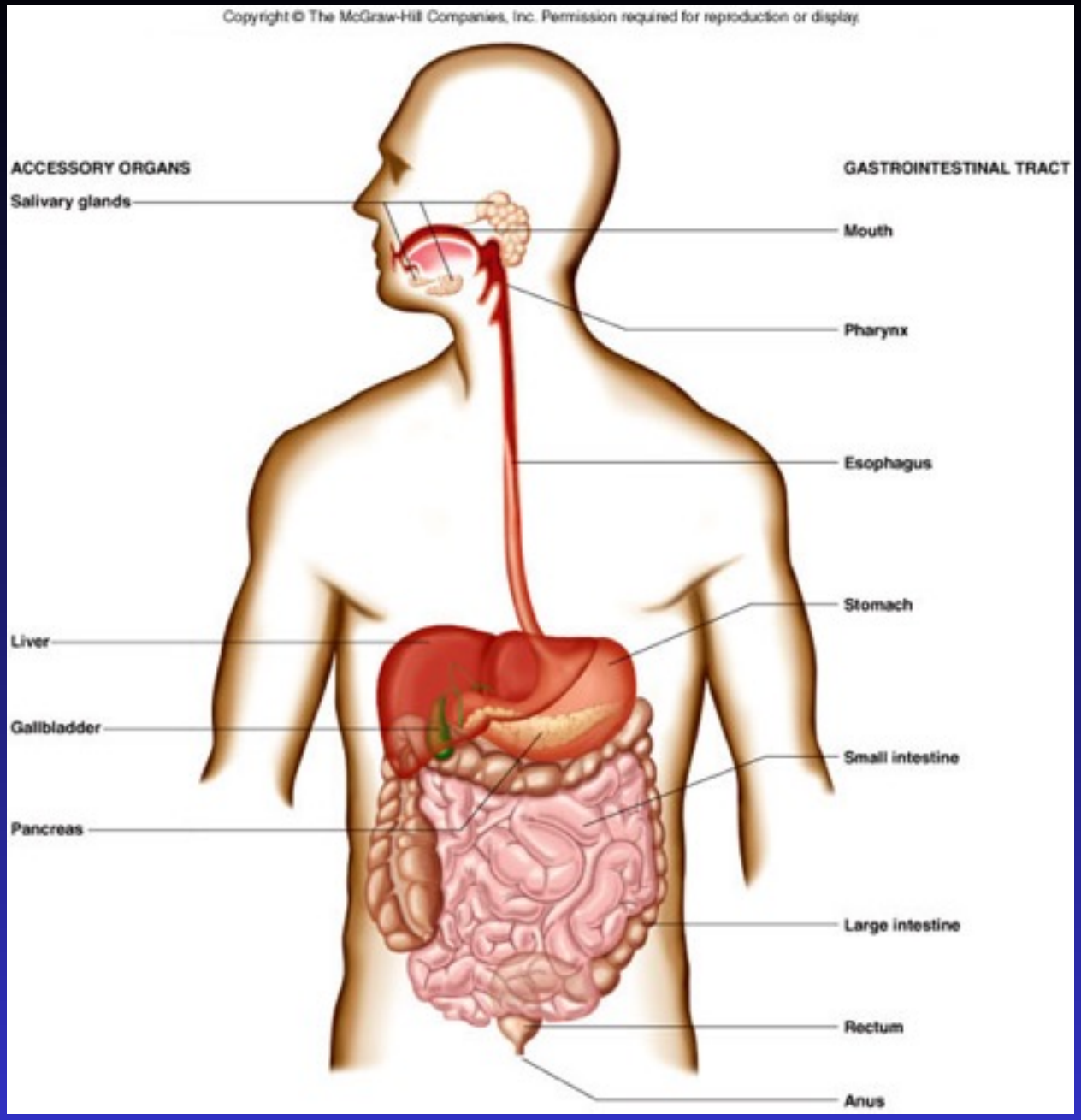
Infectious Diseases of the Digestive System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ACCESSORY ORGANS
Salivary glands
Liver
Gallbladder
Pancreas
GASTROINTESTINAL TRACT
Mouth
Pharynx
Esophagus
Stomach
Small intestine
Large intestine
Rectum
Anus

