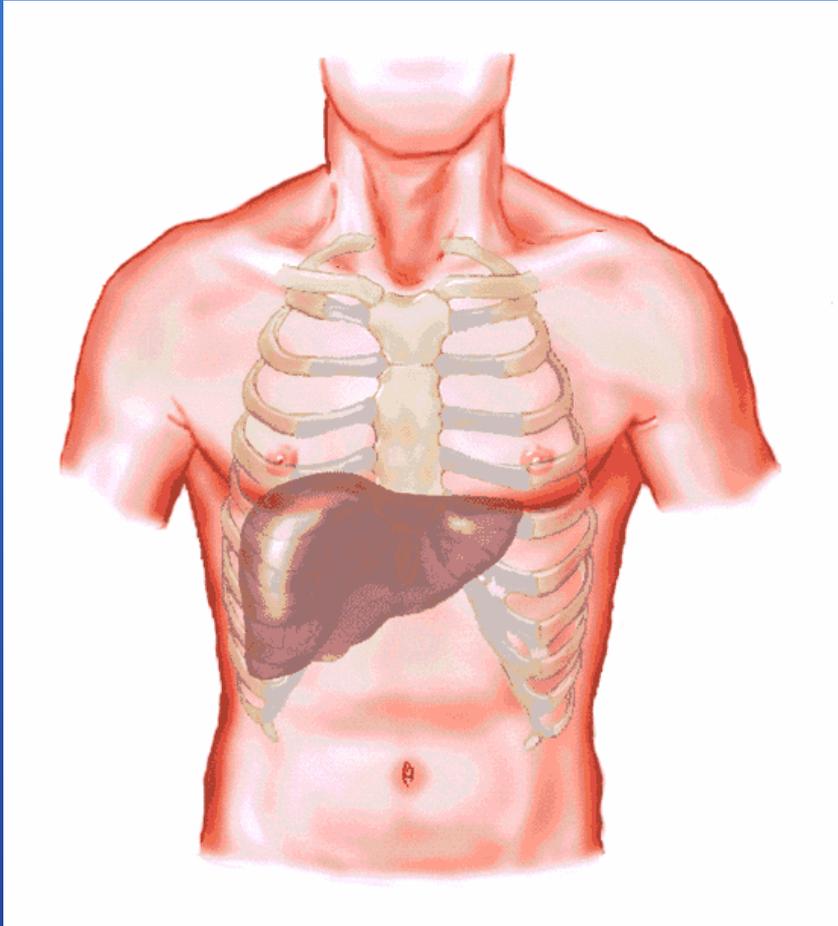


*Epidemiology and Prevention  
of Viral Hepatitis A to E:  
Introduction*

**Division of Viral Hepatitis**

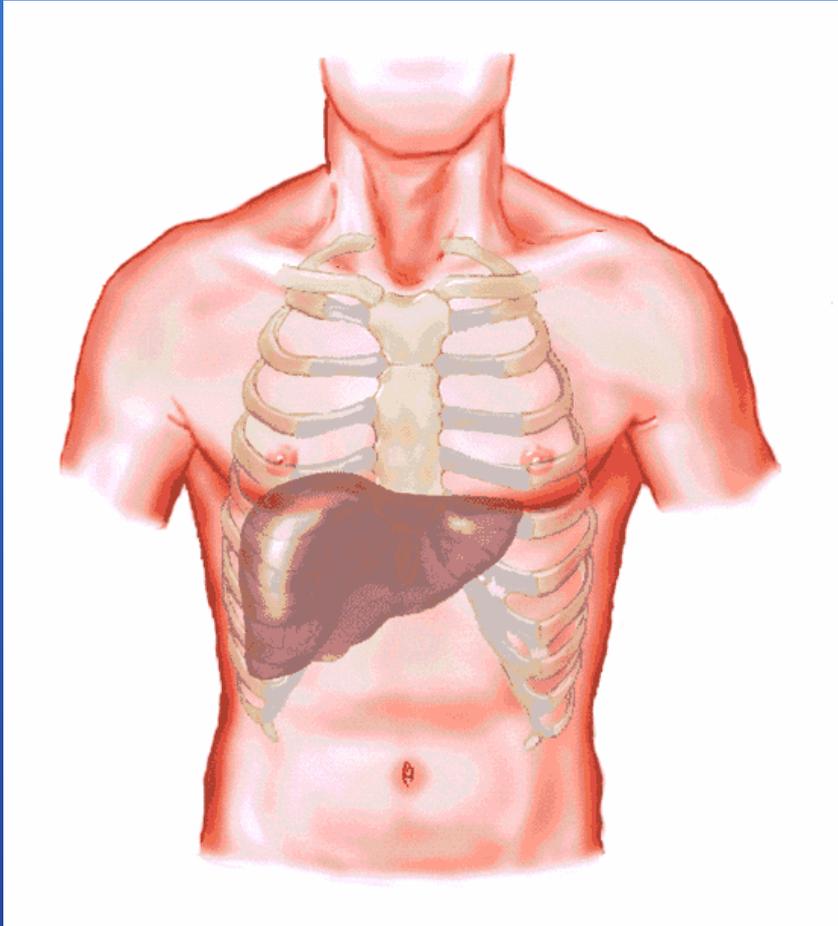


# THE LIVER



- WEDGE SHAPED ORGAN
- LOCATED UNDER RIGHT RIB CAGE
- WEIGHS ABOUT 3 LBS.

