

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

## **A Brief Primer**

**National Viral Hepatitis Prevention Conference  
Division of Viral Hepatitis  
Centers for Disease Control and Prevention  
Washington, D.C.**

**December 2005**

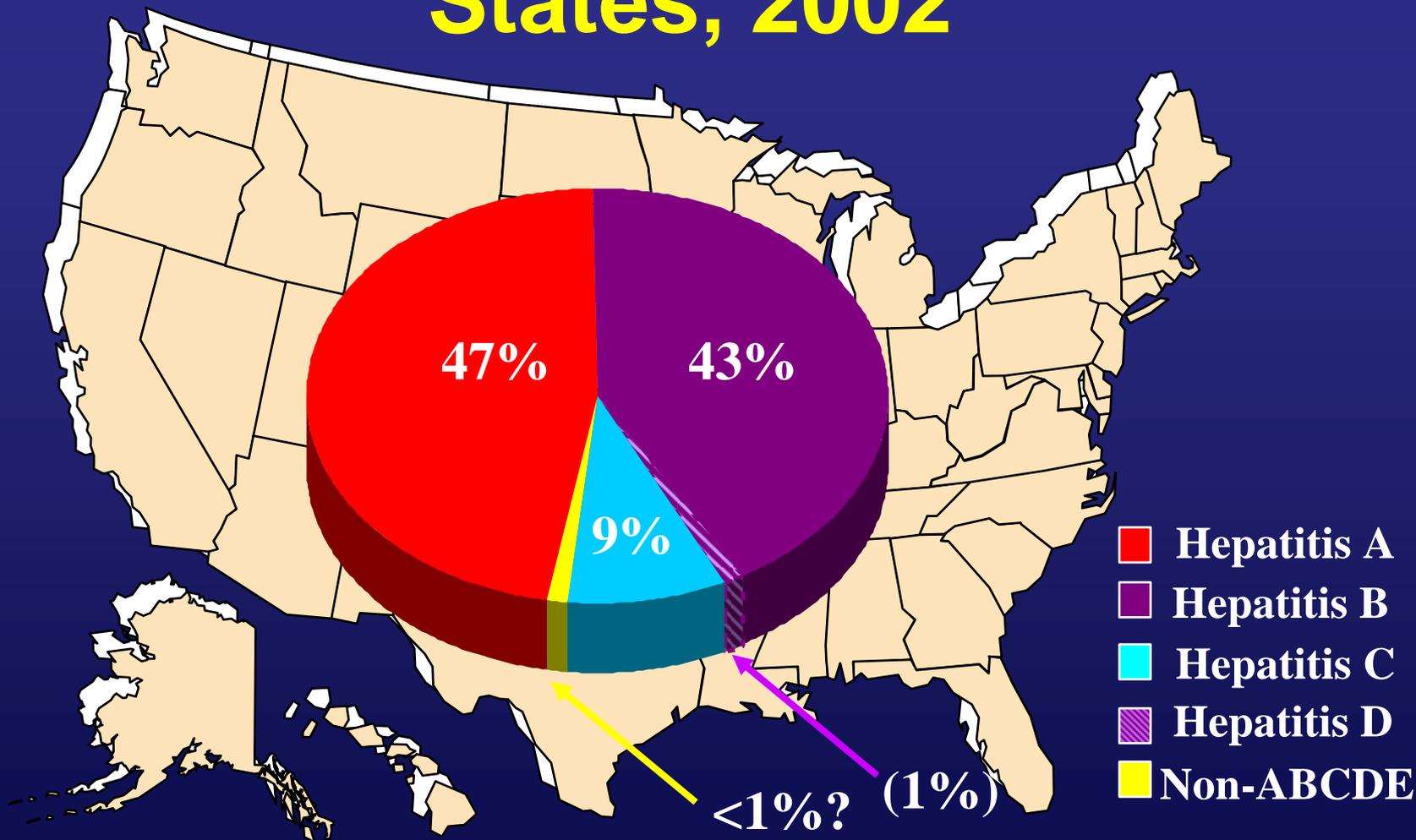


# Viral Hepatitis Overview

## 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

# Acute Viral Hepatitis, United States, 2002



Source: Extrapolated from NNDSS and Sentinel Counties

# Reported Cases of Selected Notifiable Diseases Transmitted by Sex or Blood, 1998 vs 2003

	<u>1998</u>	<u>2003</u>
Hepatitis A*	23,229	7,653
Hepatitis B	10,258	7,526
AIDS/HIV	46,521	44,232
Chlamydia	604,420	877,478
Syphilis (P&S)	6,993	7,177
Gonorrhea	355,642	335,104

\* Fecal-oral

# Reported Cases of Selected Notifiable Diseases Preventable by Vaccination, U.S., 1998 vs 2003

	<u>1998</u>	<u>2003</u>
Pertussis	7,405	11,647
Hepatitis A	23,229	7,653
Hepatitis B	10,258	7,526
H. Influenza	1,194	2,013
Measles	100	56
Meningitis	2,725	1,756
Mumps	666	231
Rubella	7	7

Source: National Notifiable Diseases Surveillance System



# Acute Hepatitis – Clinical Symptoms

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 – Clinical Features

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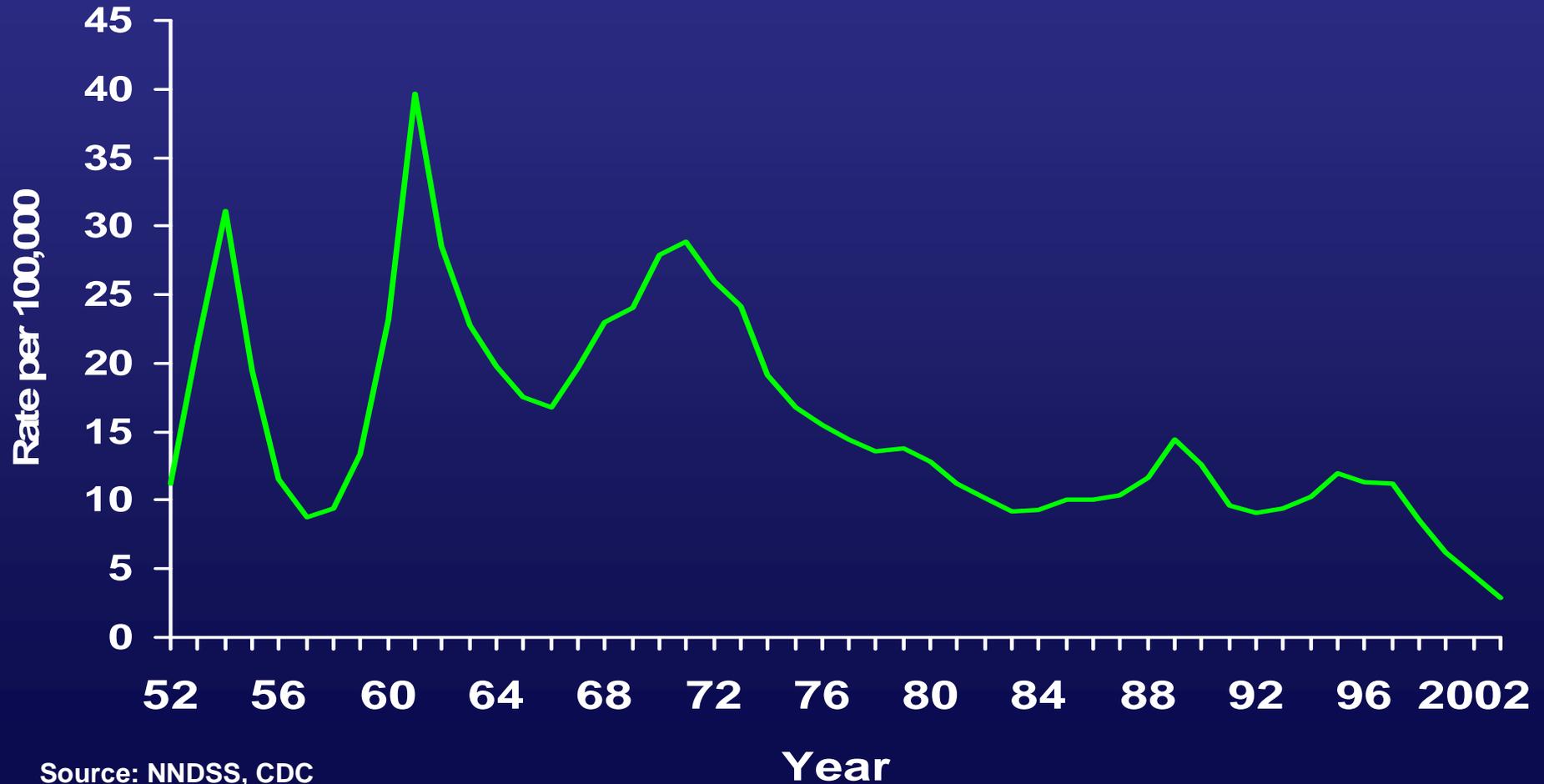
- Incubation period: Average 30 days  
Range 15-50 days
- Jaundice by age group:
  - < 6 yrs <10%
  - 6 – 14 yrs 40%-50%
  - > 14 yrs 70%-80%
- Complications: Fulminant hepatitis  
Cholestatic hepatitis  
Relapsing hepatitis
- Chronic sequelae: None

# Hepatitis A Virus Transmission

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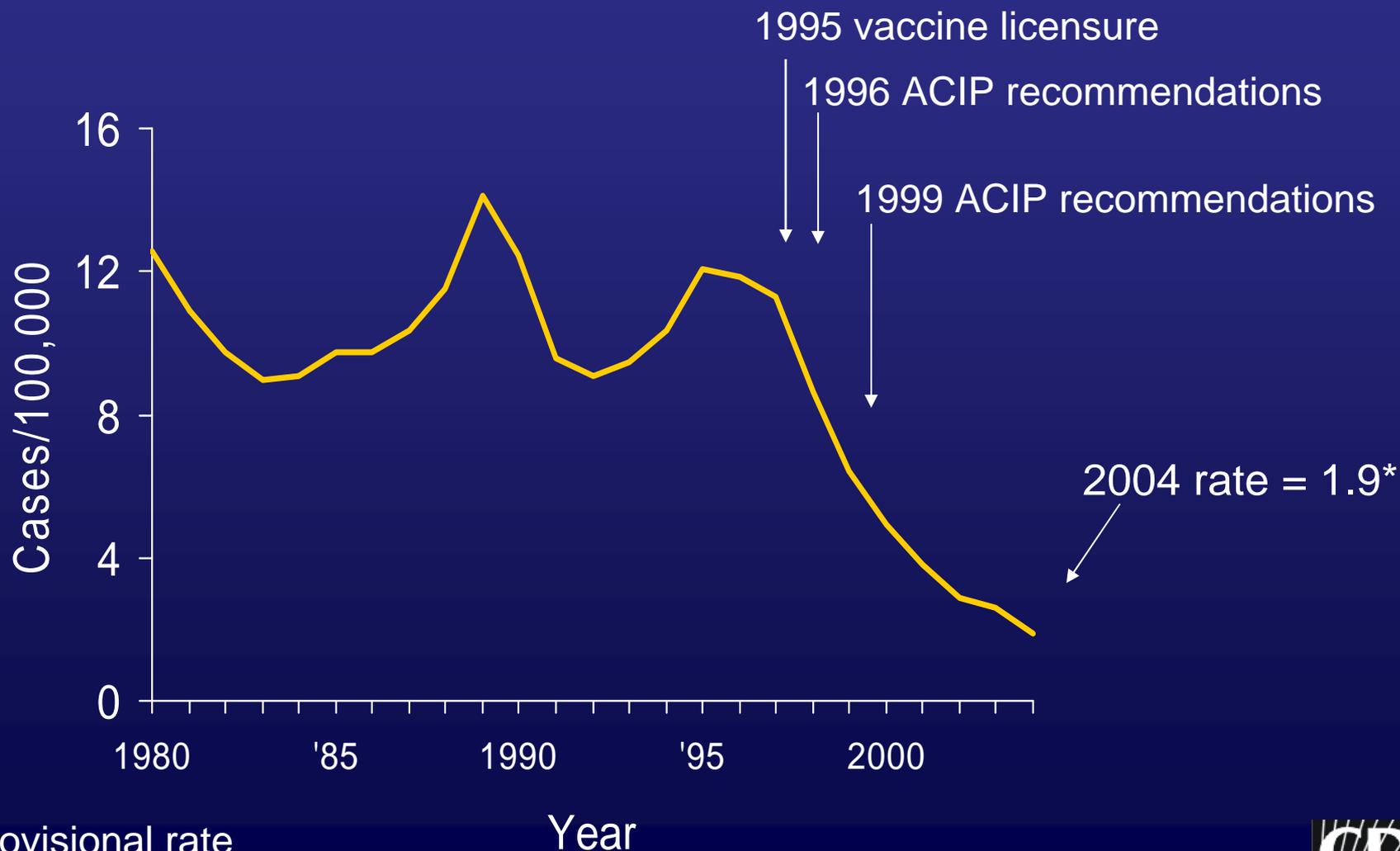
- Fecal-oral
- Close personal contact  
(e.g., household contact, sex contact, child day care centers, illegal drug sharing)
- Contaminated food, water  
(e.g., infected food handlers, raw shellfish)
- Blood exposure (rare)  
(e.g., injecting drug use, transfusion)