GI Tract

GI Tract Defenses

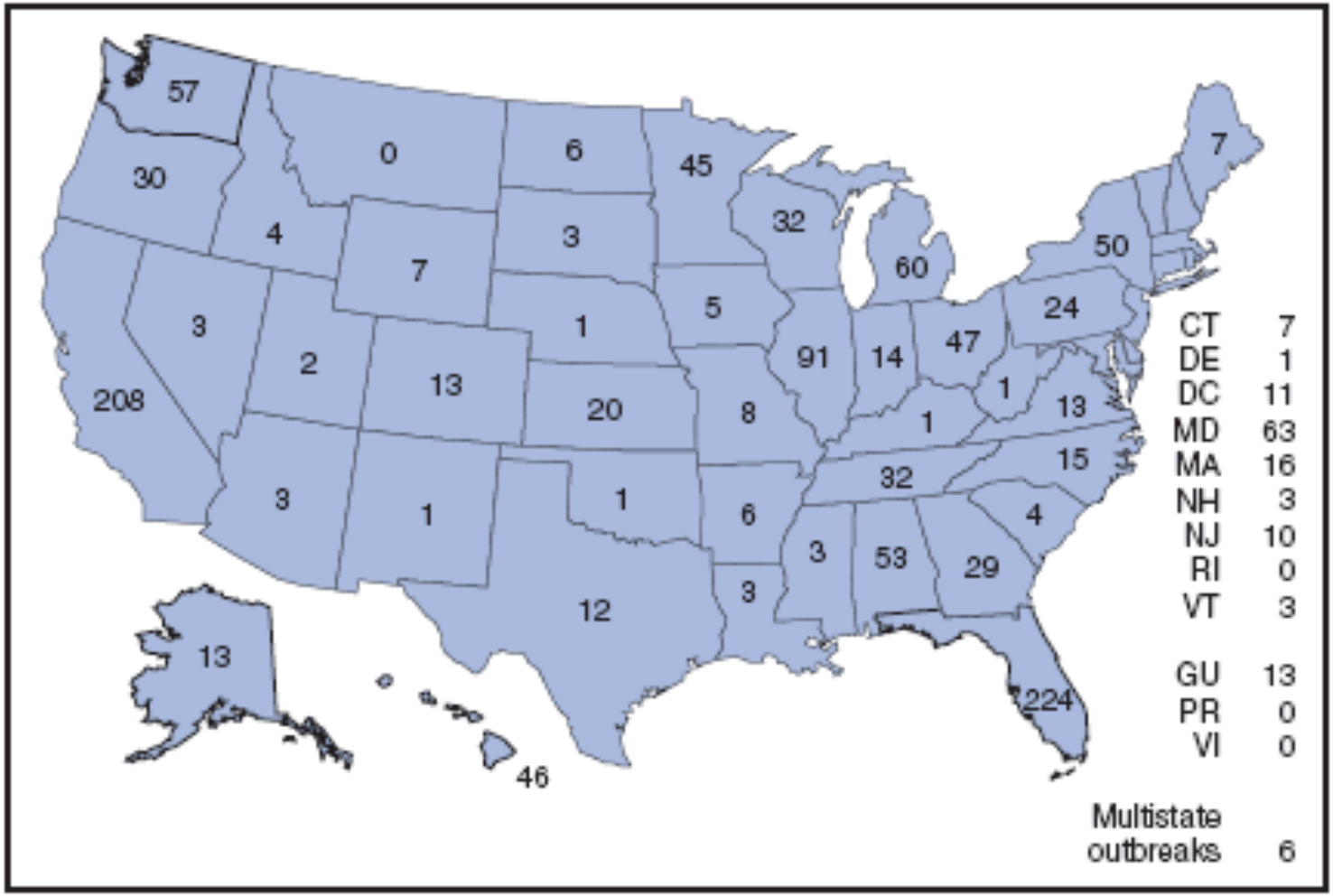
- Oral cavity: lysozyme, saliva, tonsils and adenoids
- sIgA
- Stomach: low pH, mucus
- Intestines: bile, MALT, normal flora, peristalsis