# THE LIVER



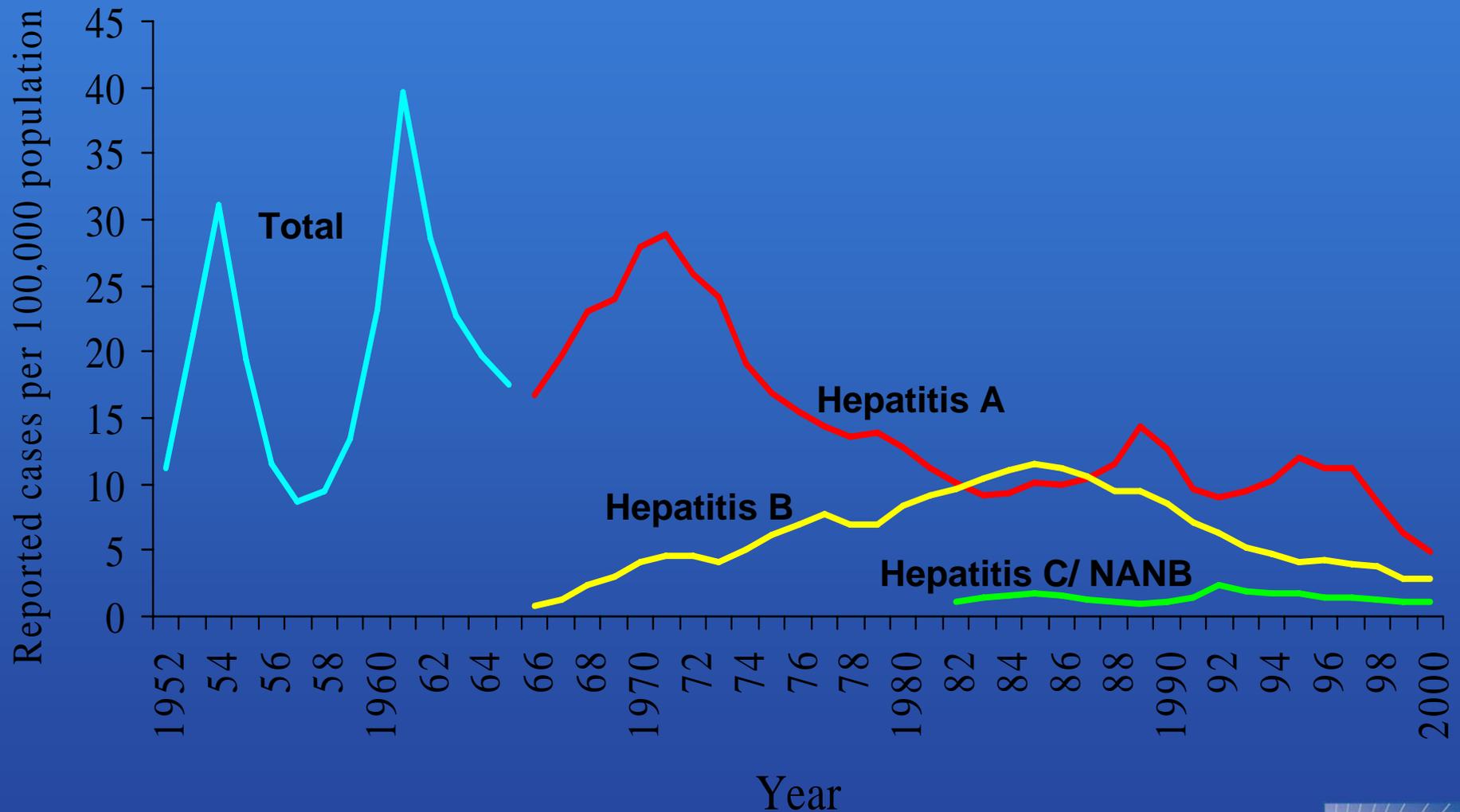
- FUNCTIONS OF THE LIVER:
  - MAKES PROTEIN NEEDED FOR BLOOD CLOTTING
  - STORES VITAMINS, IRON AND GLYCOGEN
  - METABOLIZES SUGAR, PROTEIN AND FAT TO PRODUCE ENERGY
  - REMOVES WASTE PRODUCTS AND FILTERS TOXIC SUBSTANCES FROM BLOOD

# Estimates of Acute and Chronic Disease Burden for Viral Hepatitis, United States

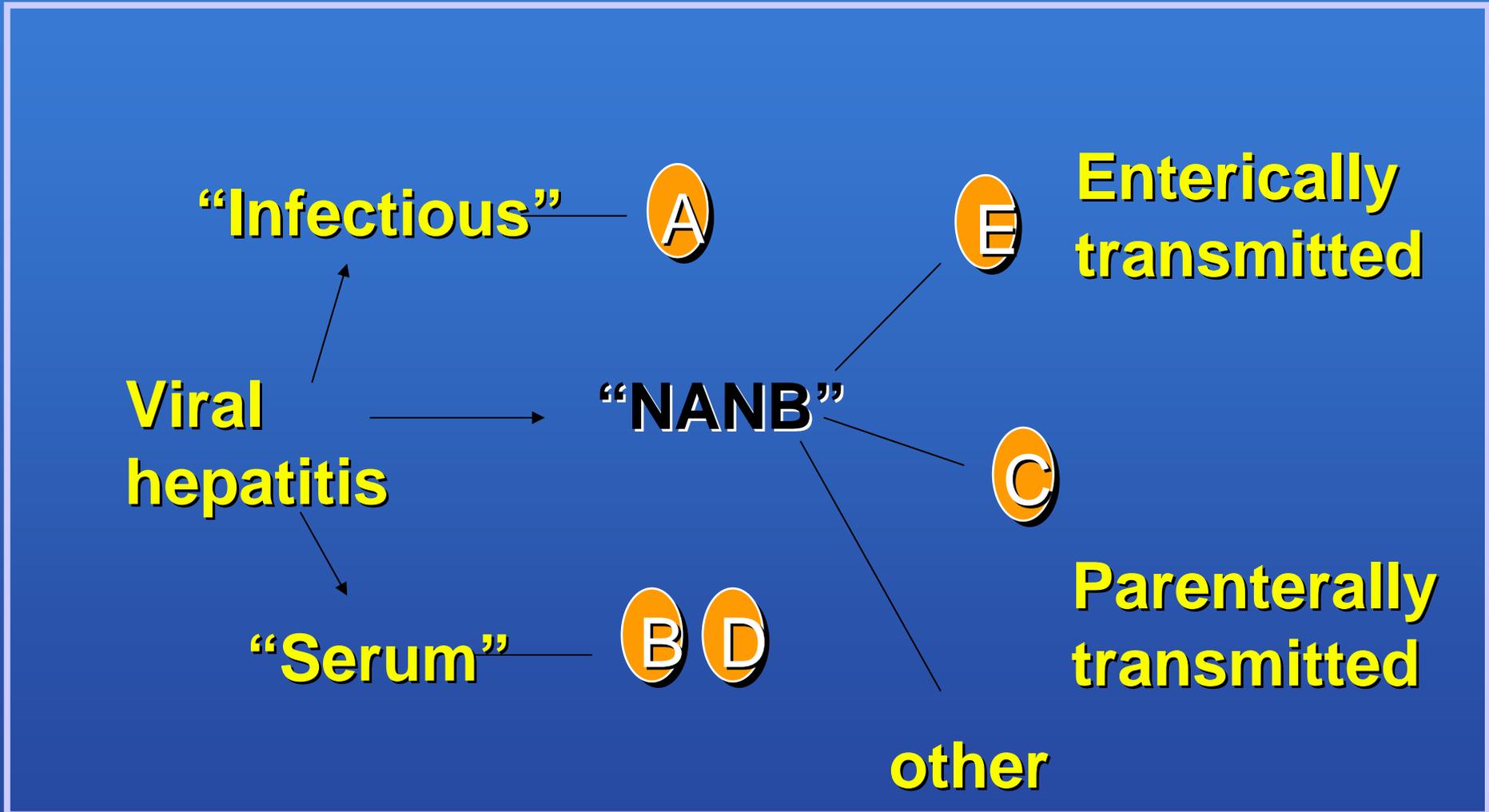
	HAV	HBV	HCV	HDV
Estimated infections (x 1000)/year*	93	78	25	6-13
Fulminant deaths/year	100	150	?	35
Chronic infections	0	1-1.25 million	2.7 million	70,000
Chronic liver disease deaths/year	0	5,000	8-10,000	1,000

\* Range based on estimated annual incidence, 2001.