# Reported Cases of Hepatitis A, United States, 1952-2002



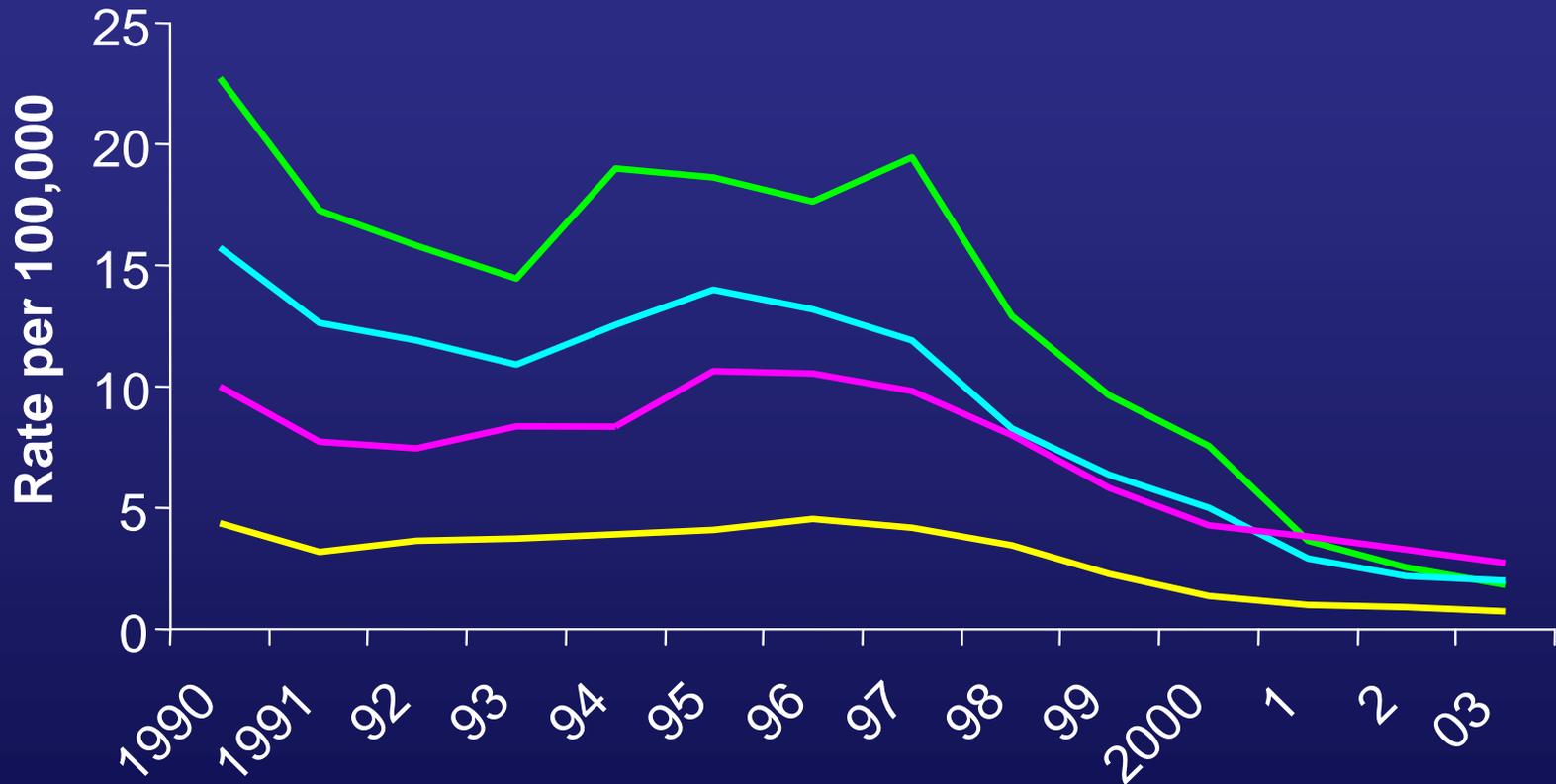
Source: NNDSS, CDC

# Hepatitis A Incidence, United States, 1980-2004



\*Provisional rate

# Incidence of Hepatitis A by Age, United States, 1990-2003



— <2 yr — 2-9 yrs — 10-18 yrs — 19+ yrs

*Decline:*

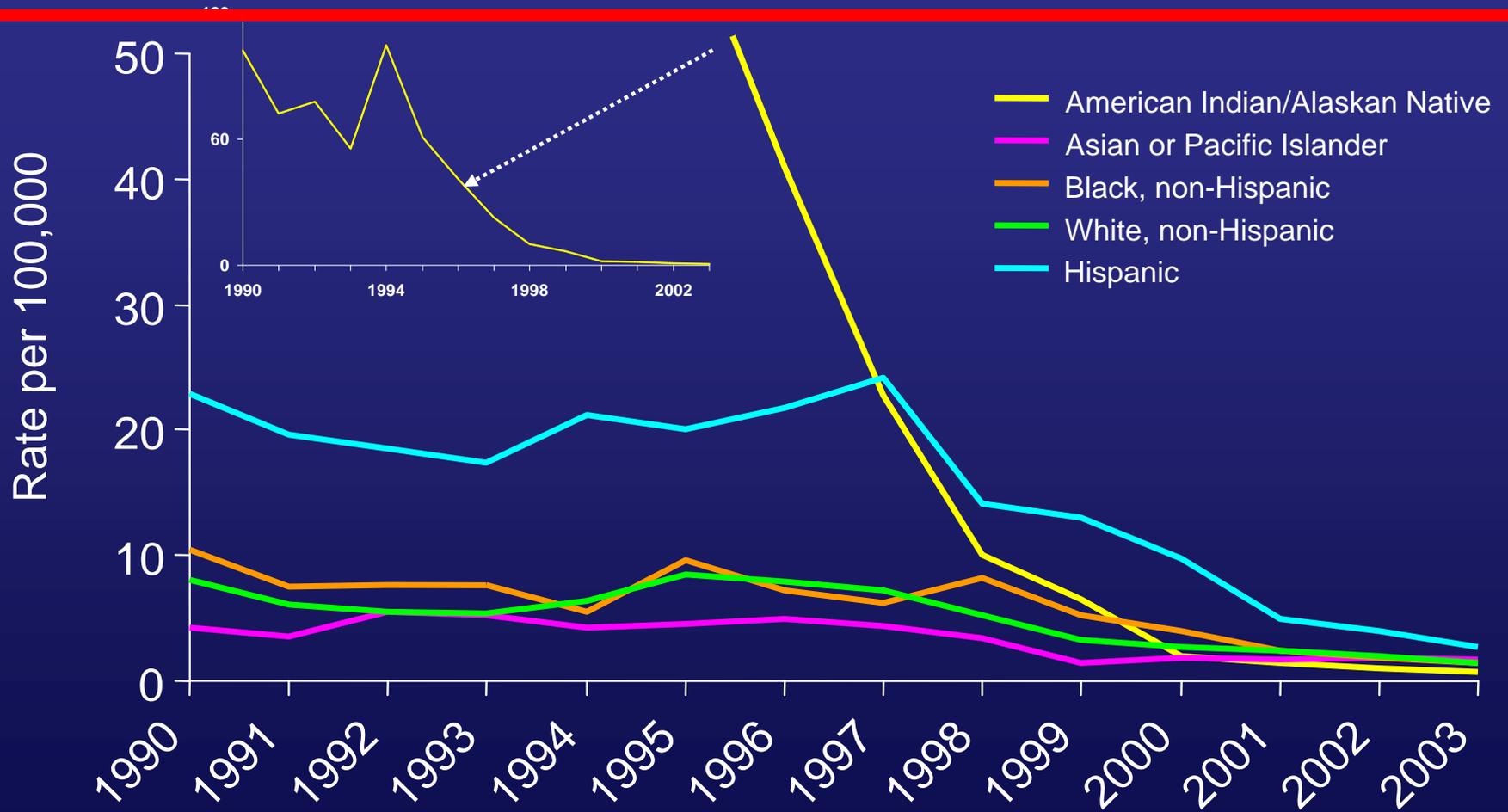
82%

90%

85%

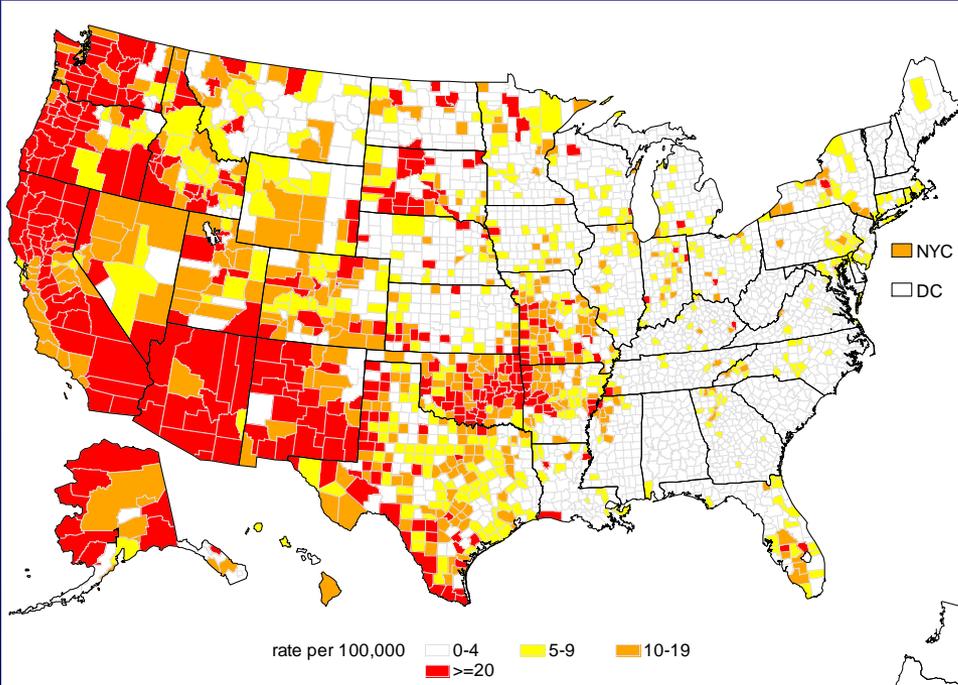
70%

# Hepatitis A Incidence by Race, Ethnicity, United States, 1990-2003

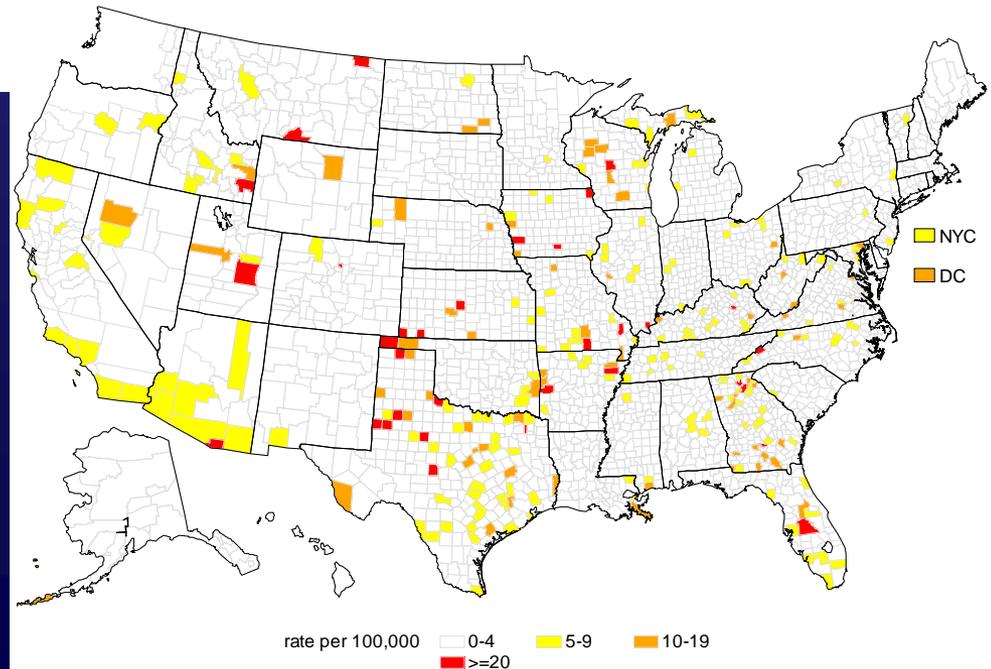


2003 rates are provisional

# Baseline period\* average incidence



# 2002 incidence

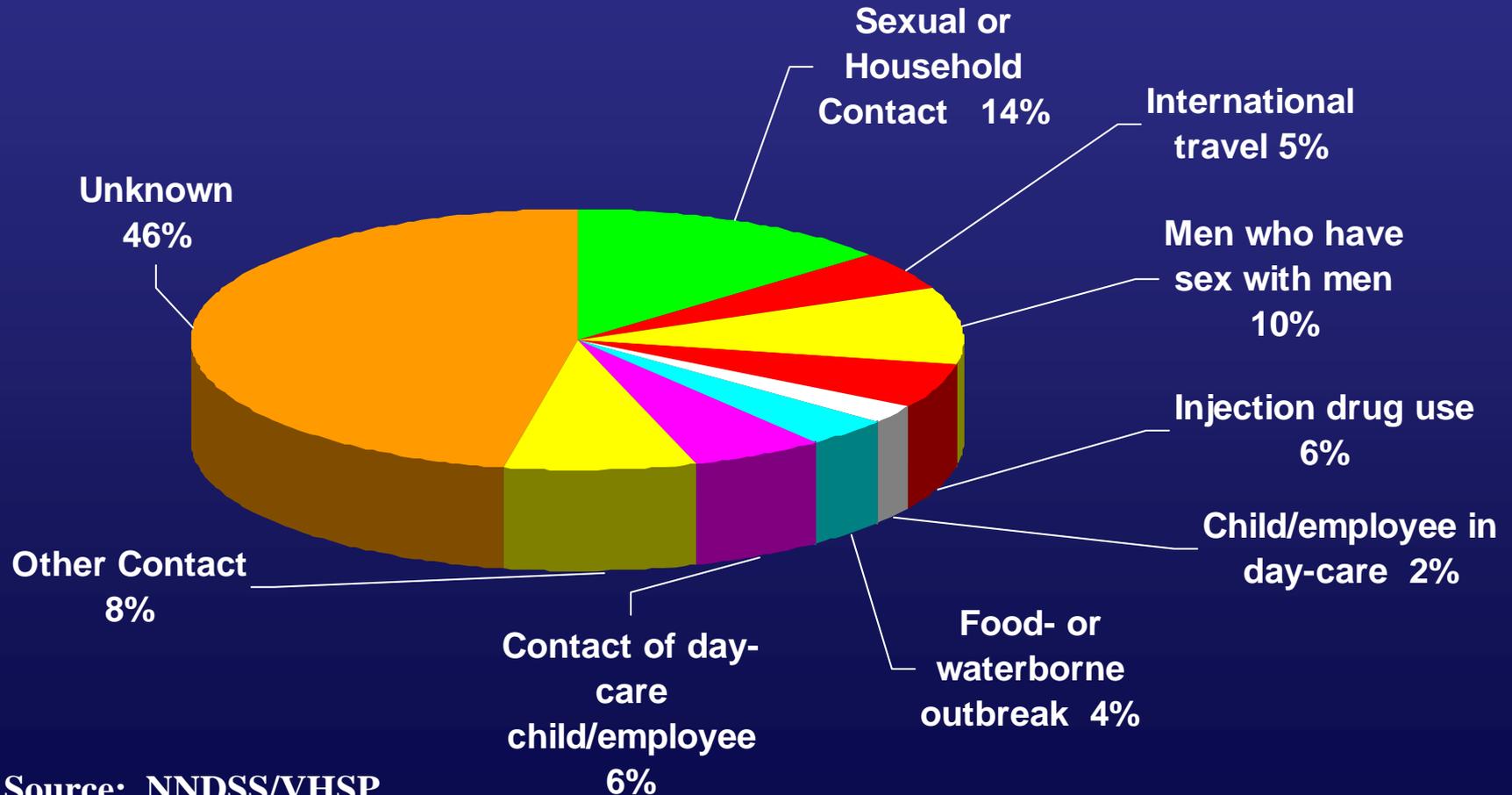


## Rate per 100,000



\*1987-1997

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



Source: NNDSS/VHSP

# Prevention of Hepatitis A

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- **Good hygiene**
- **Clean water systems; avoidance of food contamination**
- **Vaccination**
- **Immune globulin**

# Hepatitis A Prevention – Immune Globulin

- Pre-exposure
  - ▶ travelers to intermediate and high HAV-endemic regions
- Post-exposure (within 14 days)
  - Routine*
    - ▶ household and other intimate contacts
  - Selected situations*
    - ▶ institutions (e.g., day care centers)
    - ▶ common source exposure (e.g., food prepared by infected food handler)



# Recommended Dosages of Hepatitis A Vaccines\*

<u>Schedule Vaccine</u>	<u>Age (yrs)</u>	<u>Dose</u>	<u>Volume (mL)</u>	<u>2-Dose (mos)</u>
HAVRIX	1-18	720 (E.L.U.)	0.5	0, 6-12
	>18	1,440	1.0	0, 6-12
VAQTA	1-18	25 (U)	0.5	0, 6-18
	>18	50	1.0	0, 6-18

\*Licensed 1995, age 2 and older; 2005 down to 12 months of age

# Hepatitis A Vaccine

## Immunogenicity, Side Effects

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- Immunogenicity in children, adolescents, adults:
  - ✓ 94-100% positive 1 month after dose 1
  - ✓ 99-100% positive after dose 2
- Most common side effects:
  - ✓ Sore injx site (50%), headache (15%), malaise (7%)
  - ✓ No severe reactions known
  - ✓ Safety in pregnancy unknown (likely ok, but IG is ok)

# ACIP Recommendations – Hepatitis A Vaccine

## Pre-exposure Vaccination

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- Routine childhood vaccination in upcoming ACIP recommendations – stay tuned
- Persons at increased risk for infection
  - ▶ travelers to intermediate and high HAV-endemic countries
  - ▶ men who have sex with men (whether sexually active or not)
  - ▶ illegal drug users (injection and non-injection)
  - ▶ persons with chronic liver disease (including liver disease due to hepatitis C virus infection)

# ACIP Recommendations – Hepatitis A Vaccine

## Pre-vaccination Testing

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- Considerations:
  - ▶ cost of vaccine
  - ▶ cost of serologic testing (including visit)
  - ▶ prevalence of infection
  - ▶ impact on compliance with vaccination
- Likely to be cost-effective for:
  - ▶ adults born, or who lived in, high endemic areas
  - ▶ adults >40 years of age
  - ▶ older adolescents and young adults in certain groups (Native Americans, Alaska Natives)