Previous Microbes of the Day That Infect the Gastrointestinal System

- Microbial Growth
  - *Escherichia coli 0157*
  - *Listeria monocytogenes*
- Epidemiology
  - *Vibrio cholerae*

U.S. Foodborne-Disease Outbreaks

FIGURE 6. Number of reported foodborne-disease outbreaks, by state — United States,* 2002



* Includes Guam, Puerto Rico, and the U.S. Virgin Islands.

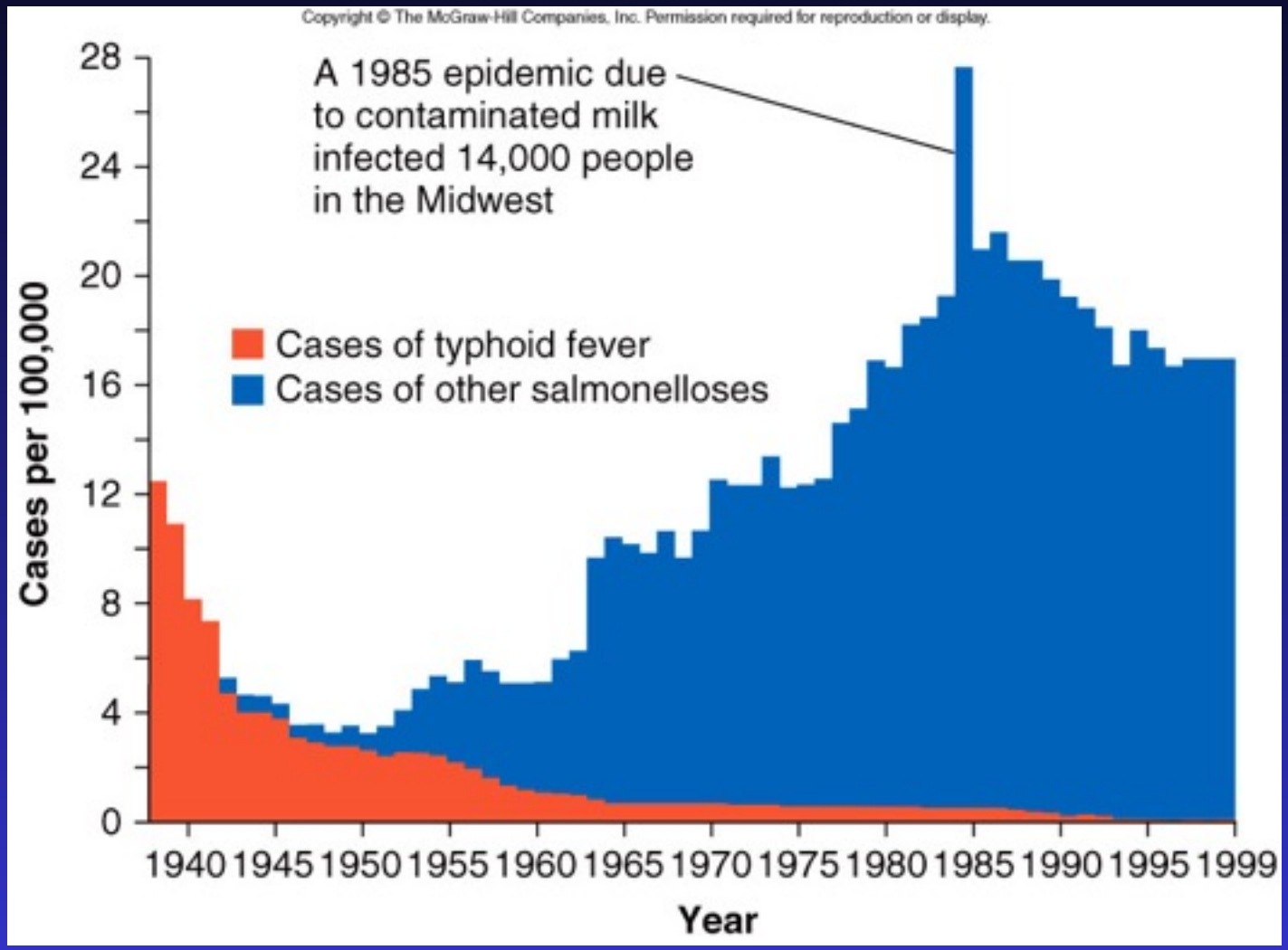
CDC Data 1998-2002

- Total outbreaks 6,647
- 3,072 had contributing factor
  - contamination, proliferation, survival
- 4,480 had unknown etiology
- 1,184 were bacterial (585 Salmonella)
- 709 viral (657 Norovirus)
- 23 parasitic
- 221 chemical

Typhoid Mary

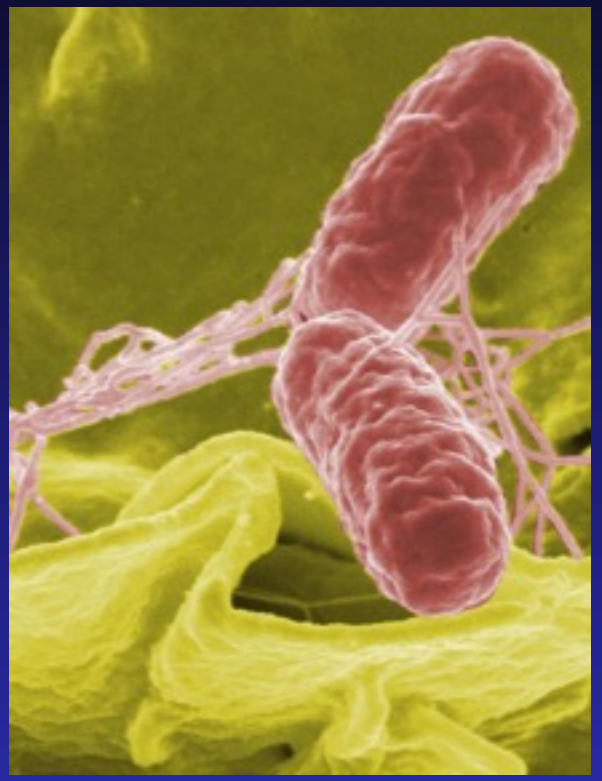
- Human carrier (and reservoir) of *Salmonella typhi*