# Acute Viral Hepatitis A, B and C/NANB by Year, United States, 1952-2000



# Viral Hepatitis – Historical Perspective



# Viral Hepatitis Overview

## Types of Viral Hepatitis

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
Source of virus	feces	blood/ blood-derived body fluids	blood/ blood-derived body fluids	blood/ blood-derived body fluids	feces
Route of transmission	fecal-oral	percutaneous permucosal	percutaneous permucosal	percutaneous permucosal	fecal-oral
Chronic infection	no	yes	yes	yes	no
Prevention	pre- exposure immunization	pre/post- exposure immunization	blood donor screening; risk behavior modification	pre/post- exposure immunization; risk behavior modification	ensure safe drinking water

# A, B, Cs of Viral Hepatitis

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- **A**

- fecal-oral spread: hygiene, drug use, men having sex with men, travelers, day care, food
- **vaccine-preventable**

- **B**

- sexually transmitted – **100x** more infectious than HIV
- blood-borne (sex, injection drug use, mother-child, and health care)
- **vaccine-preventable**

- **C**

- blood borne (injection drug use primarily)
- 4-5 times more common than HIV
- **NOT vaccine-preventable!**

# Acute Hepatitis – Clinical Symptoms

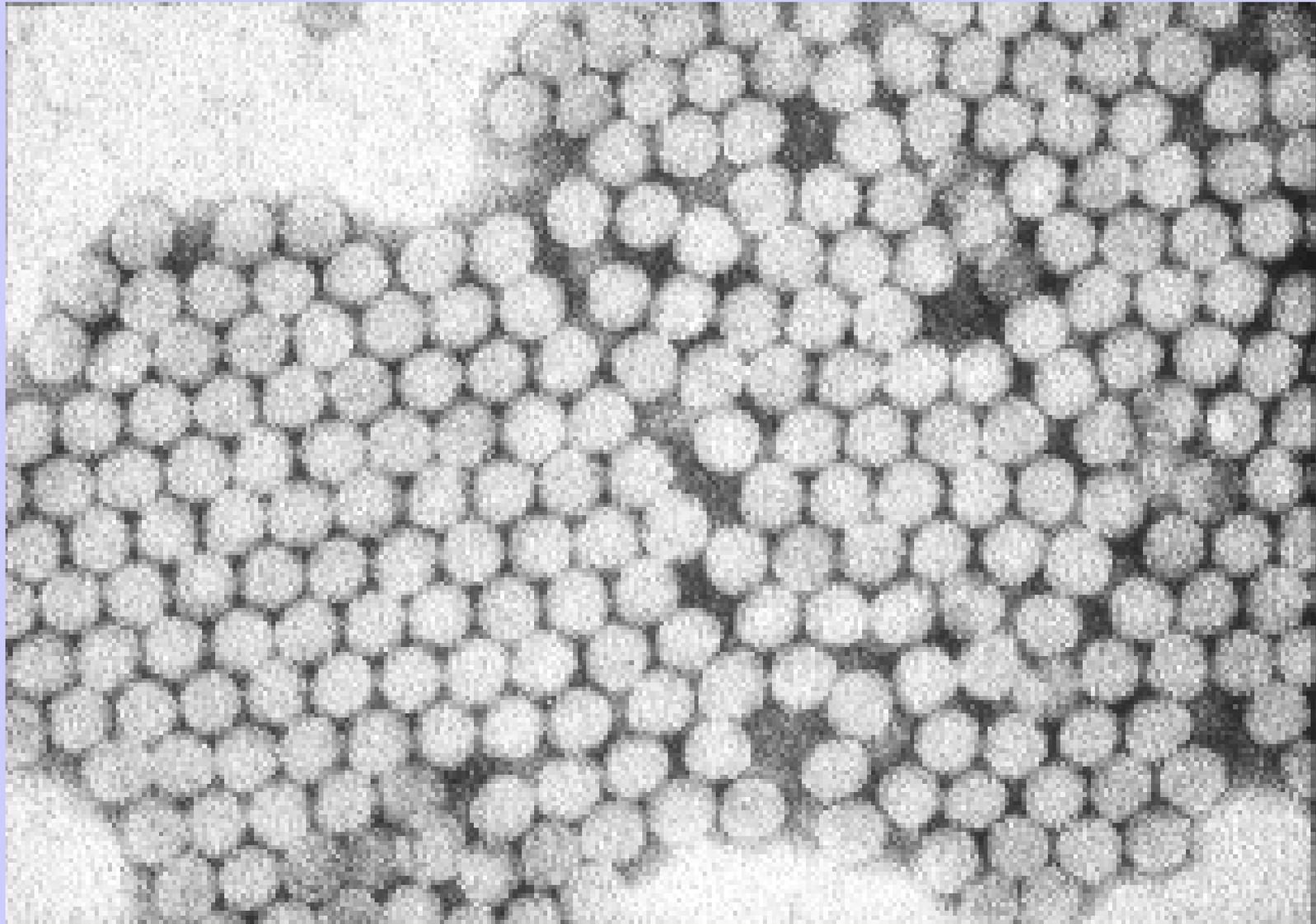
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**Asymptomatic > Symptomatic > Fulminant Liver Failure > Death**

**Symptoms (if present) are the same, regardless of cause (e.g., A, B, C, other viruses, toxins)**

- **Nausea, vomiting**
- **Abdominal pain**
- **Loss of appetite**
- **Fever**
- **Diarrhea**
- **Light (clay) colored stools**
- **Dark urine**
- **Jaundice (yellowing of eyes, skin)**