# ACIP Recommendations – Hepatitis A Vaccine

## Post-vaccination Testing

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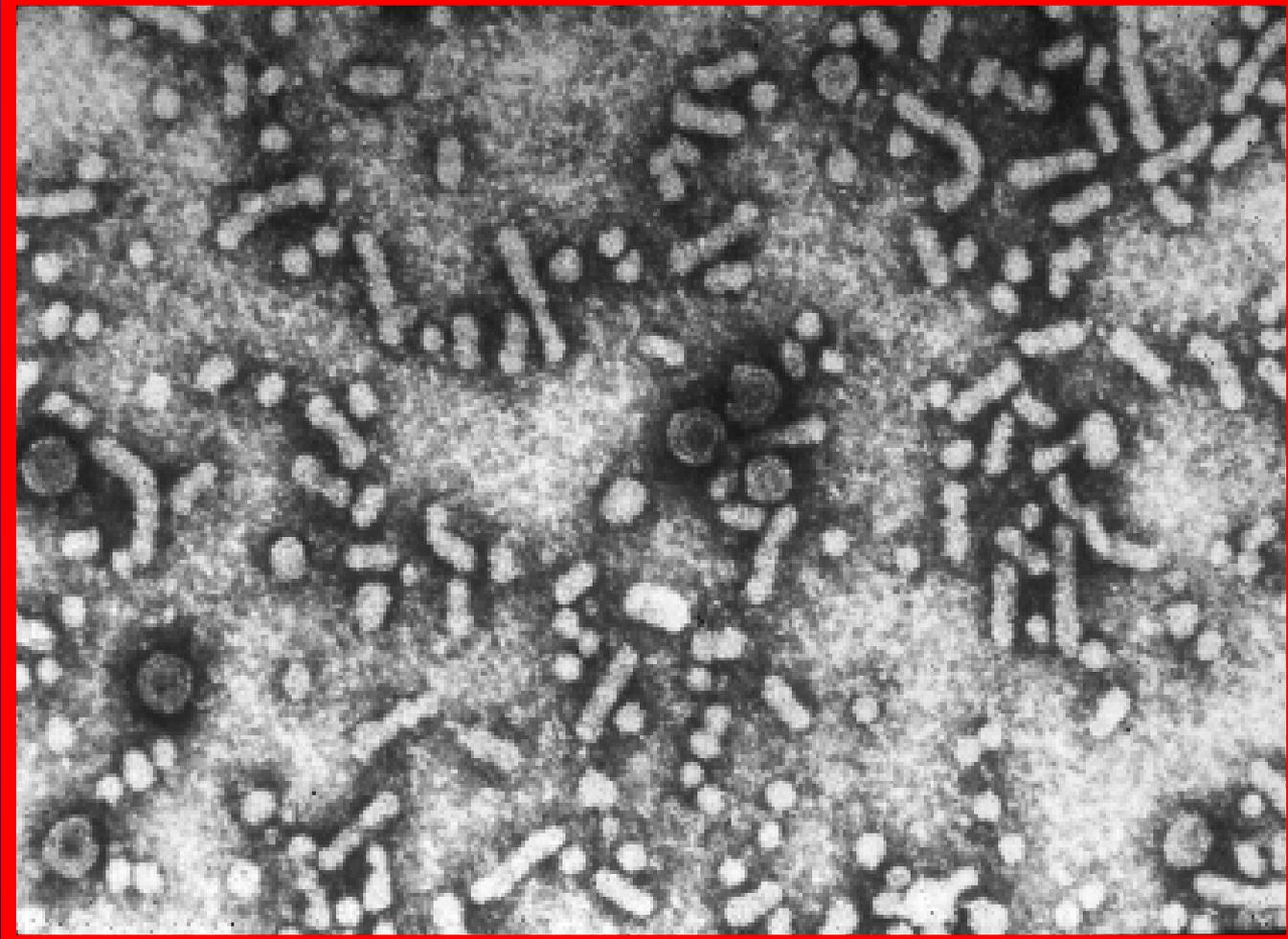
- Not recommended because of the high response rate among vaccinees (95% after dose one, 100% after two)
- No commercially available test to measure vaccine response

# Duration of Protection after Hepatitis A Vaccination

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- **Persistence of antibody**
  - ▶ At least 10 years in 95-100% of adult vaccinees
  - ▶ Few data for children and infants
- **Efficacy**
  - ▶ No cases in vaccinated children at 7-8 years of follow-up
- **Mathematical models of antibody decline suggest protective antibody levels persist for at least 20 years**

# Hepatitis B Virus

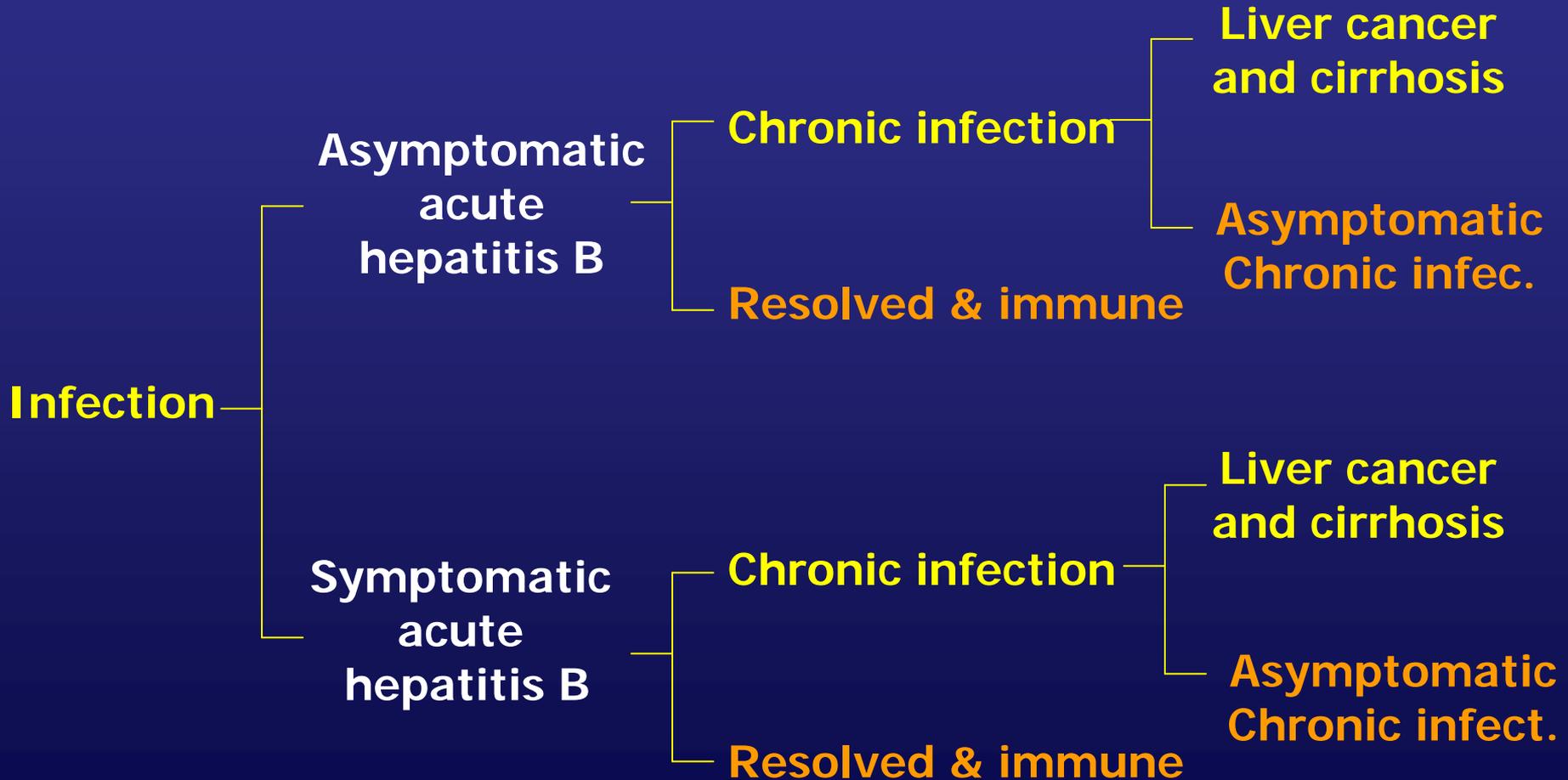


# Hepatitis B – Clinical Features

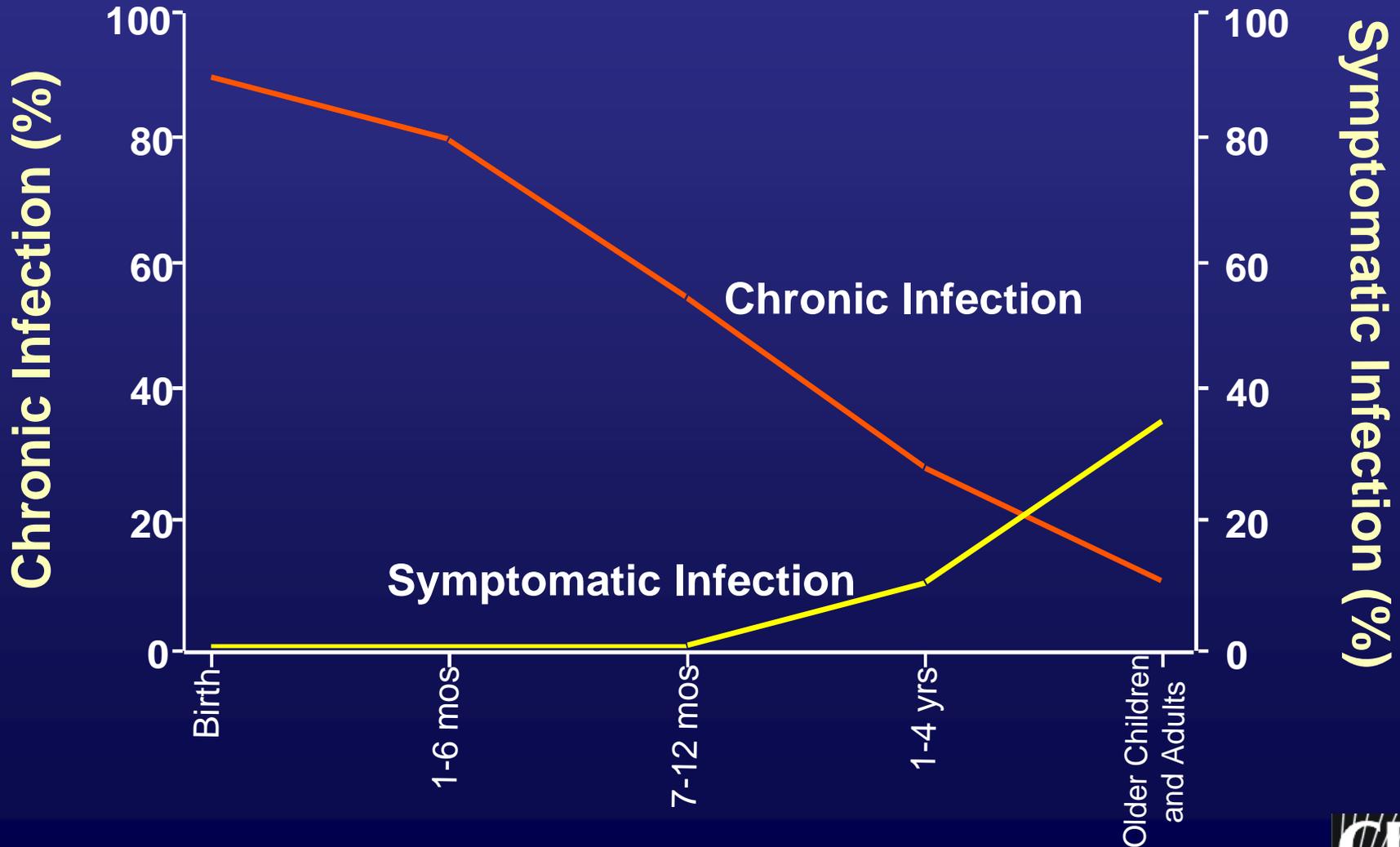
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- Incubation period: Average 60-90 days  
Range 45-180 days
- Clinical illness (jaundice): <5 yrs, <10%  
>5 yrs, 30%-50%
- Acute case-fatality rate: 0.5%-1%
- Chronic infection: <5 yrs, 30%-90%  
>5 yrs, 2%-10%
- Premature mortality from chronic liver disease: 15%-25%