Typhoid Fever and Salmonellosis



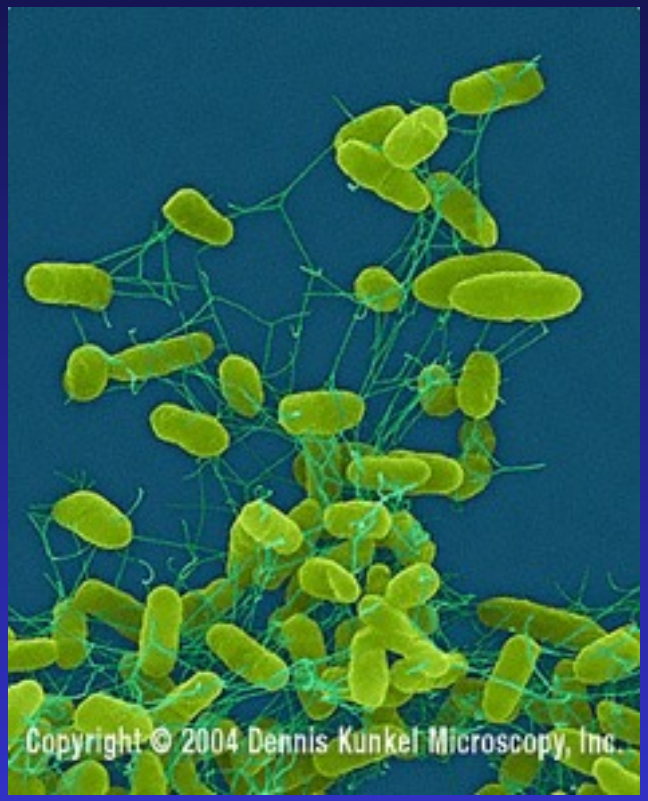
Salmonella enterica serovars

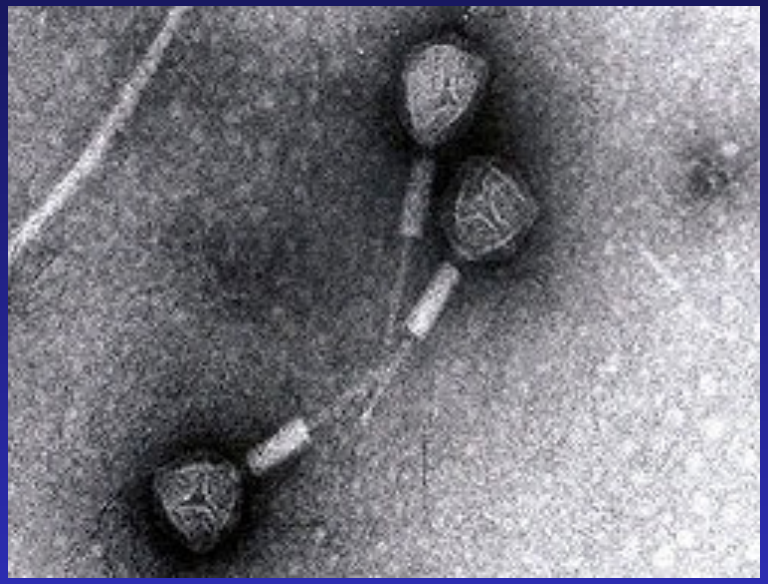
- Infect domestic animals
- Eggs and contaminated meat
- One of the most prevalent causes of food-borne illnesses
- Transmission dose as few as 10 organisms
- Attachment is key virulence factor



Salmonella enterica serovars.

- Gram negative bacillus
- Classification based on serology and phage susceptibility assays