# Hepatitis A Virus

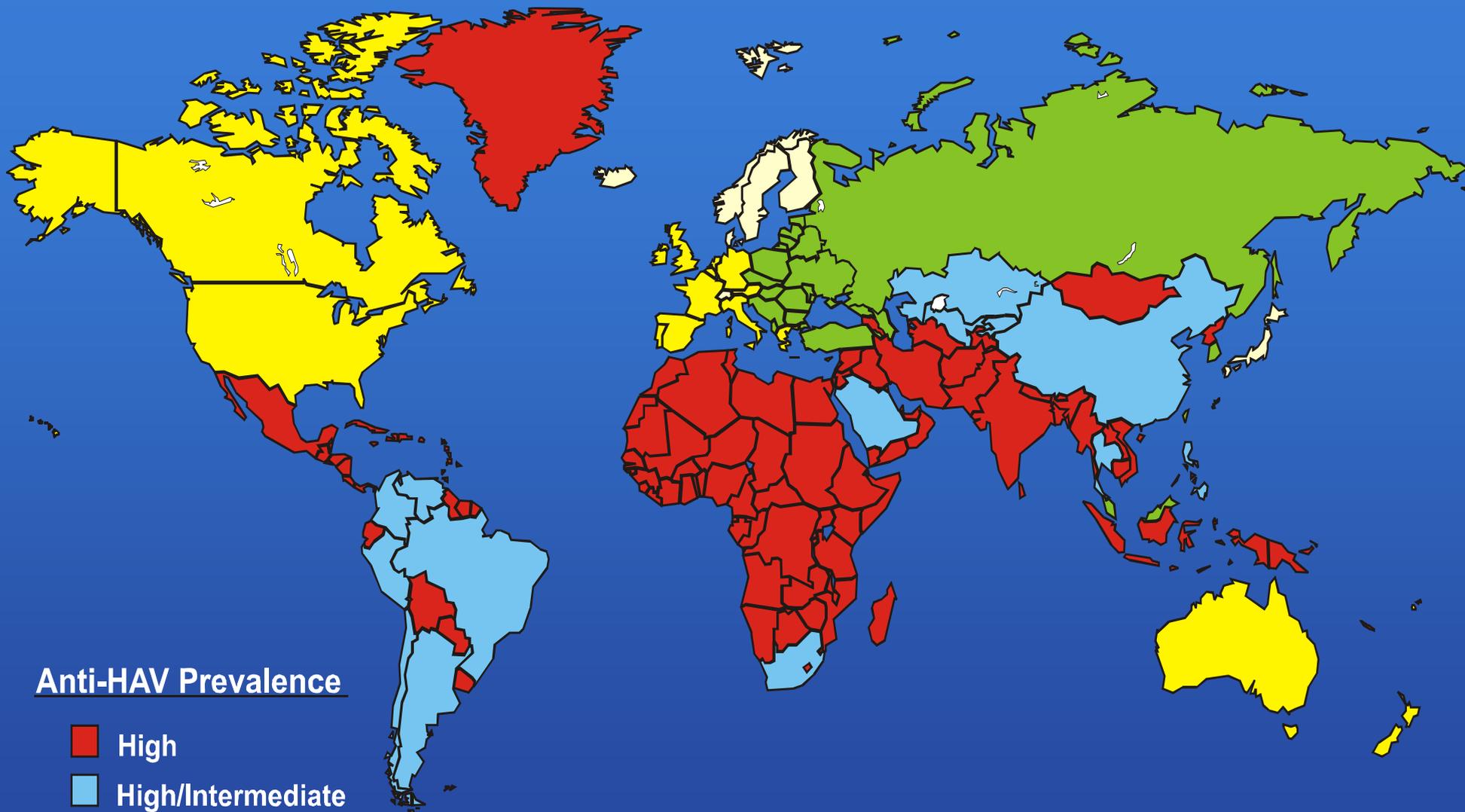


# Basics of Hepatitis A

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- **RNA Picornavirus**
  - **Single serotype worldwide**
  - **Acute disease and asymptomatic infection**
- **No chronic infection**
  - **Protective antibodies develop in response to infection - confers lifelong immunity**

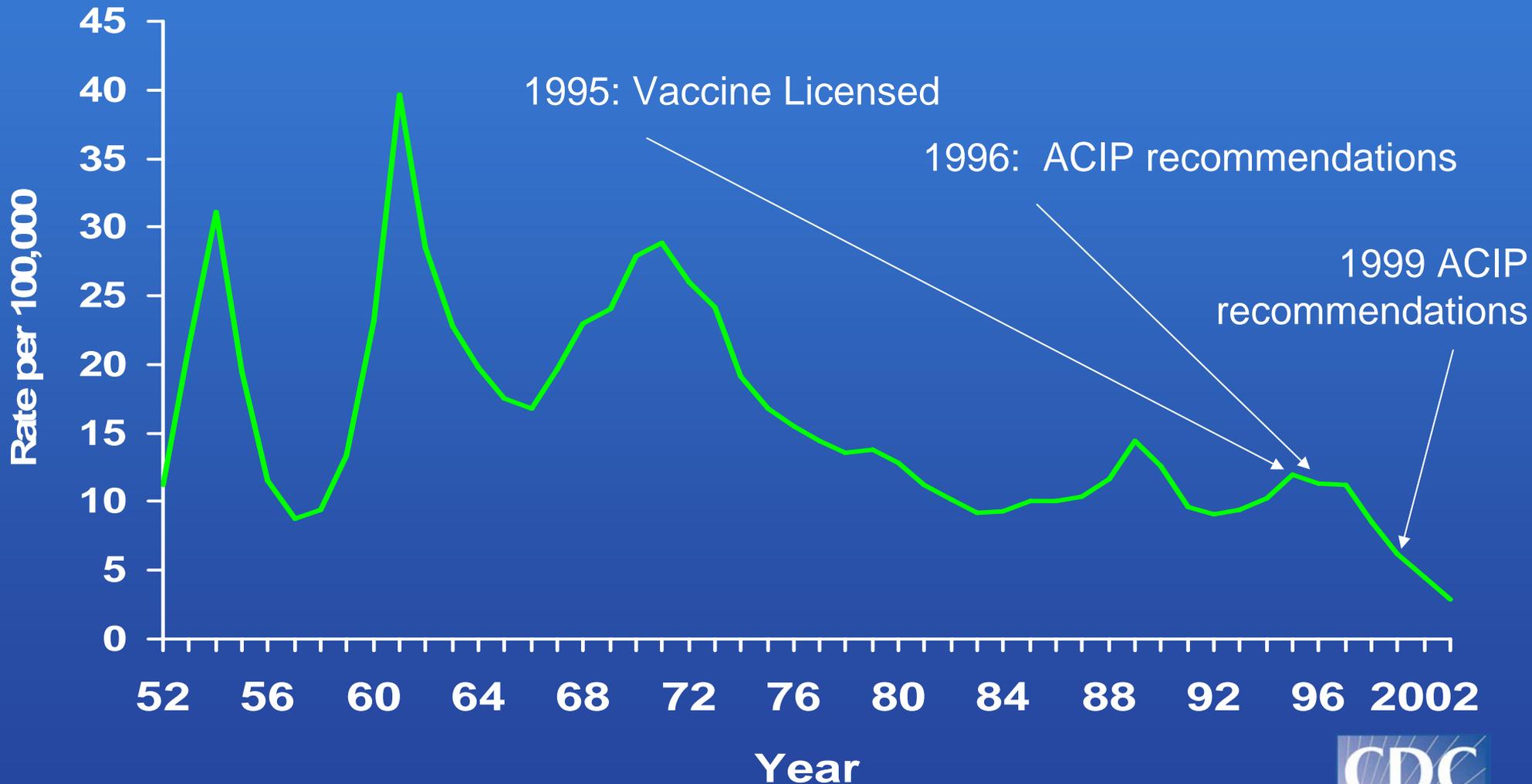
# Geographic Distribution of HAV Infection