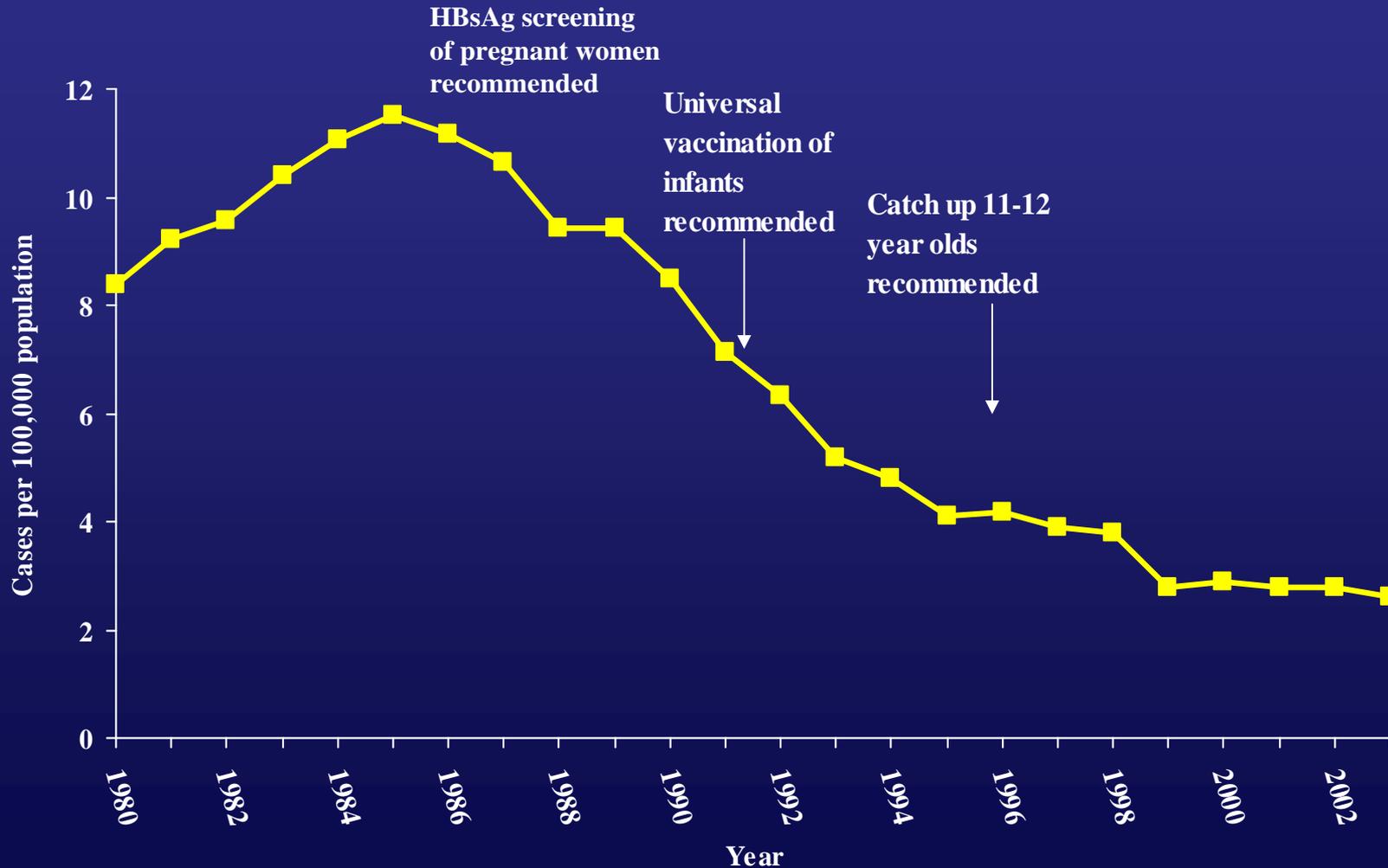
# Natural History of HBV Infection



# Outcome of Hepatitis B Virus Infection by Age at Infection

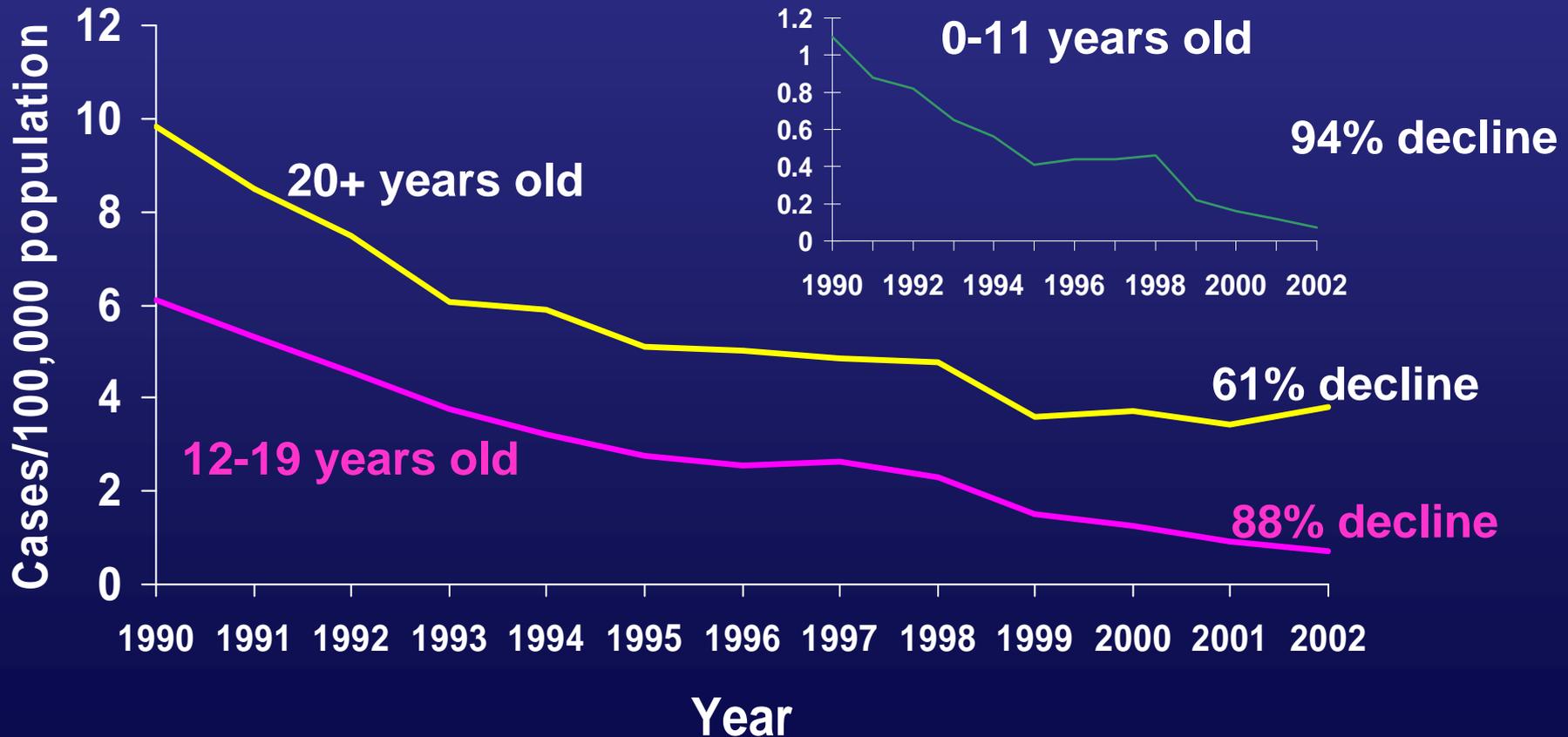


# Incidence of Acute Hepatitis B United States, 1980-2003



Source: National Notifiable Diseases Surveillance System (NNDSS)

# Acute Hepatitis B Incidence, by Age, United States, 1990-2002



# Concentration of HBV in Various Body Fluids

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High	Moderate	Low/Not Detectable
blood	semen	urine
serum	vaginal fluid	feces
wound exudates	saliva	sweat
		tears
		breast milk

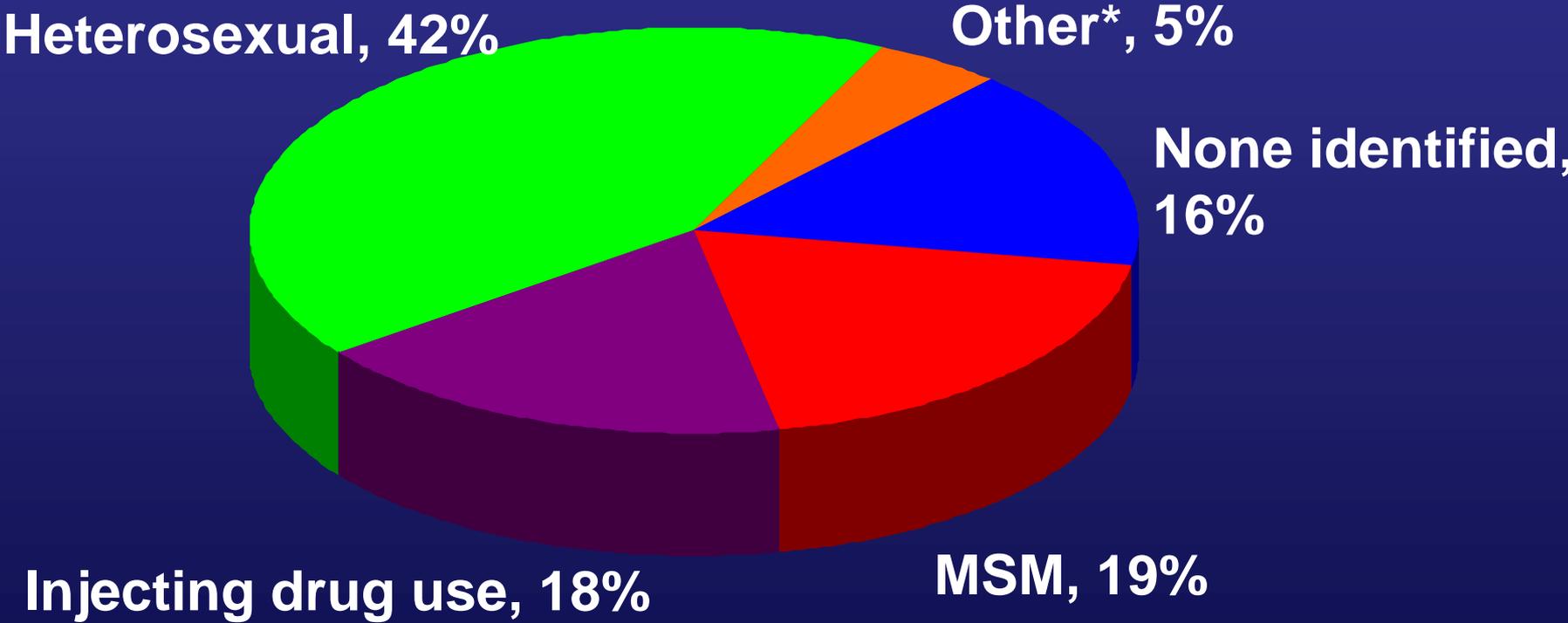
# HBV Modes of Transmission

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- Sexual
- Parenteral
- Perinatal

# Reported Risk Factors for Acute Hepatitis B in Adults, United States, 1991-2001

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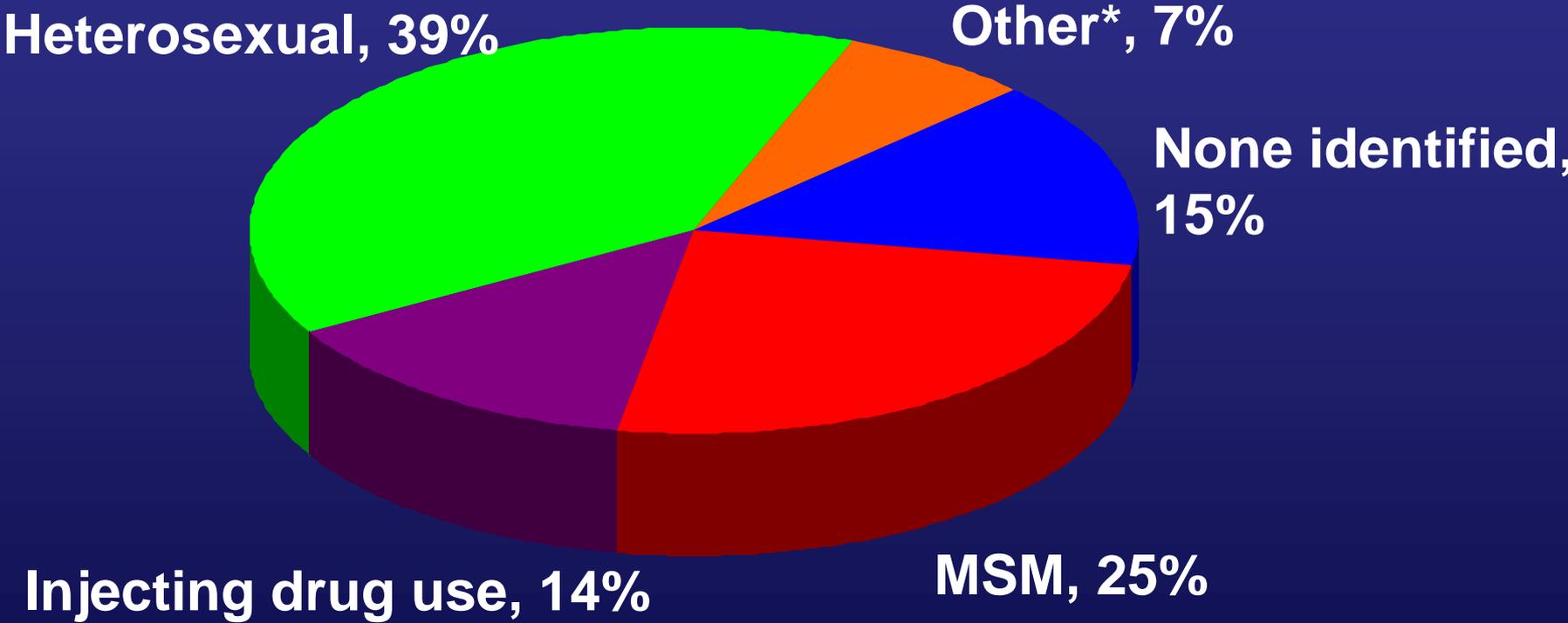


\*Other: Household contact, institutionalization, hemodialysis, blood transfusion, occupational exposure



# Reported Risk Factors for Acute Hepatitis B in Adults, United States, 2001-2003

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\*Other: Household contact, institutionalization, hemodialysis, blood transfusion, occupational exposure

Source: Sentinel Counties Study of Viral Hepatitis, CDC



# Hepatitis B Vaccine

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- Licensed in 1981; currently recombinant (in US)
- 3 dose series, typical schedule 0, 1-2, 4-6 months  
- no maximum time between doses (no need to repeat missed doses or restart)
- 2 dose series (adult dose) licensed by FDA for 11-15 year olds (Merck)
- Protection ~30-50% dose 1; 75% - 2; 96% - 3;  
lower in older, immunosuppressive illnesses  
(e.g., HIV, chronic liver diseases, diabetes),  
obese, smokers

# Hepatitis B Vaccine Safety

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- Administered to over 12 million infants and children worldwide – side effects rare
- Anaphylaxis estimated to occur in 1/600,000 doses given
- No scientific data to link hepatitis B vaccine with multiple sclerosis (MS), other autoimmune diseases, autism

# Hepatitis B Protection

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- If vaccine recipient responds adequately to vaccine (anti-HBs  $> 10\text{mIU/ml}$ ), long term protection is provided
- Immunity persists despite loss of anti-HBs
- Documented protection up to 15 years, but lifelong protection is likely
- Booster doses of vaccine are NOT recommended (except for select groups, such as on hemodialysis)

# Elimination of HBV Transmission, United States

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## *Objectives*

- Prevent chronic HBV Infection
  - ✓ Prevent chronic liver disease
  - ✓ Prevent primary hepatocellular carcinoma
- Prevent acute symptomatic HBV infection

# Elimination of HBV Transmission, United States

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## *Strategy*

- Prevent perinatal HBV transmission
- Routine vaccination of all infants
- Vaccination of all children up through 18
- Vaccination of high risk adults

# Elimination of Hepatitis B Virus Transmission United States

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## *Strategy*

- Prevent perinatal HBV transmission

# Key Elements of Perinatal Hepatitis B Prevention Programs

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- **Testing all pregnant women for HBsAg**
- **Reporting of HBsAg-positive women**
- **Case-management and tracking to assure:**
  - ▶ **HBIG and hepatitis B vaccine at birth**
  - ▶ **completion of vaccination by 6 months of age**
  - ▶ **post-vaccination serologic testing at 12-15 months**
  - ▶ **identification and vaccination of susceptible HH/sex contacts**
- **Integration with other newborn disease prevention programs (“one-stop shopping”)**

# Prevention of Perinatal HBV Transmission

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## Major changes in guidelines since 1995:

- Recommendations for implementation of policies and procedures in delivery hospitals to ensure prevention of perinatal HBV transmission, including standing orders for administration of hepatitis B vaccination at birth, and maintenance of case-management programs to prevent perinatal HBV transmission

# Elimination of Hepatitis B Virus Transmission United States

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## *Strategy*

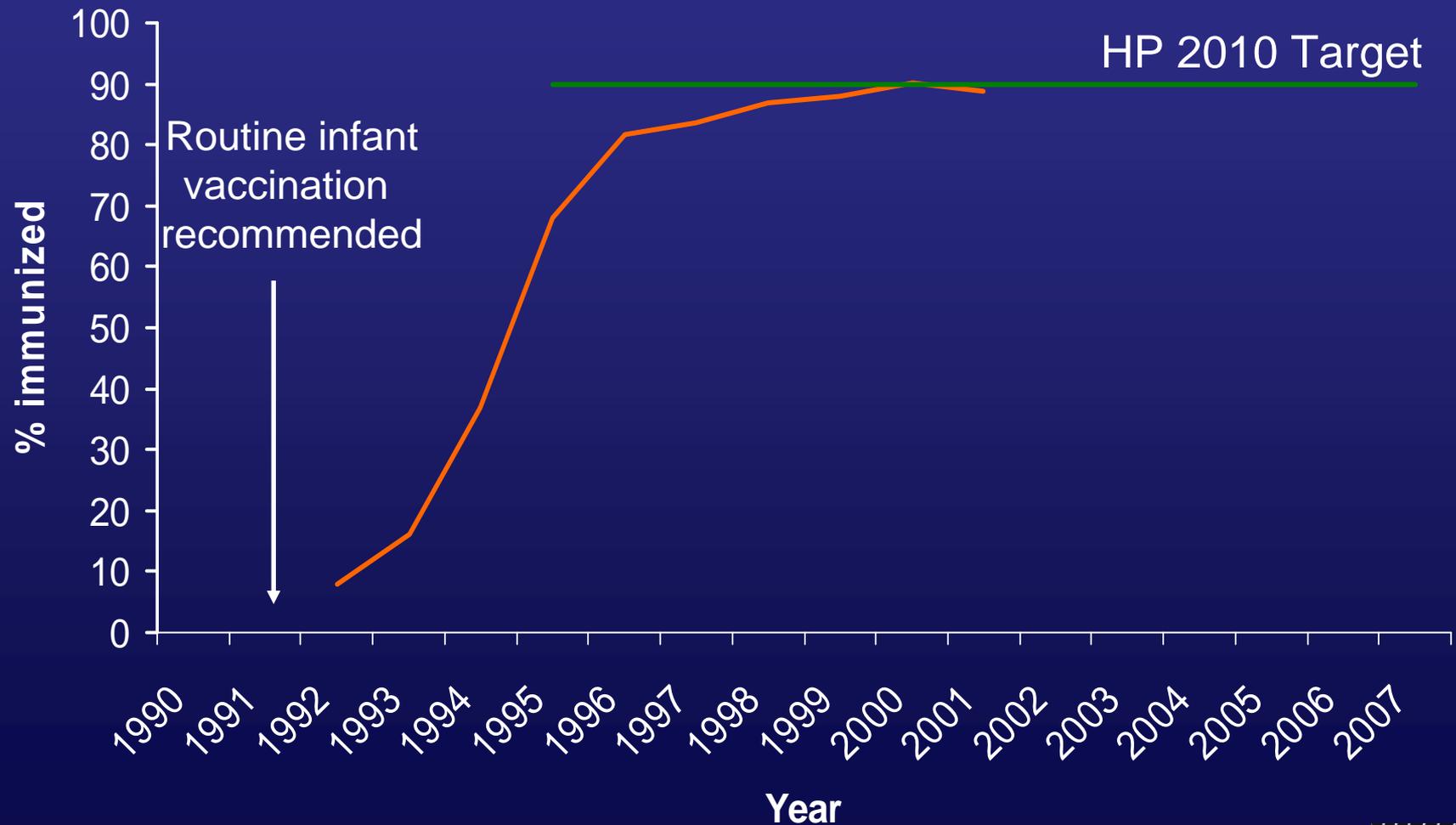
- Routine vaccination of all infants

# Universal Infant Immunization Rationale

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- ~16,000 US children infected each year postnatally before universal infant B vaccination implemented
- Vaccination of all infants needed to prevent these infections because ~50% of early childhood cases were in children born to HBsAg-negative mothers
- Birth dose for all infants is a “safety net” to prevent perinatal HBV infections:
  - ▶ Assures protection for infants born to mothers with unknown HBsAg status
  - ▶ Prevents infections in infants born to HBsAg-positive mothers if there are errors in tracking these infants
- Immunization of infants provides long-term protection