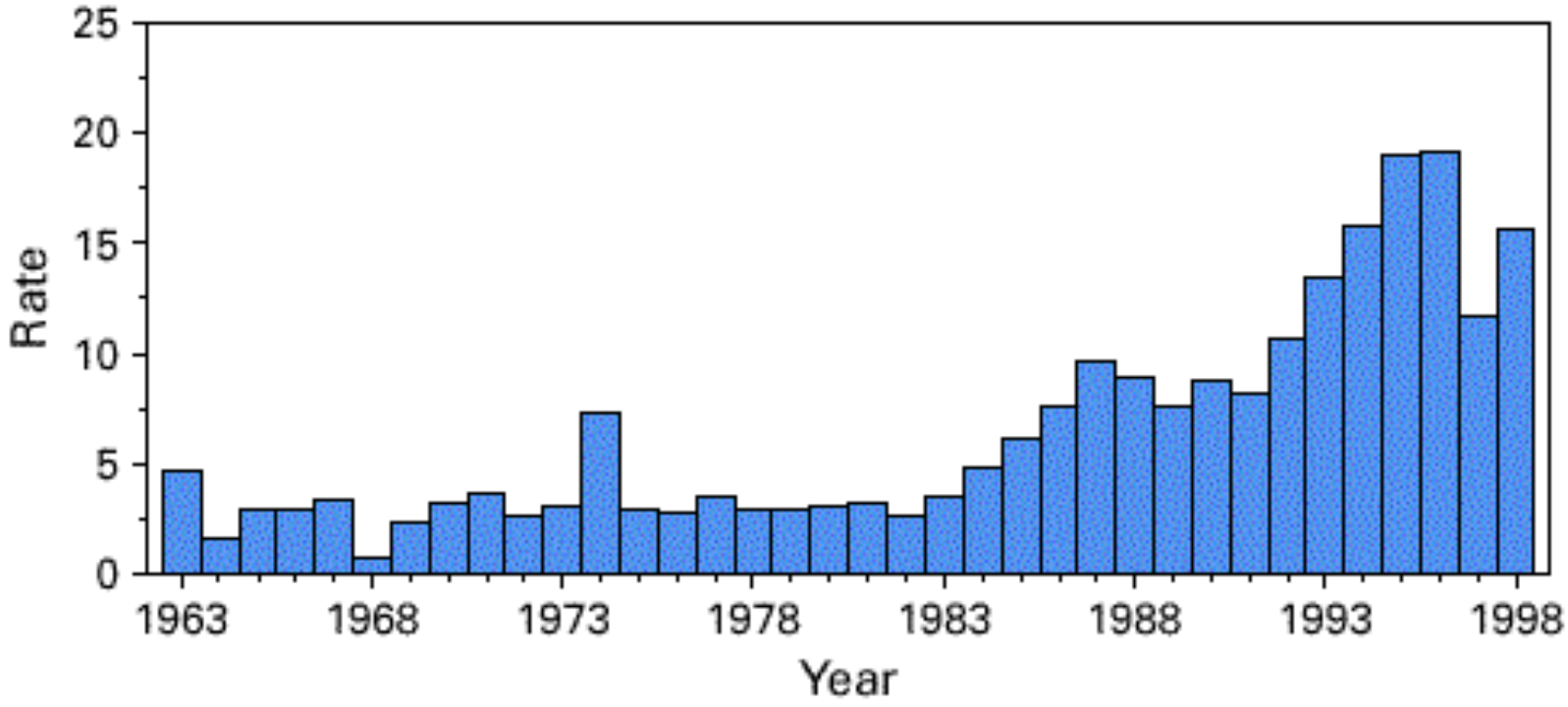




Salmonellosis

- 40,000 cases annually in US
- Invades intestinal epithelial cells
  - motility, LPS, fimbriae
- Nausea, cramps, diarrhea
- Recovery in a few days but may shed organism for 6 months

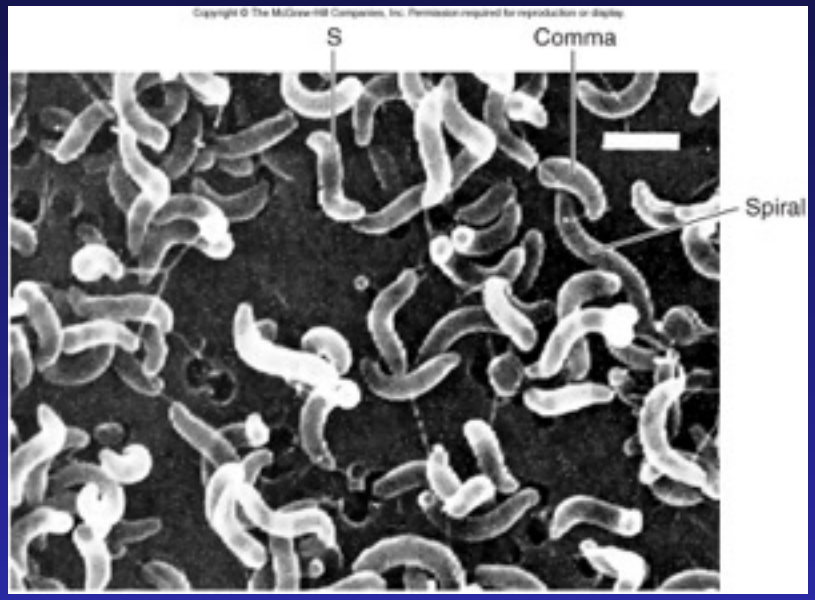
FIGURE 1. Rate* of reptile-associated *Salmonella* serotypes isolated from humans — United States, 1963–1998†



*Per 10,000,000 population.