## Anti-HAV Prevalence

- High
- High/Intermediate
- Intermediate
- Low
- Very Low

# Reported Cases of Hepatitis A, United States



Source: NNDSS, CDC



# DISEASE BURDEN FROM HEPATITIS A UNITED STATES, 2001

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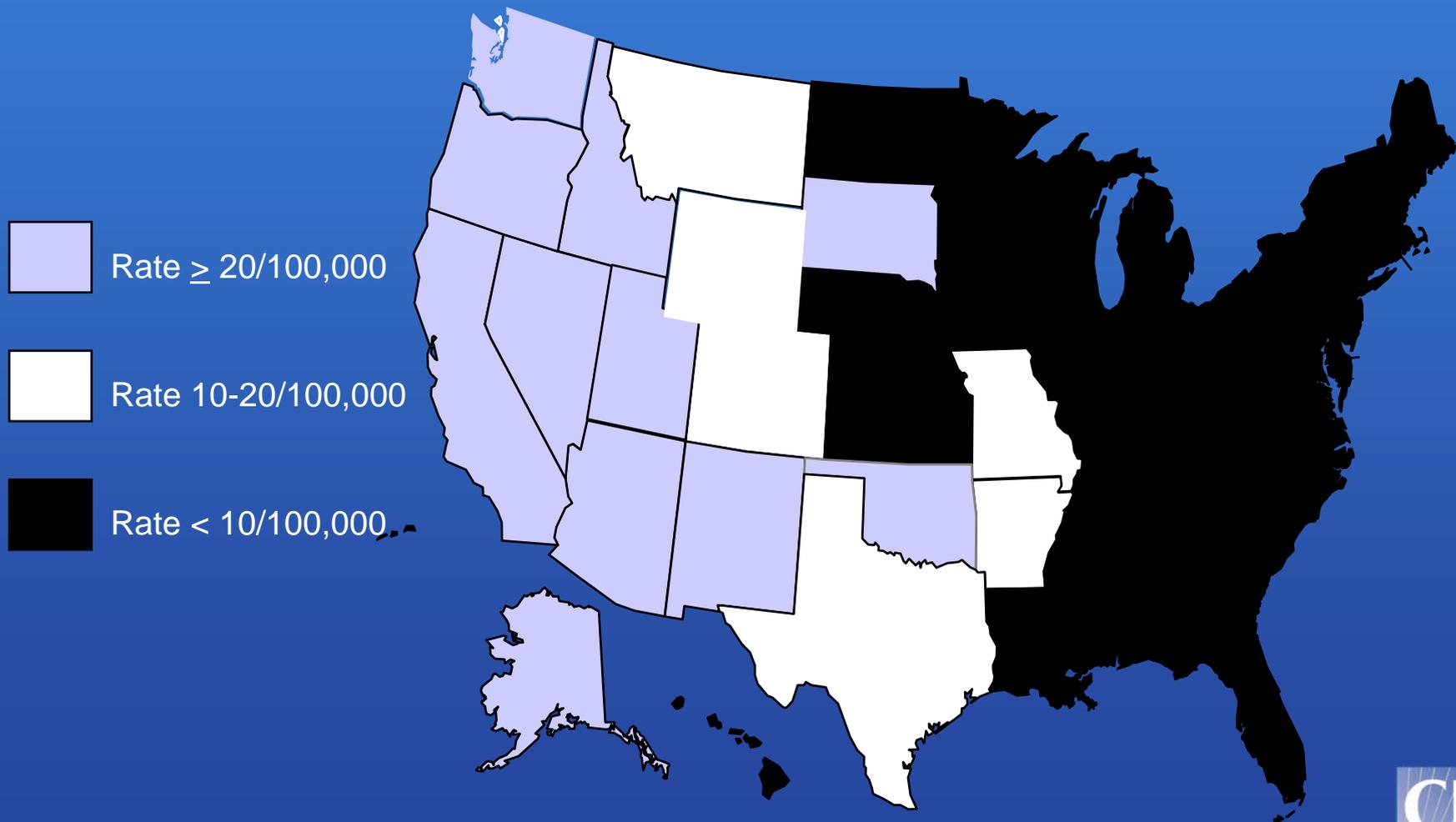
**Number of acute clinical  
cases reported** **10,609**