# Hepatitis B Vaccine Coverage 19-35 month olds, United States



Source: National Immunization Survey, CDC



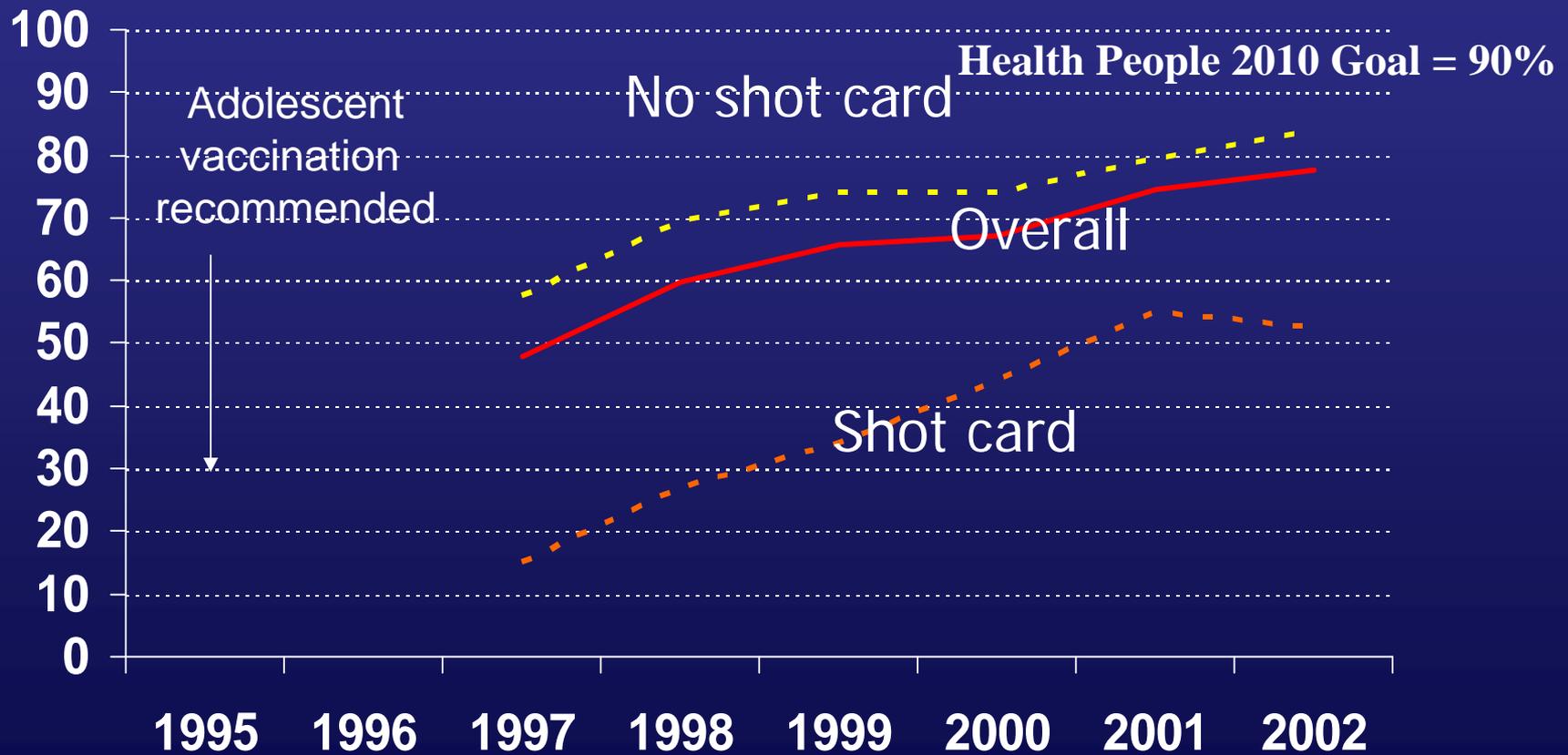
# Elimination of Hepatitis B Virus Transmission United States

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## *Strategy*

- Vaccination of all children through 18

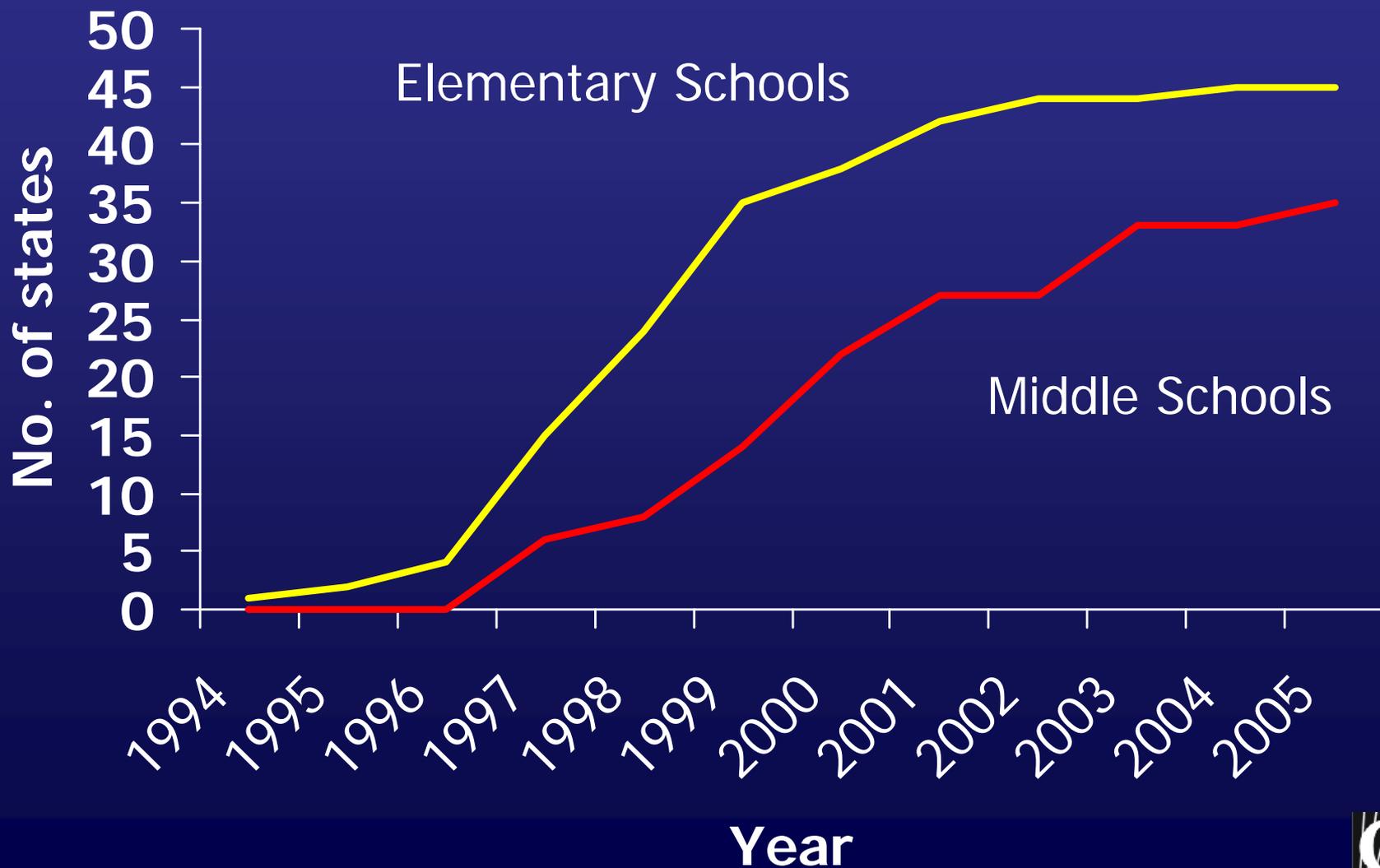
# Estimated Hepatitis B Vaccine Coverage 13-15 Year Olds, 1997-2002



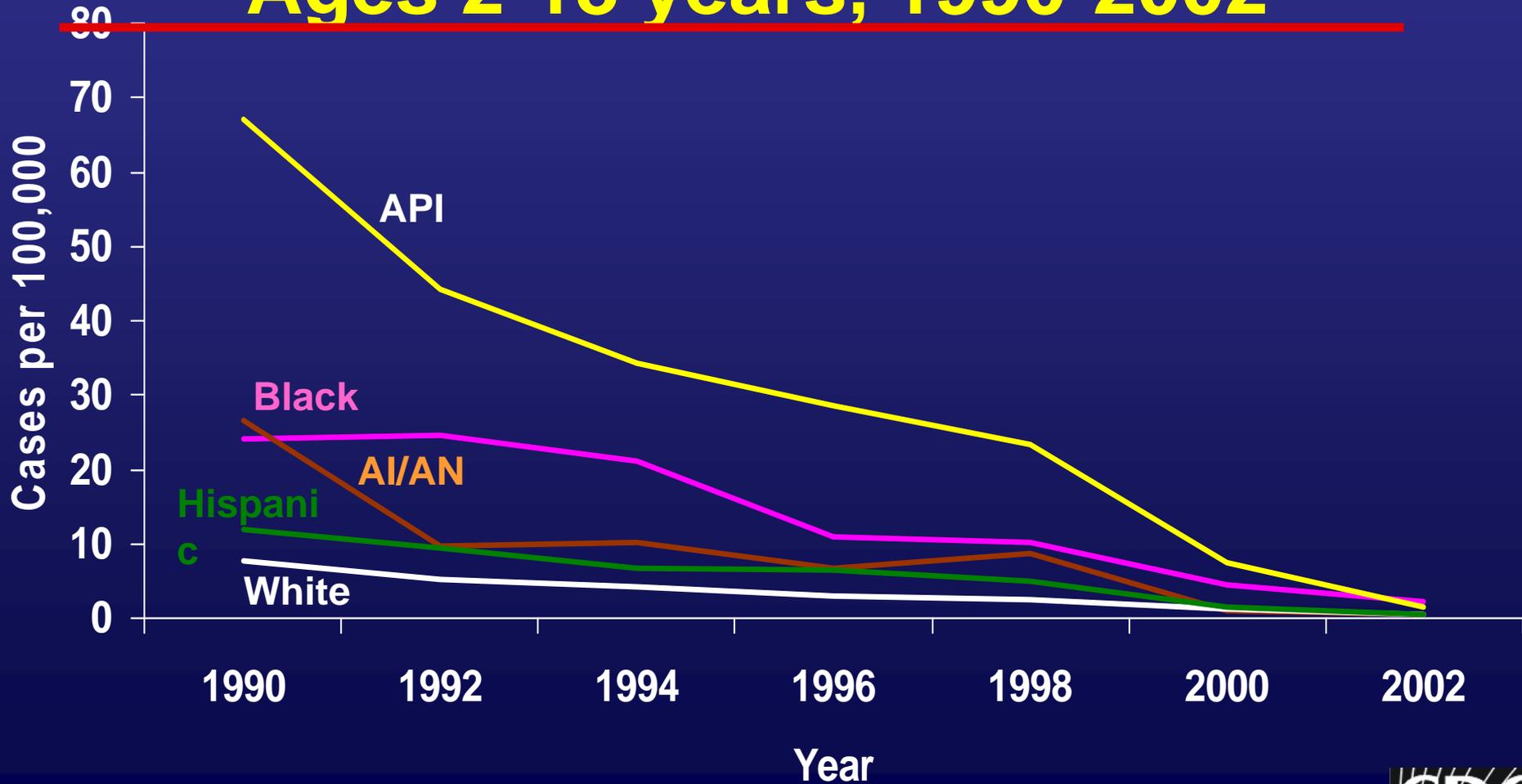
Source: National Health Interview Survey



# States With Elementary or Middle School Hepatitis B Vaccine Requirements, 1994-2005



# Estimated Hepatitis B Incidence by Race, Ages 2-18 years, 1990-2002



# Catch up Vaccination of Previously Unvaccinated Children and Adolescents

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New recommendations:

- **Hepatitis B vaccination should be routinely provided in:**
  - ▶ **Juvenile correction facilities**
  - ▶ **Programs that serve high risk youth for STD, HIV/AIDS, and substance abuse treatment and prevention**
- **States should adopt regulations or laws that require hepatitis B vaccination for entry into middle school or its equivalent**

# Elimination of Hepatitis B Virus Transmission United States

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## *Strategy*

- Vaccination of persons in “high-risk” groups

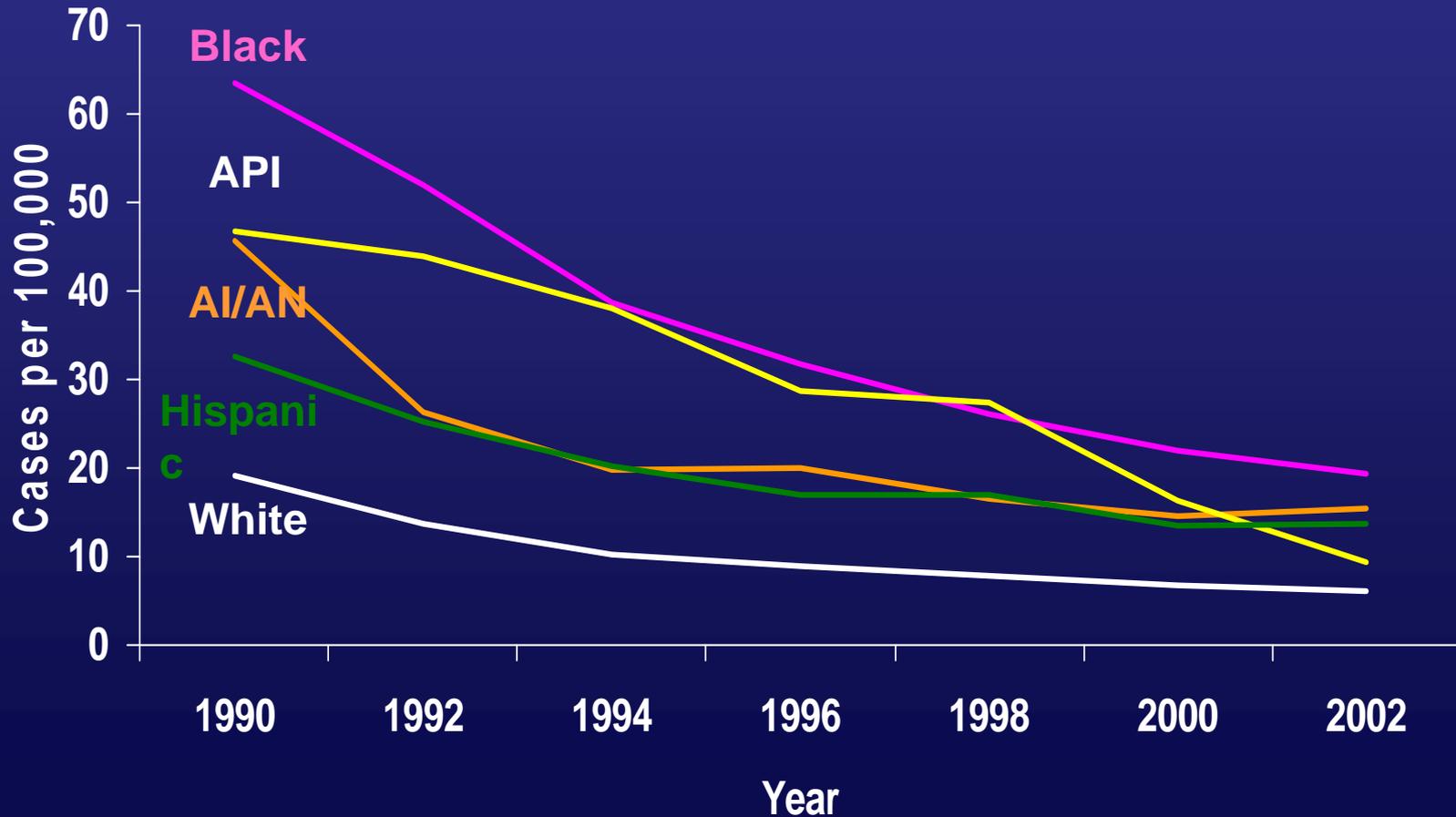
# Vaccination of Adults in Risk Groups

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## Vaccinate adults with risk factors for hepatitis B (1982)

