURRENT TREATMENTS

INTERFERON
- Naturally occurring substance
- Stimulates the immune system to attack Hepatitis
- Inhibits viral entry and replication
- Given by injection

RIBAVIRIN
- Active against RNA viruses
- Synthetic nucleoside analogue
- Mechanism of action thought to be modulator of the immune system
- Ribavirin monotherapy ineffective for the treatment of chronic hepatitis C*

DAAs
- Directly Acting Antivirals
- Protease Inhibitors, inhibit N3/4sb protease
TIME COURSE OF SIDE EFFECTS

- Neutropenia
- Anemia
- Hepatic changes
- Fatigue
- Depressive/anxiety symptoms

Severity

Continuum of Therapy
Patients With a Durable SVR at Mean 4.1 (0.4–7) Years’ Follow-up

SVR: HCV RNA negative 24 weeks after end of treatment.


Please see PEGASYS full prescribing information and slides 4-12 for Important Safety Information.