**Estimated number of acute  
clinical cases** **45,000**

**Estimated number of  
new infections** **93,000**

**Percent ever infected** **31.3%**

# States with Hepatitis A Rates $\geq 10/100,000$ 1987-97



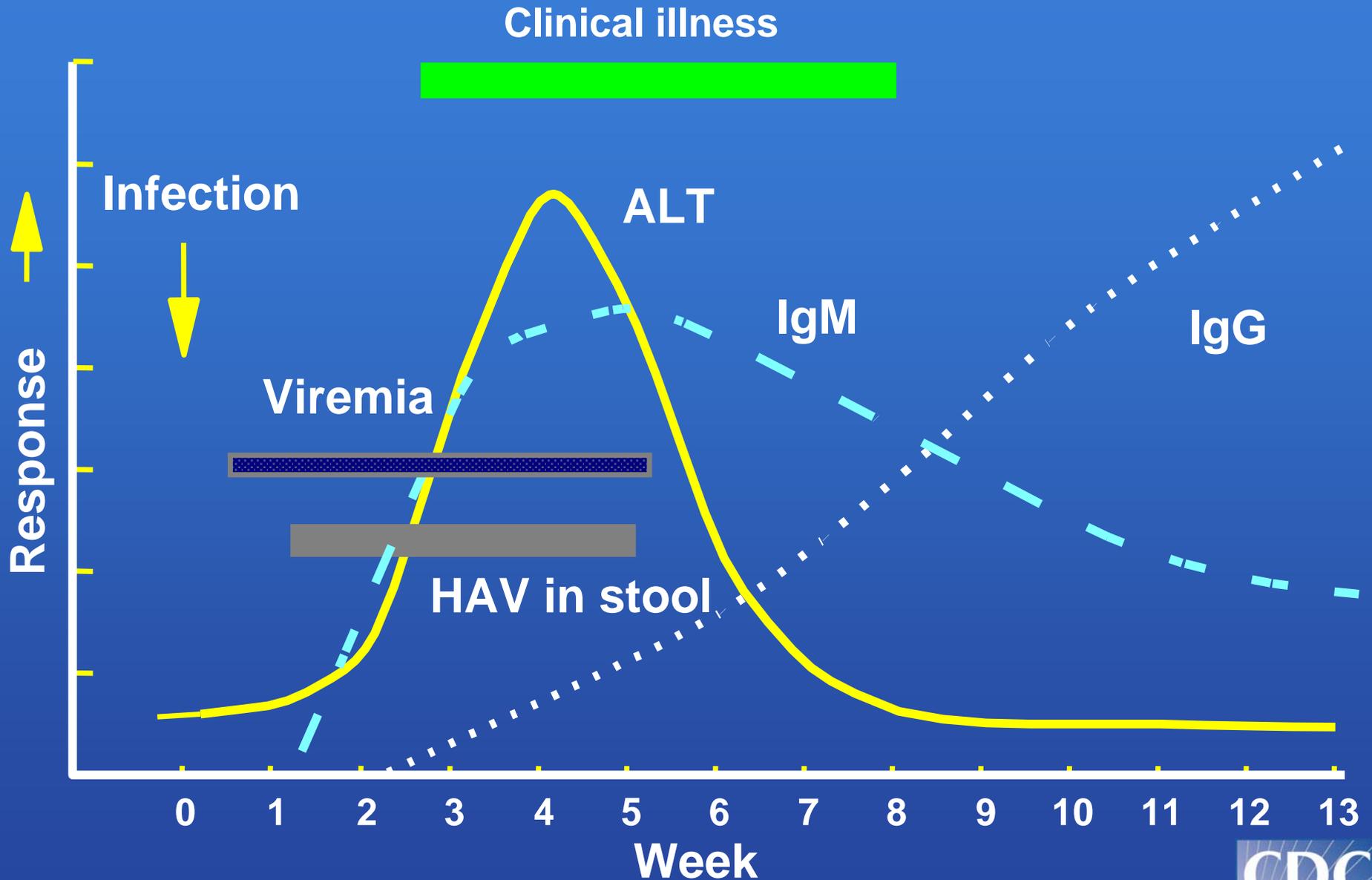
# Hepatitis A – Clinical Features

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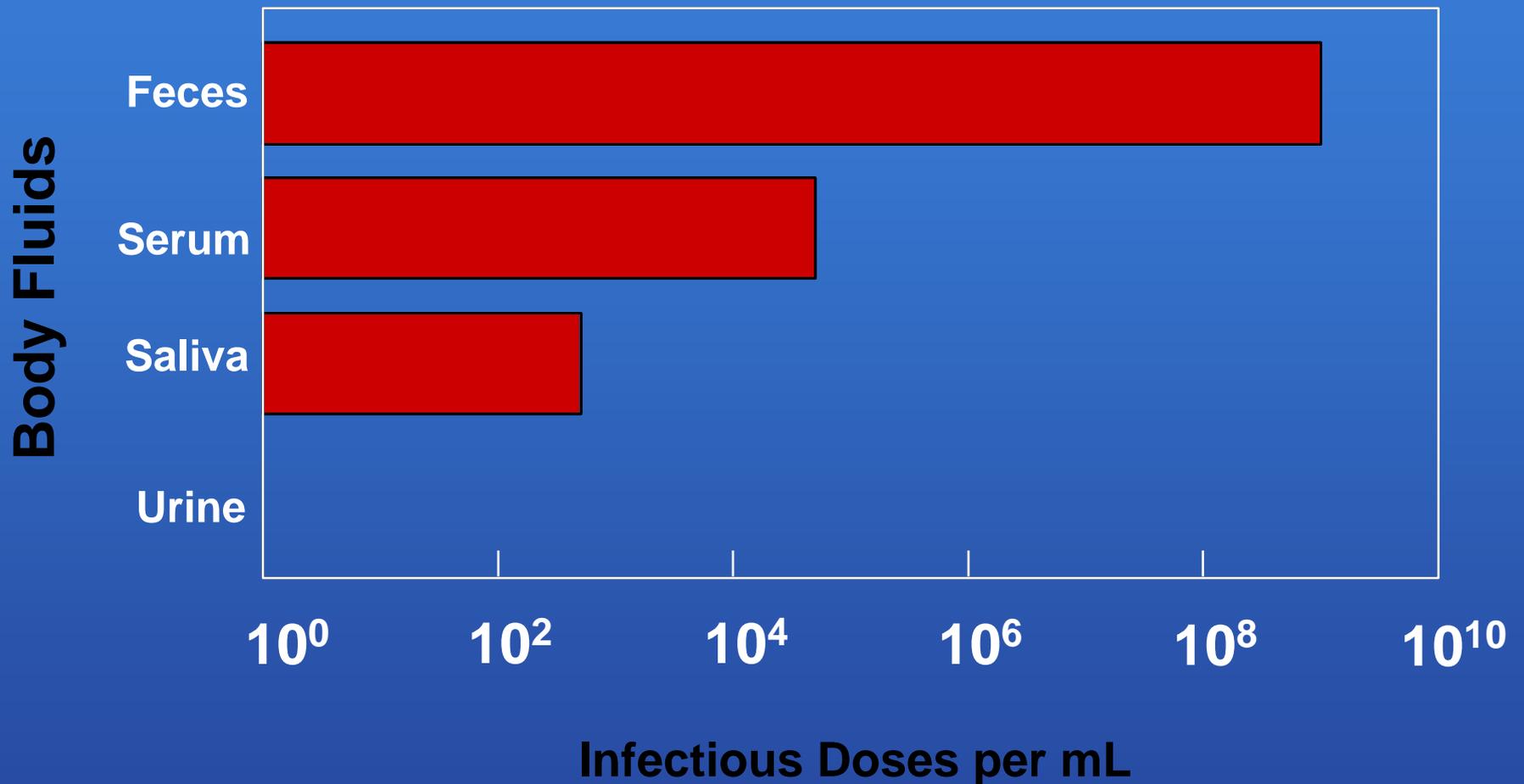
- **Incubation period:**
  - Average 30 days
  - Range 15-50 days
- **Jaundice by age group:**

< 6 yrs	<10%
6 – 14 yrs	40%-50%
> 14 yrs	70%-80%
- **Rare Complications:**
  - Fulminant hepatitis
  - Cholestatic hepatitis
  - Relapsing hepatitis
- **Chronic sequelae:**
  - None

# Events In Hepatitis A Virus Infection



# Concentration of Hepatitis A Virus in Various Body Fluids



Source: Viral Hepatitis and Liver Disease 1984;9-22  
J Infect Dis 1989;160:887-890