- Persons at risk of sexually-transmitted infection
- Men who have sex with men
- Injection drug users
- Sexual and HH contacts of HBsAg-positive persons, including international adoptees
- Persons at occupational risk
- Dialysis patients
- Patients who receive clotting factor concentrates
- International travelers
- Inmates

# Estimated Hepatitis B Incidence by Race, Ages 19+ Years, 1990-2002



# Estimated Hepatitis B Vaccine Coverage in Adults

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<b>Risk Group</b>	<b>Coverage Estimate (year, site)</b>
<b>Dialysis patients</b>	<b>60% (2001, national)</b>
<b>Occupationally-exposed workers</b>	<b>71% (1995, national)</b>
<b>MSM</b>	<b>16% (98-01, San Diego)</b>
<b>Injection drug users</b>	<b>6% (98-01, San Diego)</b>
<b>STD clinic clients</b>	<b>10% (2001, San Diego)</b>

# Missed Opportunities for Adult Hepatitis B Vaccination

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**Of all persons with reported acute hepatitis B:**

- **37% reported prior treatment for an STD**
- **29% reported prior incarceration**
- **56% had been treated for an STD and/or incarcerated in a prison or jail prior to their illness**

Source: Goldstein ST et.al., JID 2002;185:713-9



# Vaccination of Adults in Risk Groups

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New recommendations:

Hepatitis B vaccination recommended for any person who wants to be protected from HBV infection

New Implementation recommendation:

Hepatitis B vaccination should be routinely available and offered to all persons in:

- STD clinics
- HIV/AIDS testing and counseling programs
- Drug use prevention and treatment clinics
- Correctional facilities

# Barriers (Real and Perceived) to Hepatitis B Vaccination of Adolescents and Adults in High Risk Groups

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- **No funding for adult hepatitis B vaccine**
- **Lack of integrated services at sites where persons at risk are seen: leadership and staff commitment (“buy-in”); resources**
- **Sites not enrolled in Vaccine for Children**
- **Lack of resources for:**
  - ▶ **prevaccination counseling, vaccine administration, tracking series completion**
- **Compliance with 3-dose vaccine series**

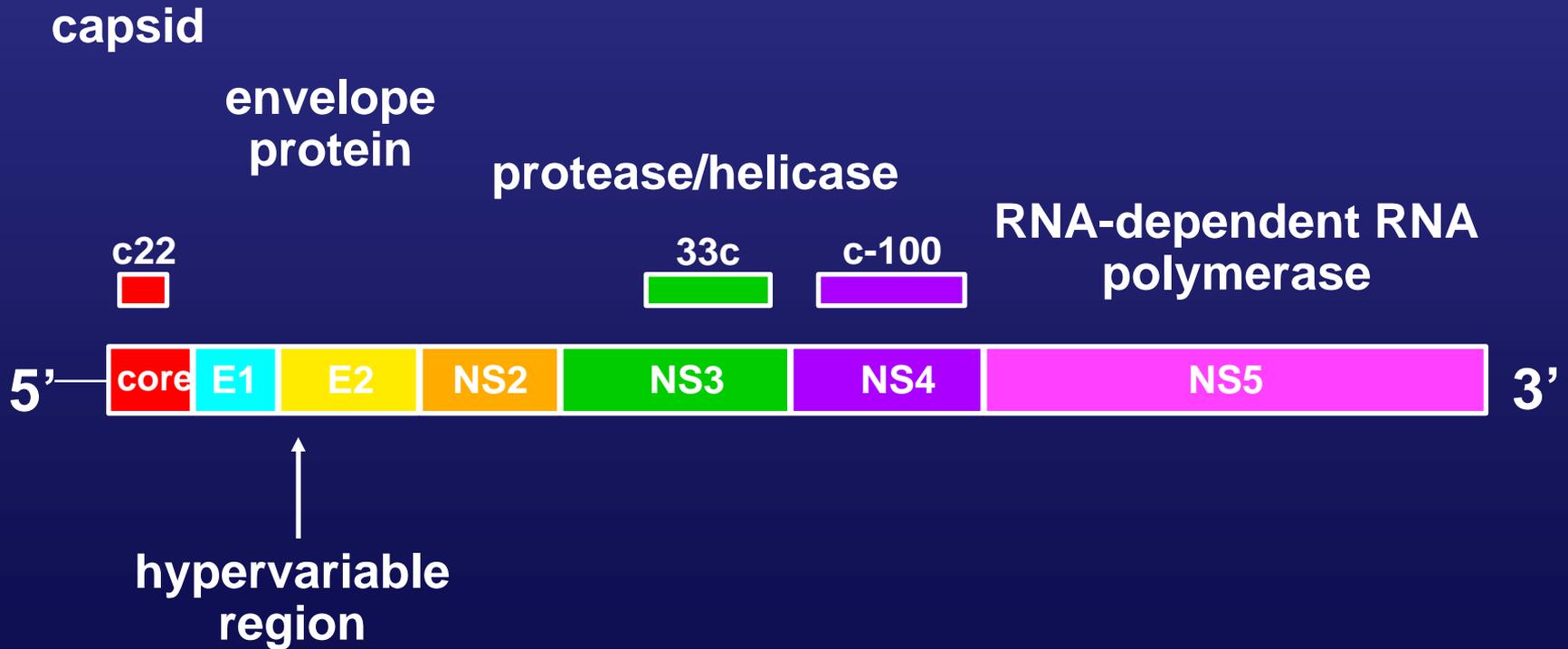
**ONE DOSE better than NONE! 2 better than 1, 3 better than 2; flexible schedule; 2-dose formulation (11-15 years old)**

# Hepatitis B Vaccination ACIP Recommendations

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- **Routine infant**
- **All children up through 18 years**
- **Over 18 – high risk**
  - ▶ Behavioral risk
  - ▶ Occupational risk
  - ▶ Medical risk
  - ▶ Venue-based “all”
    - STD clinic clients
    - Correctional settings
    - HIV care
    - Drug treatment
    - Institution for developmental disability
- **Prevaccination testing – if cost effective**
- **Post-vaccination testing – 1-2 months after last shot, if establishing response critical (HCW)**

# Hepatitis C Virus



# Hepatitis C – Clinical Features

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- Incubation period: Average 6 - 7 wks  
Range 2 - 26 wks
- Clinical illness (jaundice) : 30 - 40% (20 - 30%)
- Chronic hepatitis: 70%
- Persistent infection: 85 - 100%
- Immunity: No protective antibody response identified

# Hepatitis C Virus Infection, United States

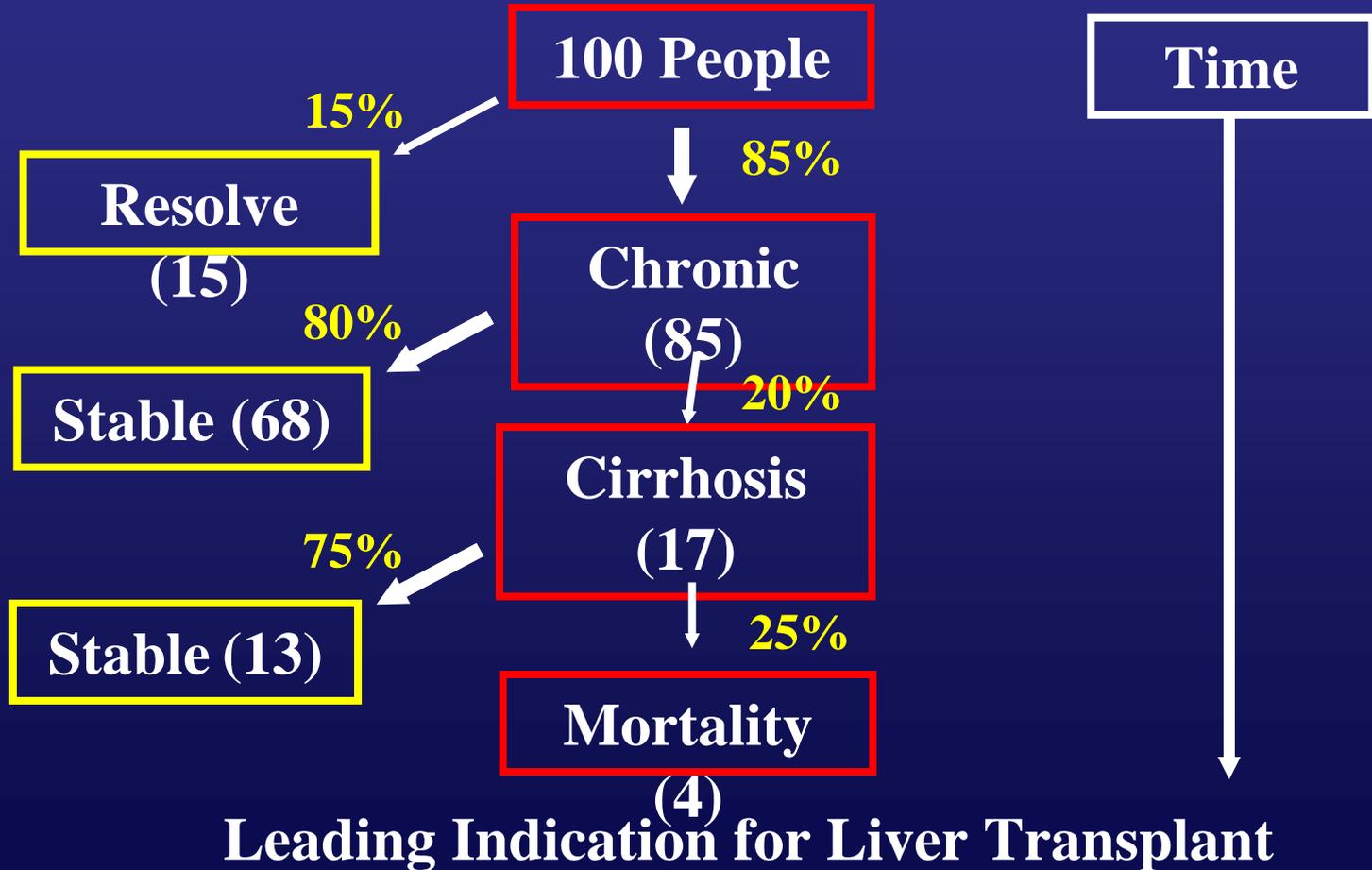
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<b>New infections (cases)/year (98-2003)</b>	<b>25-40,000</b>
<b>Deaths from acute liver failure</b>	<b>Rare</b>
<b>Persons ever infected (1.6%)</b>	<b>~ 4 million</b>
<b>Persons with chronic infection</b>	<b>~ 3 million</b>
<b>HCV-related chronic liver disease</b>	<b>40% - 60%</b>
<b>Deaths from chronic disease/year</b>	<b>8,000-10,000</b>