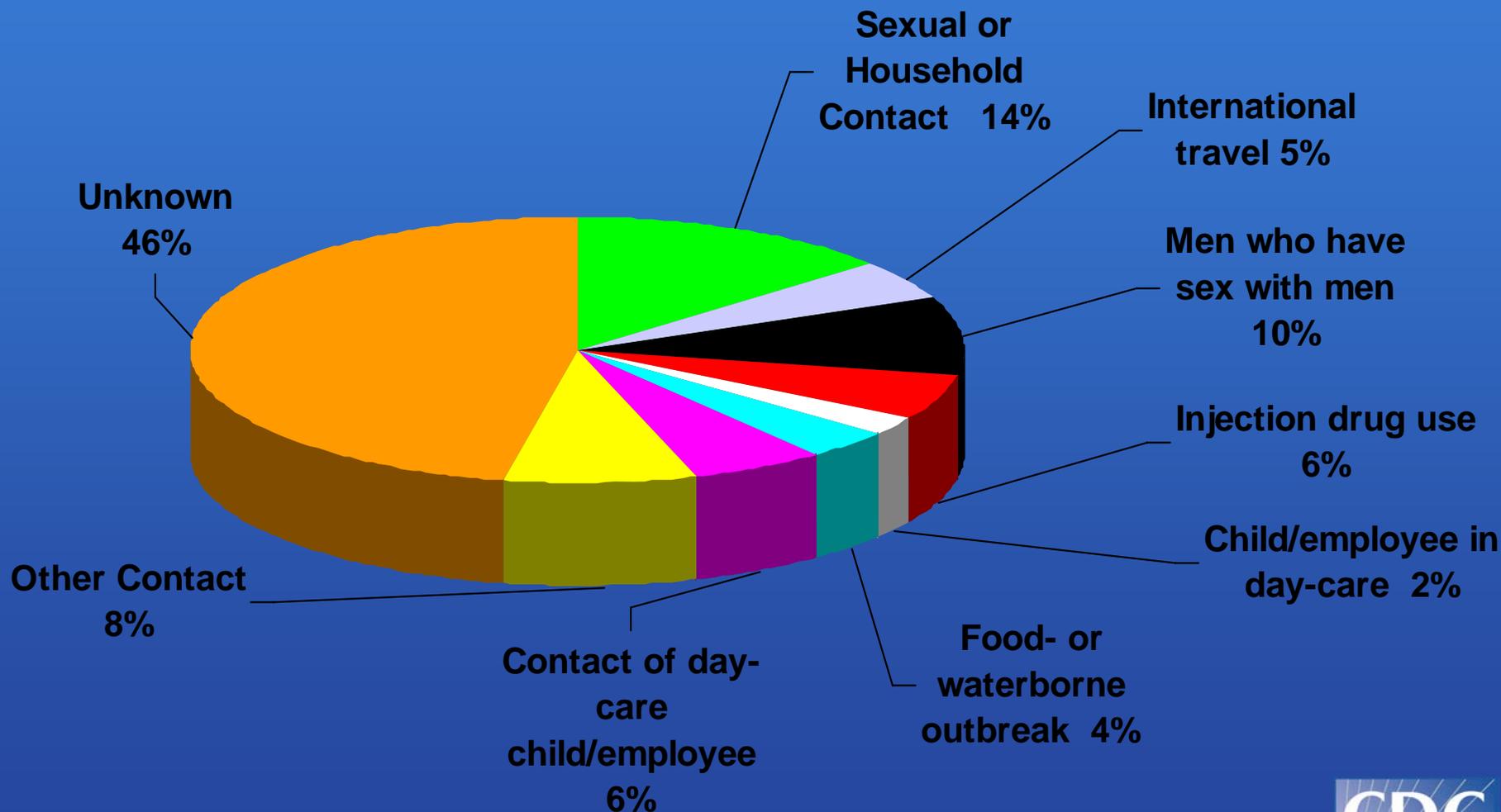
# Hepatitis A Virus Transmission

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- **Fecal-oral**
- **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., injecting drug use, transfusion)



# Risk Factors Associated with Reported Hepatitis A, 1990-2000, United States



Source: NNDSS/VHSP

# Prevention of Hepatitis A

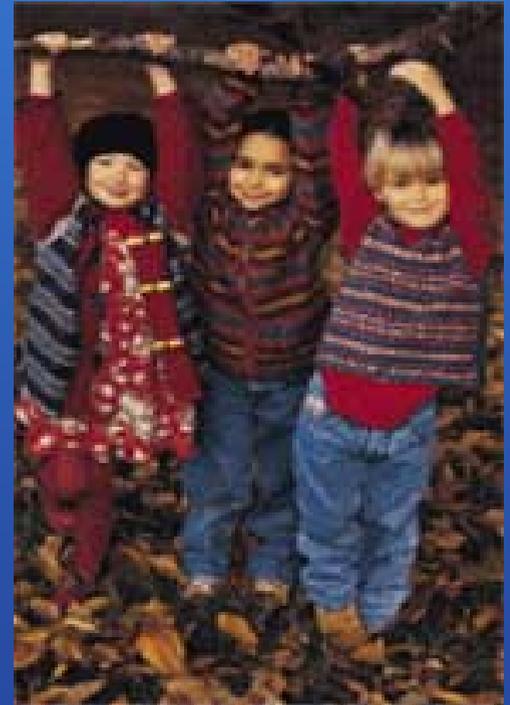
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- **Vaccination (pre-exposure)**
- **Immune globulin**
- **Good hygiene**
- **Clean water systems; avoidance of food contamination**

# Hepatitis A Vaccination Strategy: Epidemiologic Considerations

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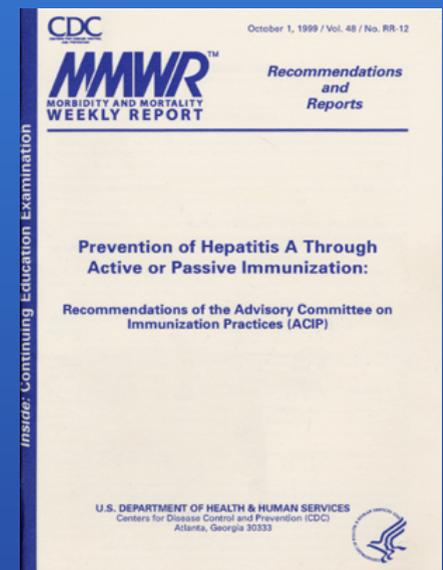
- **Many cases occur in community-wide outbreaks**
  - no risk factor identified for 40-50% of cases
  - highest attack rates in 5-14 year olds
  - children serve as reservoir of infection
- **Groups at increased risk of infection**
  - travelers to developing countries
  - men who have sex with men
  - illegal drug users
  - persons with chronic liver disease



# ACIP Recommendations – Hepatitis A Vaccine

## Pre-exposure Vaccination

- **Persons at increased risk for infection**
  - travelers to intermediate and high HAV-endemic countries
  - MSM (Men who have sex with men)
  - illegal drug users
  - Persons who have clotting factor disorders
  - persons with chronic liver disease
- **Communities with historically high rates of hepatitis A**
  - routine childhood vaccination



# Duration of Protection after Hepatitis A Vaccination

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- **Persistence of antibody**
  - At least 5-8 years among adults and children
- **Efficacy**
  - No cases in vaccinated children at 5-6 years of follow-up
- **Mathematical models of antibody decline suggest protective antibody levels persist for at least 20 years**
- **Other mechanisms, such as cellular memory, may contribute**

# COMBINED HEPATITIS A HEPATITIS B VACCINE

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- **Approved by the FDA in United States for persons  $\geq 18$  years old**
- **Contains 720 EL.U. hepatitis A antigen and 20  $\mu\text{g}$ . HBsAg**
- **Vaccination schedule: 0,1,6 months**
- **Immunogenicity similar to single-antigen vaccines given separately**
- **Can be used in persons  $\geq 18$  years old who need vaccination against both hepatitis A and B**
- **Formulation for children available in many other countries**

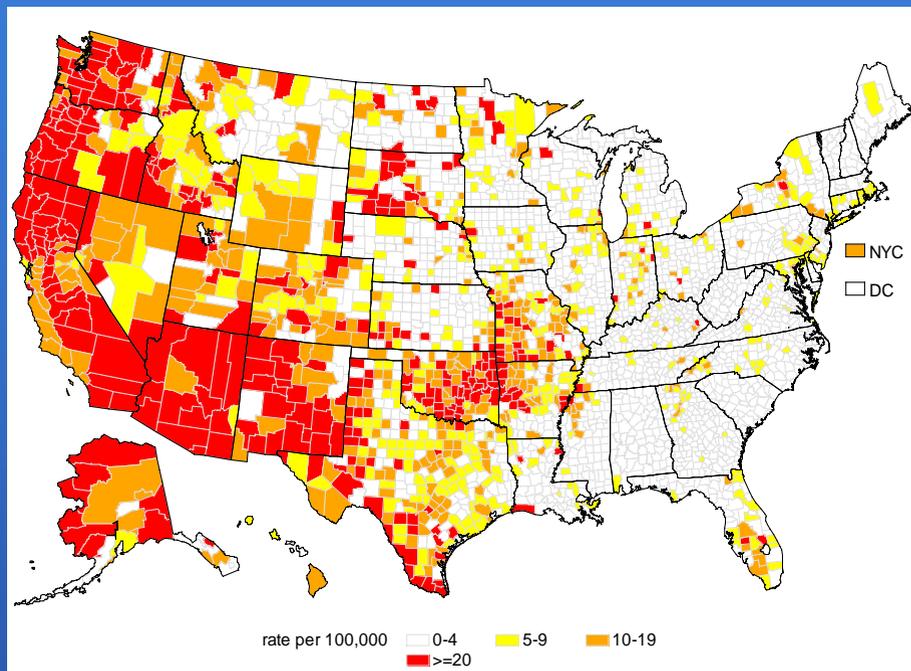
# Hepatitis A in the United States-2002

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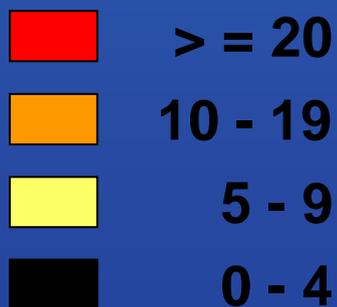
- **National rate lowest yet recorded**
  - Continued monitoring needed to determine if low rates sustained and due to vaccination
  - Evaluation of age-specific rates to assess impact of vaccination strategy
- **Rates increasing in some states**
  - Occurring among adults in high risk groups (e.g. MSM, drug users)

# Hepatitis A Incidence, United States

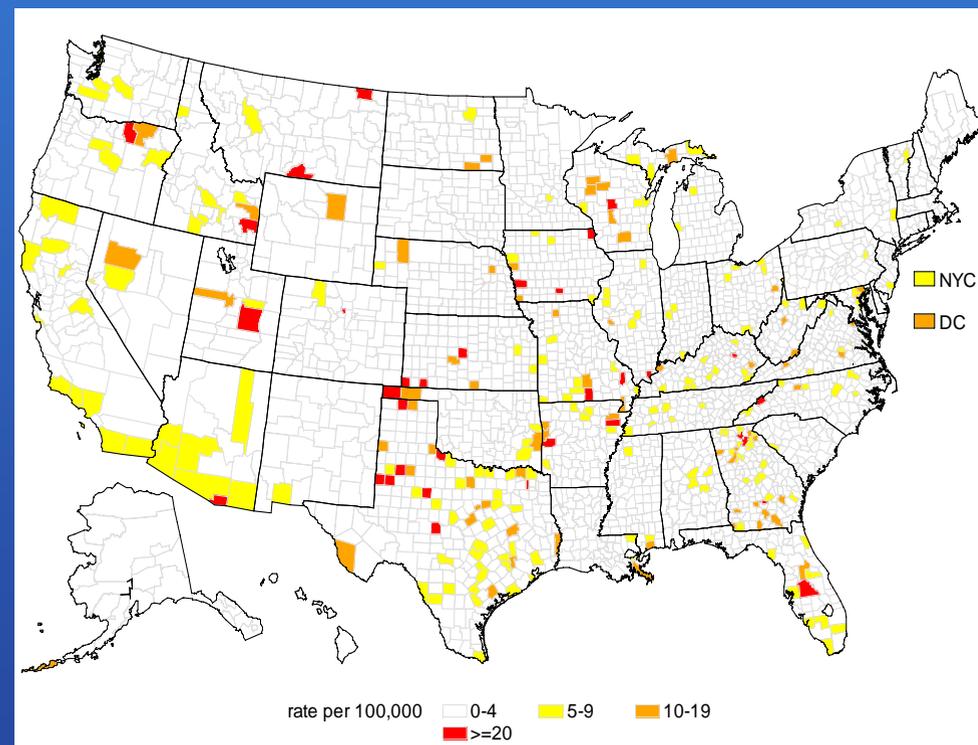
1987-97 average incidence



Rate per 100,000



2002 incidence



# Lack of integrated prevention activities leads to...

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- **Individuals infected with HIV, hepatitis and other STDs remain undiagnosed, untreated and uninformed**
- **Infected and uninformed have higher levels of risky behavior and continue to transmit**
- **Counseling is mistakenly based on limited diagnosis and individuals at risk for HAV and HBV don't get immunized**

# Long-term Hepatitis A Prevention Strategy

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- **Sustain ongoing vaccination**
- **Lower disease incidence**
  - Catch-up vaccination of children and adolescents
- **Further reduce incidence**
  - Vaccination of high-risk adults
  - Routine vaccination of children nationwide