\*95% Confidence Interval

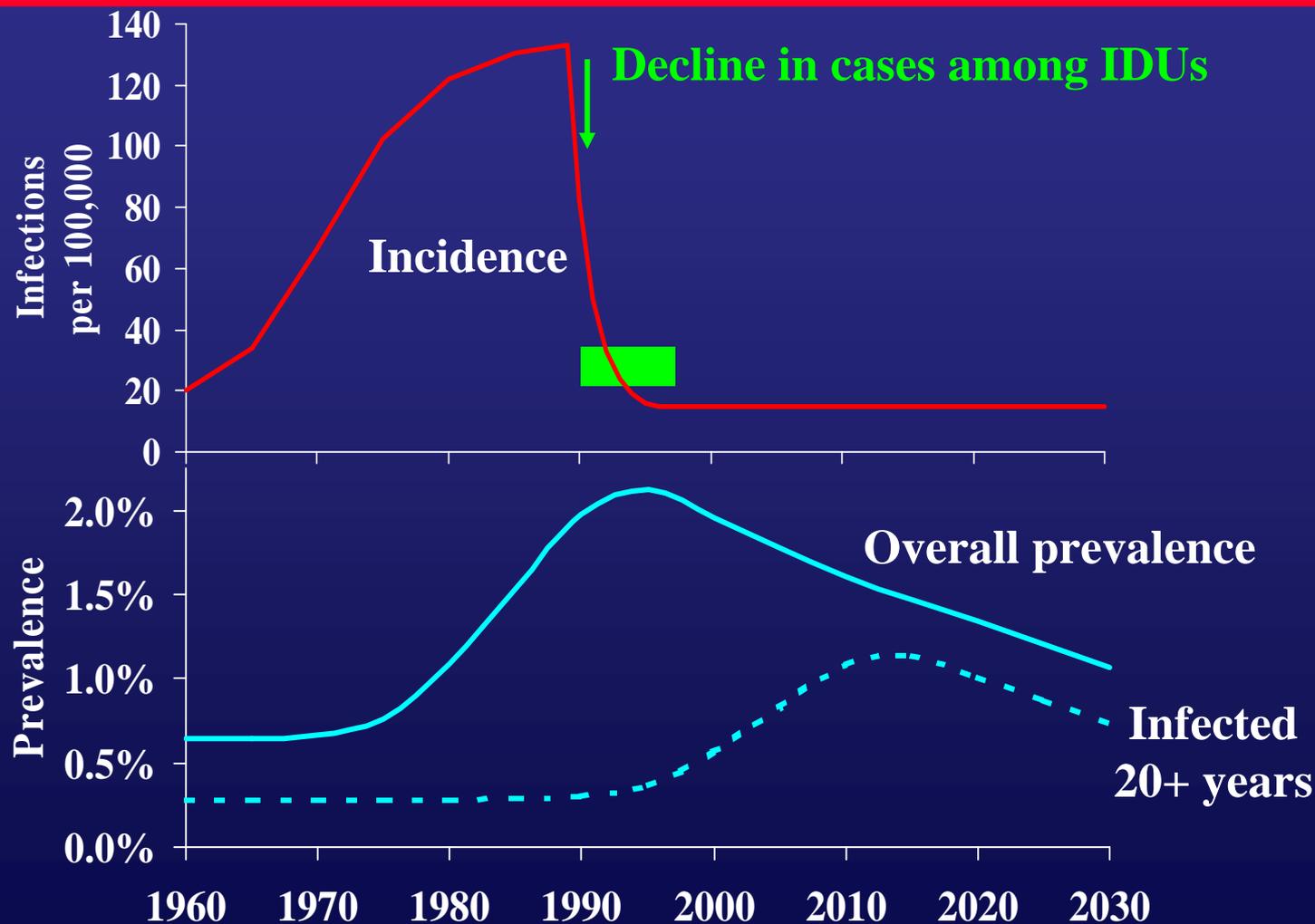


# Natural History of HCV Infection



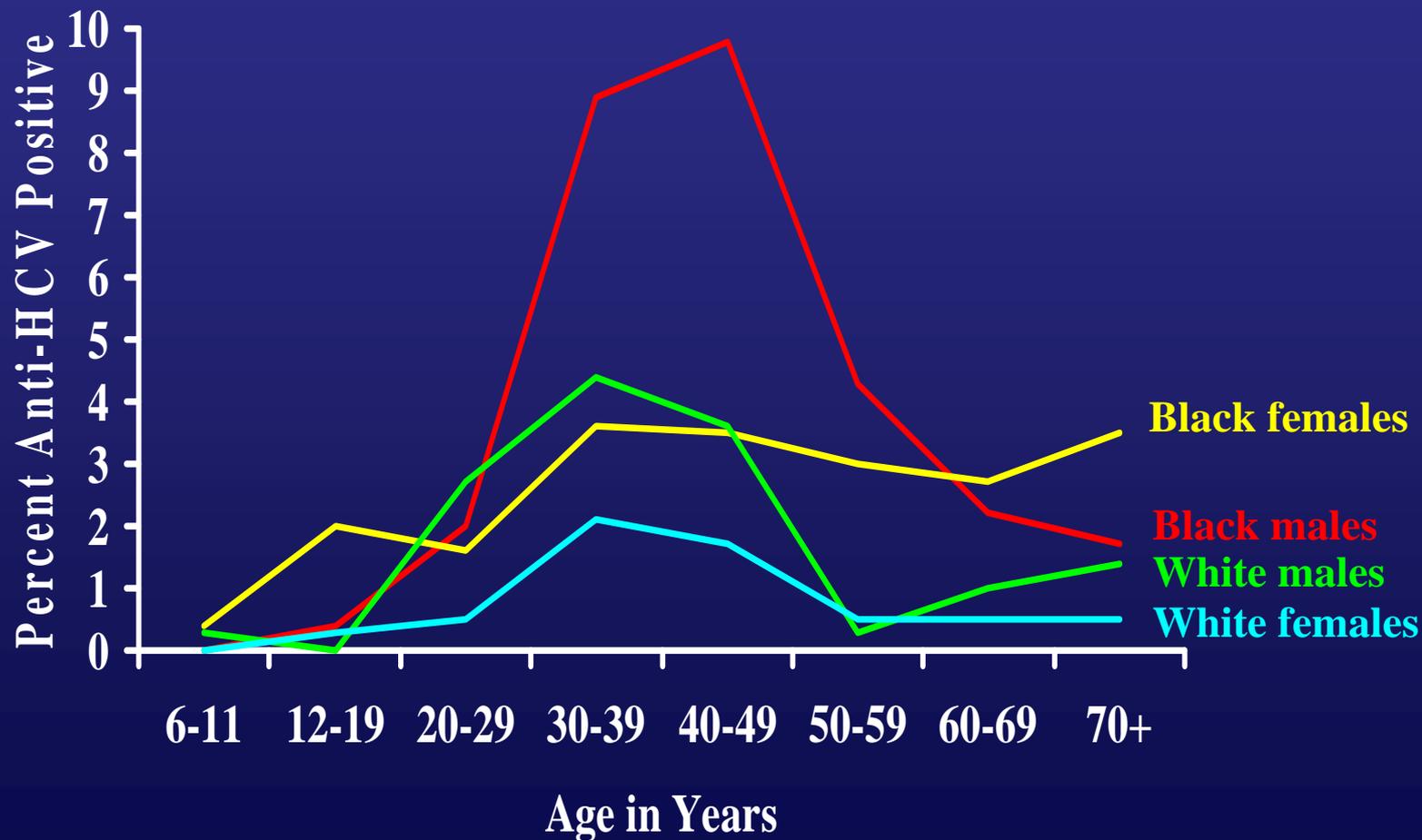
Adapted from Alter HJ

# HCV Infection, Estimates of Past Incidence and Future Prevalence



Source: Armstrong GL et al. Hepatology 2000;31

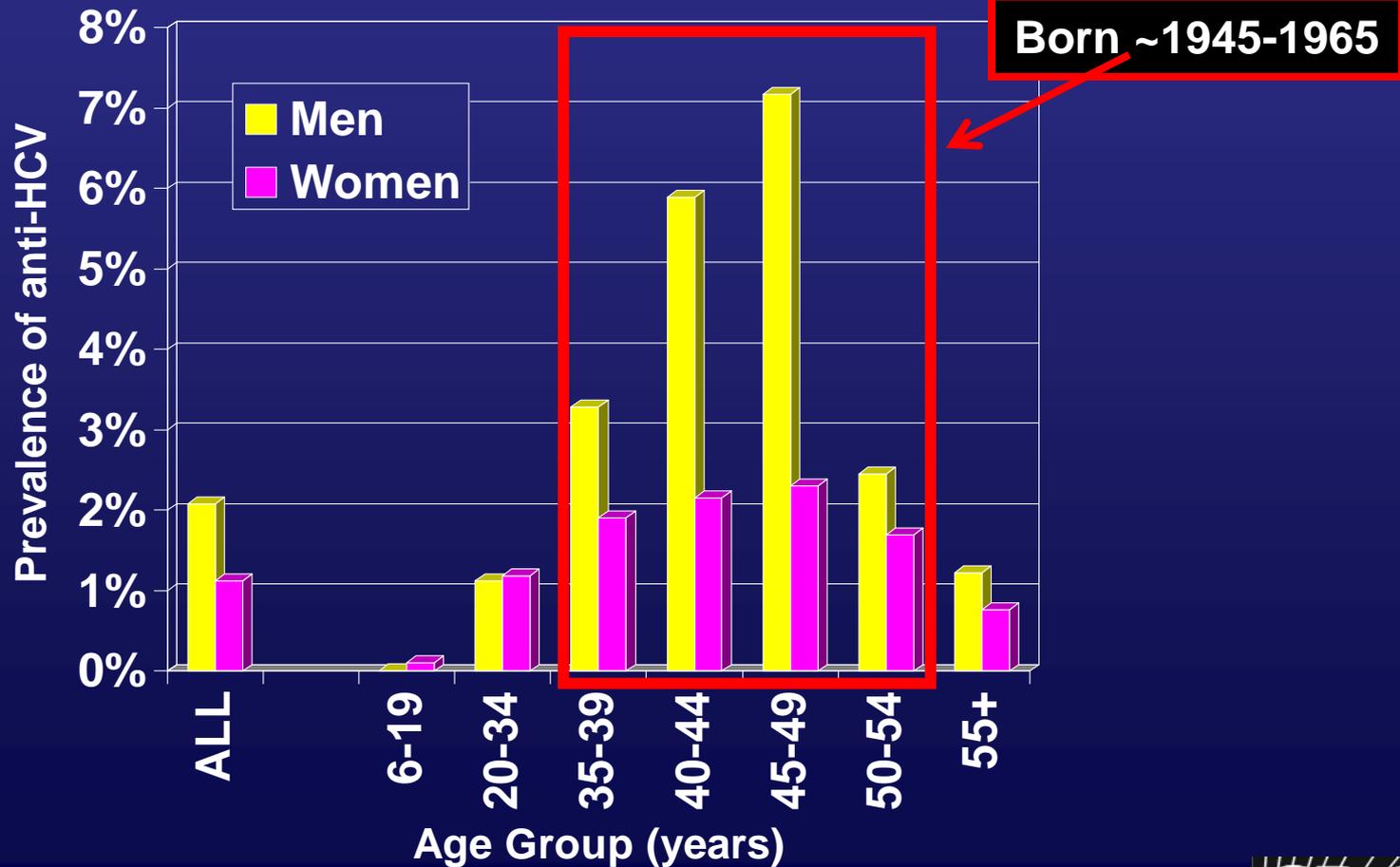
# Prevalence of HCV Infection by Age, Race, and Gender, United States, 1988-1994



Source: NHANES III

# Prevalence of Anti-HCV, United States, 1999-2002 (NHANES)

Overall prevalence: 1.6% (4.1 million)



# Risk Factors Associated with Transmission of HCV

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Exposure to blood of an HCV-infected person through:

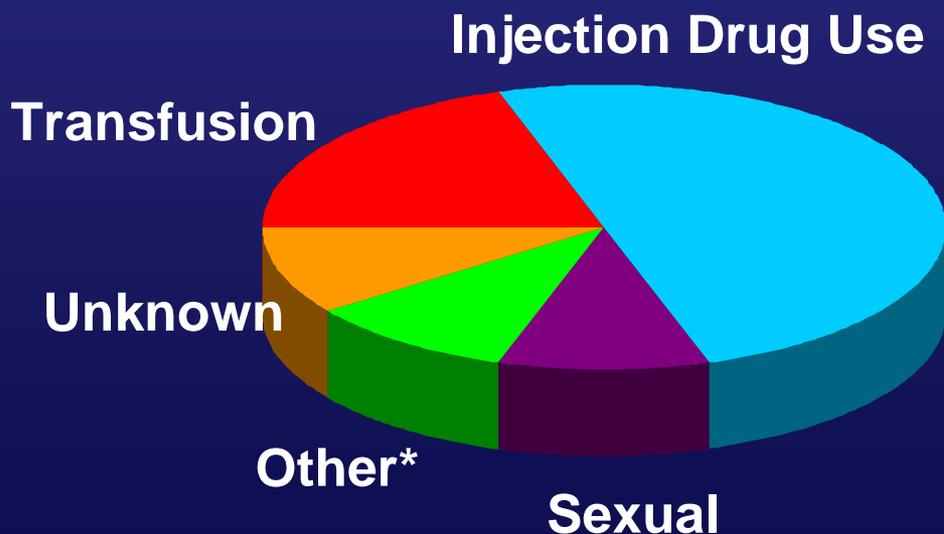
- Illegal injecting drug use
- Transfusion or transplant from infected donor
- Chronic hemodialysis
  
- Injuries with contaminated needles/sharps
- Sex (inefficient), household (rare)
- Birth to HCV-infected mother

# Relative Importance of Risk Factors for Hepatitis C

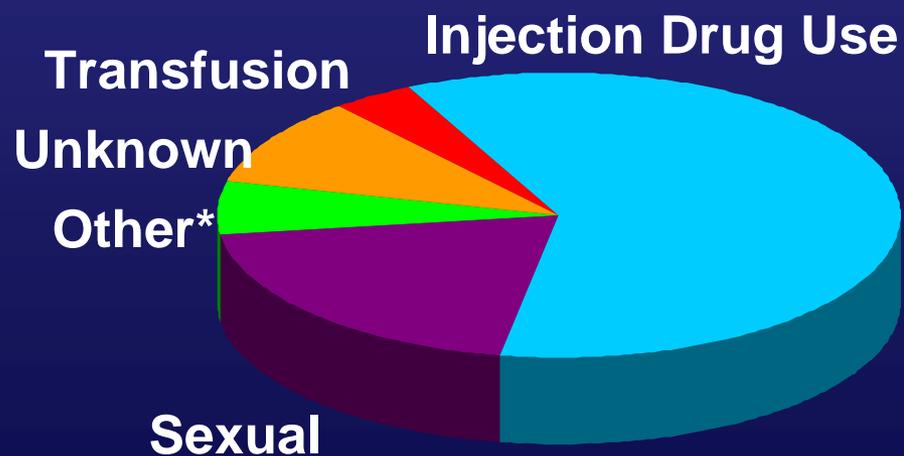
## Remote and Recent Infection

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### Remote (≈15 yrs ago)

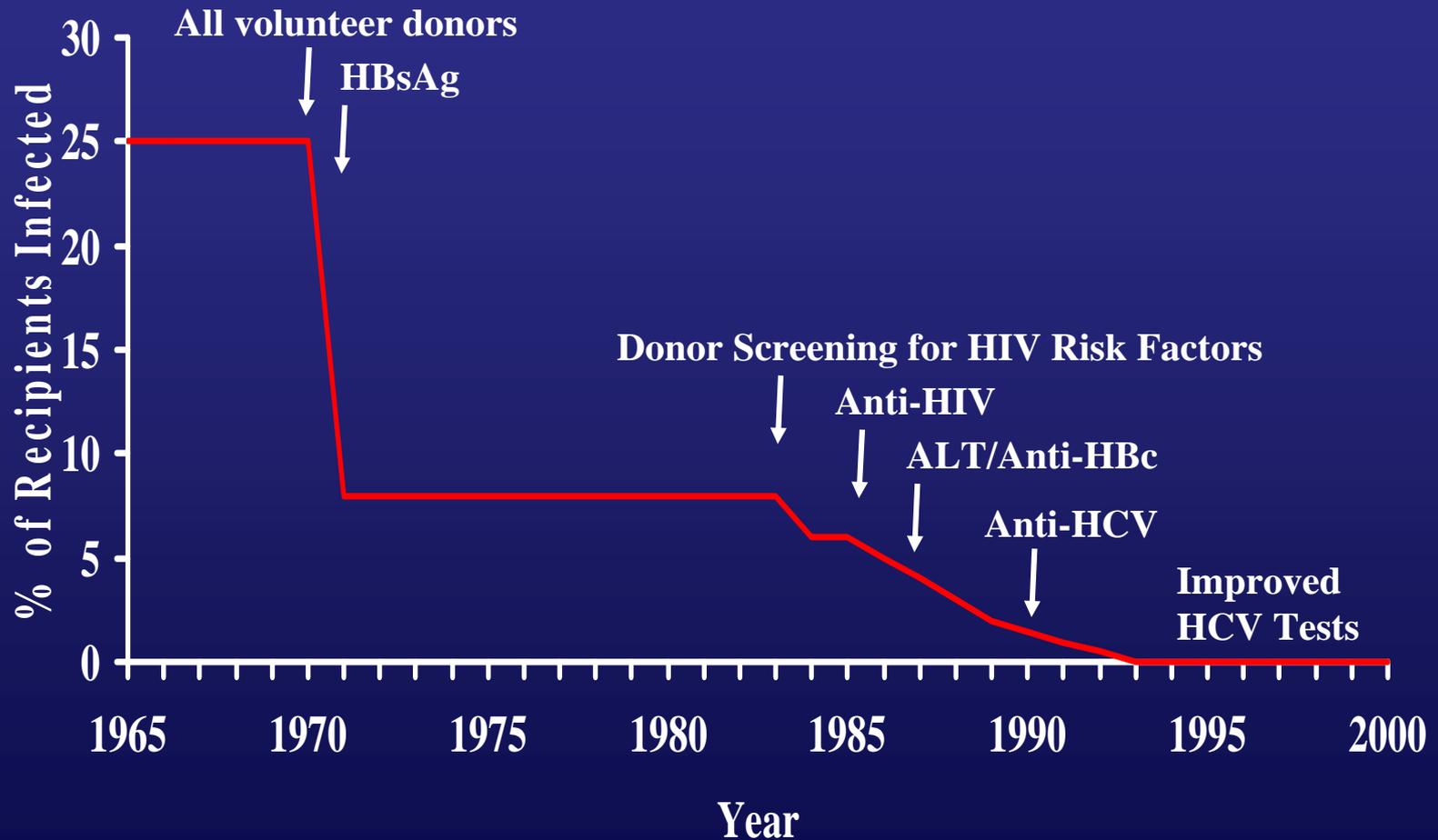


### Recent (<15 yrs ago)



\* Nosocomial, occupational, perinatal

# Posttransfusion Hepatitis C



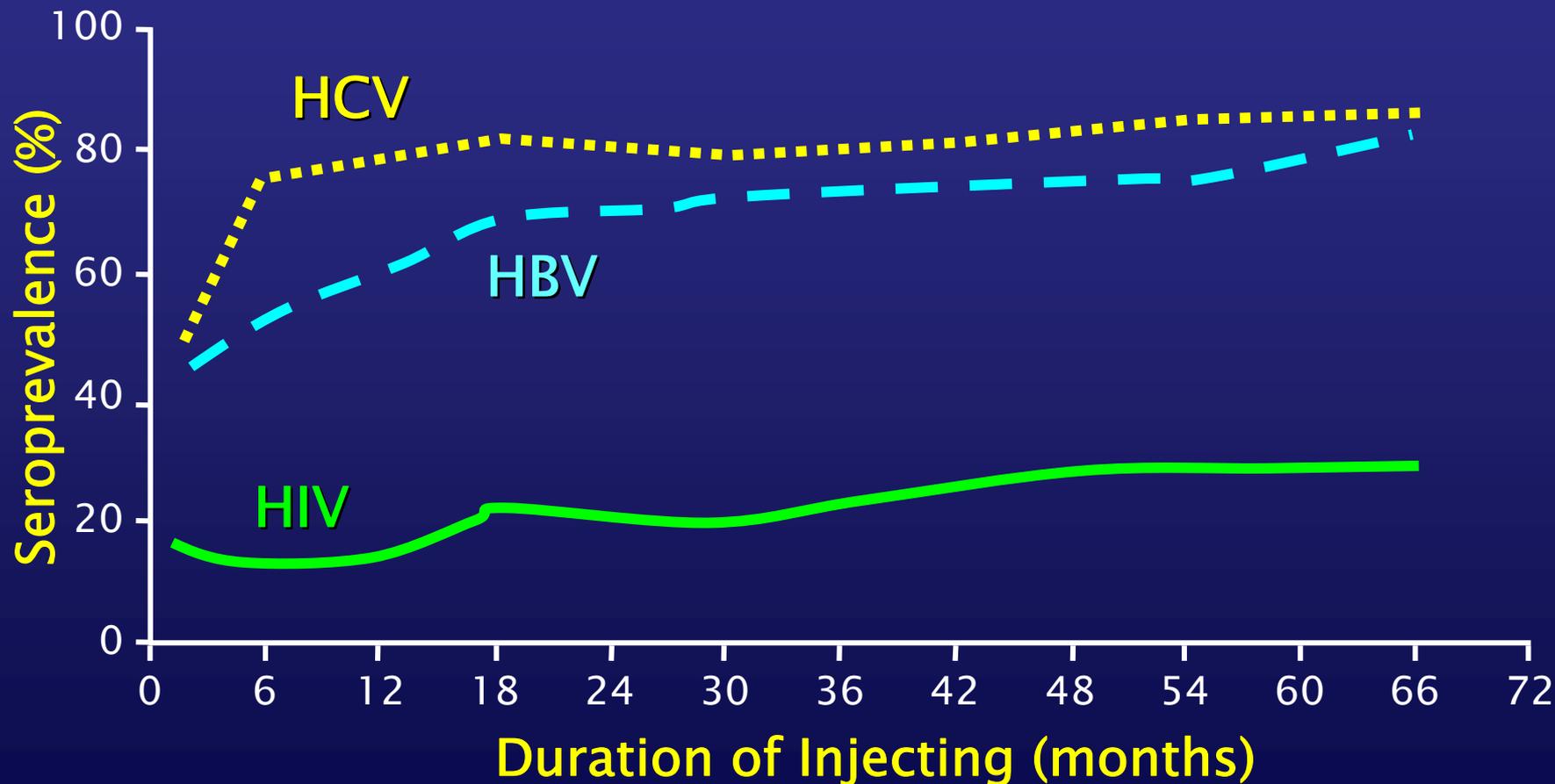
Adapted from HJ Alter and Tobler and Busch, Clin Chem 1997

# Injecting Drug Use and HCV Transmission

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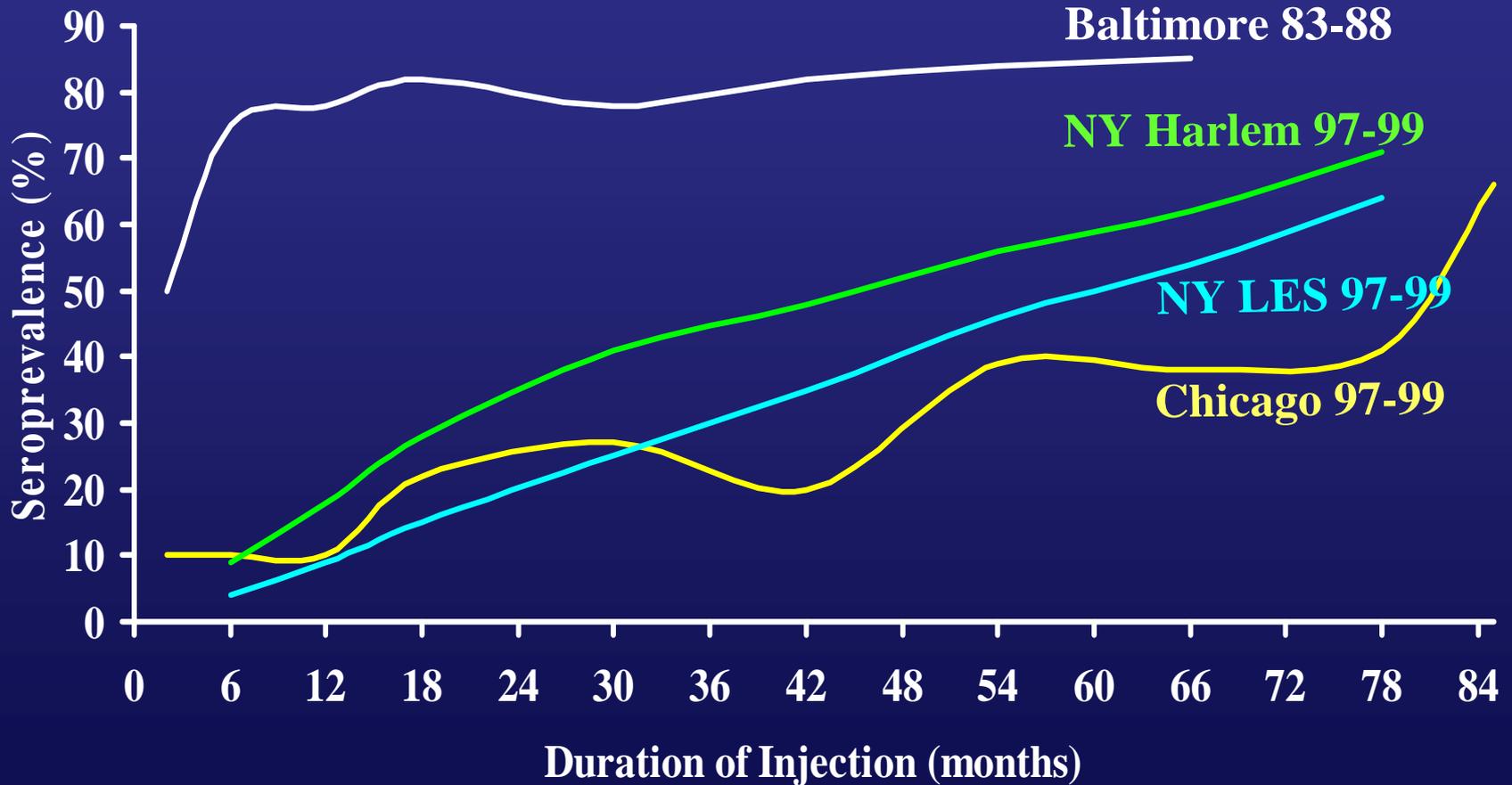
- **Highly efficient among injection drug users**
- **Rapidly acquired after initiation**
- **Four times more common than HIV**
- **Prevalence 60-90% after 5 years**

# Risk of Bloodborne Virus Infections Injection Drug Users *Baltimore 1983–1988*



Garfein RS. Am J Public Health. 1996;86:655.

# Risk of HCV Infection Among Injection Drug Users



Garfein RS *Am J Public Health* 1996; 86:655. Thorpe LE *JID* 2000;182:1588-94. Diaz T *Am J Public Health* 2001; 91(1): 23-30.



# Sexual Transmission of HCV

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- **Occurs, but efficiency is low**
  - ▶ Rare between long-term steady partners (1.5-3%)
  - ▶ MSM 3% (1-18% in selected STD clinic settings) – same as heterosexuals
  - ▶ Factors that facilitate transmission between partners unknown (e.g., viral titer)
- **Accounts for 15-20% of acute and chronic infections in the United States**
  - ▶ Large chronic reservoir provides multiple opportunities for exposure to potentially infectious partners

# Patient to Patient Transmission of HCV

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- **Contaminated equipment**
  - ▶ hemodialysis\*
  - ▶ endoscopy
- **Unsafe injection practices**
  - ▶ plasmapheresis,\* phlebotomy
  - ▶ multiple dose medication vials\*
  - ▶ therapeutic injections

\* Reported in U.S.

# Patient to HCW Transmission of HCV

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- **Hepatitis B**
  - ▶ >30% after sharps injury with HBV+ (e-Ag) blood
  - ▶ VACCINE-preventable!
  - ▶ Post-exposure immune globulin (HBIG)
- **Hepatitis C**
  - ▶ 1.8% (0-7%) after sharps injury with HCV+ blood
  - ▶ Not vaccine-preventable
  - ▶ No post-exposure prophylaxis
- **HIV**
  - ▶ 0.3% after sharps injury with HIV+ blood
  - ▶ Not vaccine preventable
  - ▶ Yes – post-exposure prophylaxis

# Patient to HCW Transmission of HCV

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- **Average incidence 1.8% following needlestick from HCV-infected source**
  - ▶ Associated with hollow-bore needles
- **Case reports of transmission from blood splash to eye.**
- **Prevalence among health care workers 1%**
  - ▶ Lower than adults in the general population
  - ▶ 10 times lower than for HBV infection
  - ▶ Primarily related to needlesticks (unlike HBV)

# HCW to Patient Transmission of HCV

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- **Rare**
  - ▶ In U.S., none related to performing invasive procedures
- **Most appear related to HCW substance abuse**
  - ▶ Reuse of needles or sharing narcotics used for self-injection
  - ▶ Reported mechanism for transmission of other bloodborne pathogens from anesthesiologists
- **No restrictions recommended**

# Perinatal Transmission of HCV

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- **Transmission only from women HCV-RNA positive at delivery**
  - ▶ Average rate of infection 6%
  - ▶ Higher (17%) if woman co-infected with HIV
  - ▶ Role of viral titer unclear
- **No association with**
  - ▶ Delivery method
  - ▶ Breastfeeding
- **Infected infants do well**
  - ▶ Severe hepatitis is rare

# Household Transmission of HCV

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- Rare but not absent
- Could occur through percutaneous/mucosal exposures to blood
  - ▶ Theoretically through sharing of contaminated personal articles (razors, toothbrushes)
  - ▶ Contaminated equipment used for home therapies
    - Injections\*
    - Folk remedies

\*Reported in U.S.

# **Insufficient or No Data Demonstrating Increased Risk for HCV Infection**

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- **Intranasal cocaine use**
- **Cosmetic or alternative medicine procedures**
  - ▶ **Tattooing, body piercing, barbering, acupuncture**
  - ▶ **Risk may differ by setting where “exposure” occurs**
    - **Prisons, unregulated commercial establishments**
- **Military service or foreign travel**

# Reduce or Eliminate Risks for Acquiring HCV Infection

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- **Screening and testing 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**

# Identifying Persons at Risk for HCV Infection

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- **Testing to determine infection status**
- **Counseling, medical evaluation and management of infected persons**
  - ▶ **Prevent disease progression**
  - ▶ **Prevent transmission to others**

# HCV Testing Routinely Recommended

**(Based on Risk for Infection)**

- **Persons who ever injected illegal drugs**
- **Persons with selected medical conditions**
  - ▶ received clotting factor concentrates produced before 1987
  - ▶ ever on chronic hemodialysis
  - ▶ evidence of liver disease
- **Prior recipients of transfusion/organs**
  - ▶ before July 1992
  - ▶ notified that donor later tested positive

# HCV Testing Routinely Recommended

**(Based on Recognized Exposure)**

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- Healthcare, emergency medical, and public safety workers after needle sticks, sharps, or mucosal exposures to HCV-positive blood
- Children born to HCV-positive women

# **Routine HCV Testing Not Recommended**

**(Unless Risk Factor Identified)**

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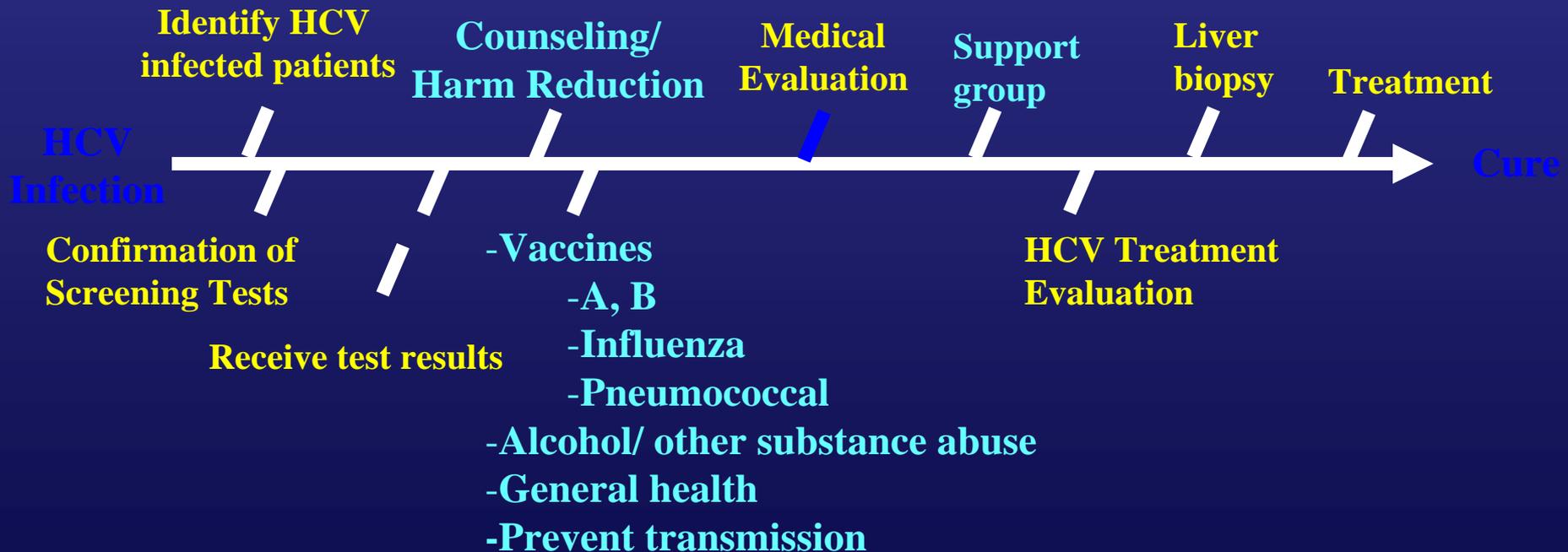
- **Health-care, emergency medical, and public safety workers**
- **Pregnant women**
- **Household (non-sexual) contacts of HCV-positive persons**
- **General population**

# Routine HCV Testing of Uncertain Need

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- Recipients of transplanted tissue
- Intranasal cocaine or other non-injecting illegal drug users
- History of tattooing, body piercing
- History of STDs or multiple sex partners
- Long-term steady sex partners of HCV-positive persons

# Path from Screening for Hepatitis C to Treatment: What Can YOU Do?



# Medical Evaluation and Management

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- **Assess for biochemical evidence of CLD**
- **Assess for severity of disease and possible treatment, according to current practice guidelines**
  - ▶ **30-70% sustained response to antiviral combination therapy (interferon alpha, ribavirin); genotype 1 least successful**
  - ▶ **Vaccinate against hepatitis A**
- **Counsel to reduce further harm to liver**
  - ▶ **Limit or abstain from alcohol**

# Preventing HCV Transmission to Others

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## 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

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- **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

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- **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

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## 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
  - ▶ Need for counseling and testing of partner
    - May provide couple with reassurance
  - ▶ Some couples might decide to use barrier precautions to lower limited risk further

# Sexual Transmission of HCV

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## 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

# Post-exposure Follow-up of Workers For HCV Infection

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- Baseline testing of source for anti-HCV
- Person exposed to HCV-positive source, baseline and follow-up testing: anti-HCV and ALT, again at 4-6 months (or test for HCV RNA at 4-6 weeks)
- Confirmation by supplemental anti-HCV testing of all positive by enzyme immunoassay
- IG not recommended; studies ongoing of early treatment of positives

# Hepatitis D - Clinical Features

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- **Coinfection with HBV**
  - ▶ severe acute disease
  - ▶ low risk of chronic infection
- **Superinfection on top of chronic HBV**
  - ▶ usually develop chronic HDV infection
  - ▶ high risk of severe chronic liver disease

# Hepatitis D Virus

## Modes of Transmission

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- Percutaneous exposures
  - ▶ injecting drug use
- Per mucosal exposures
  - ▶ sex contact

# Hepatitis D - Prevention

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- **HBV-HDV Coinfection**

Pre or postexposure prophylaxis to prevent HBV infection (HBIG and/or Hepatitis B vaccine)

- **HBV-HDV Superinfection**

Education to reduce risk behaviors among persons with chronic HBV infection

# Hepatitis E – Epidemiologic Features

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- Most outbreaks associated with fecally contaminated drinking water
- Minimal person-to-person transmission
- U.S. cases usually have history of travel to HEV-endemic areas

# Prevention and Control Measures for Travelers to HEV – Endemic Regions

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- Avoid drinking water (and beverages with ice) of unknown purity, uncooked shellfish, and uncooked fruit/vegetables not peeled or prepared by traveler
- IG prepared from donors in Western countries does not prevent infection
- Unknown efficacy of IG prepared from donors in endemic areas
- Future vaccine (?)

# **CDC – Educational and Training Resources**

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- **Website: [cdc.gov/hepatitis](http://cdc.gov/hepatitis)**
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- **Toll-free information: 888-4HEPCDC**
- **Web-based HCV training for professionals**
- **Brochures, posters, slide sets, videos**