†Reptile-associated serotypes are isolates from nonhumans reported to CDC and the U.S. Department of Agriculture that are isolated from reptiles ≥50% of the time.

Campylobacter jejuni

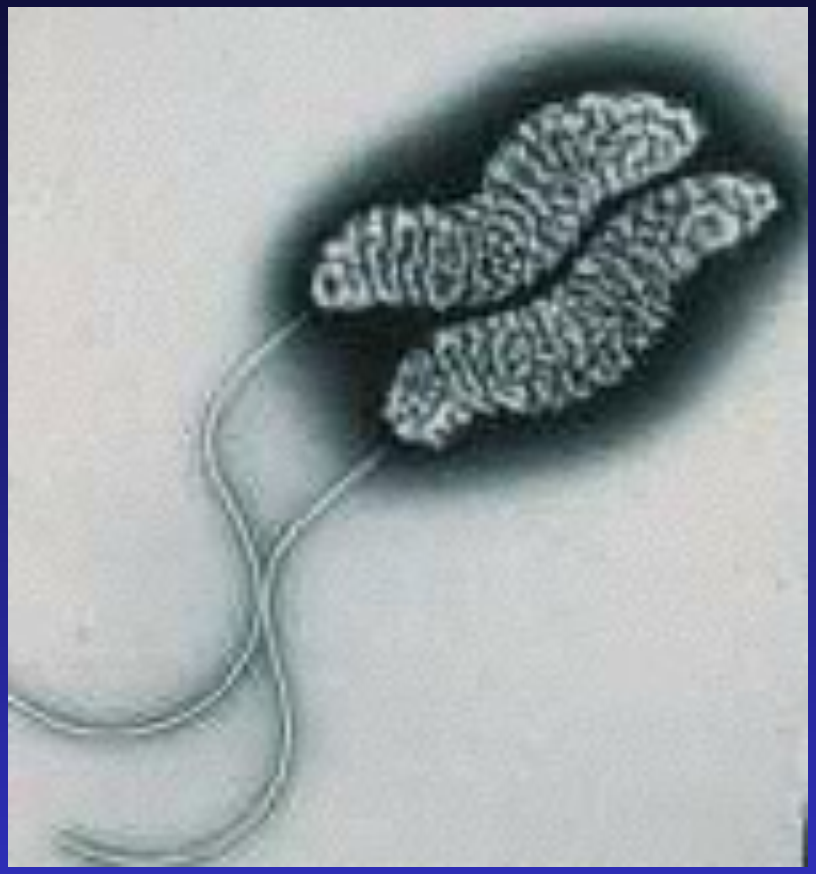


- Small curved Gram negative rod
- Lives in large intestine of birds and mammals
- Fecal contamination of water and foods

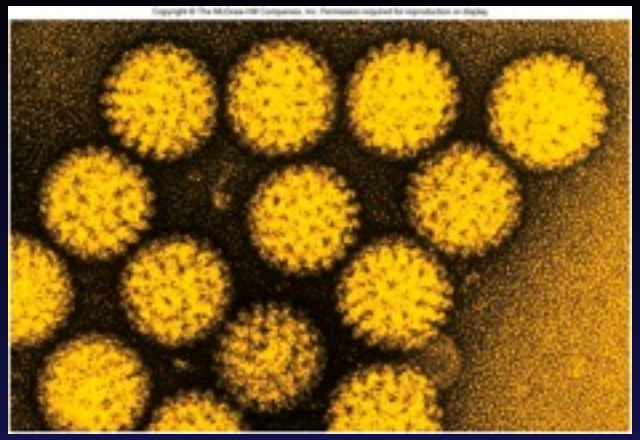
Campylobacteriosis

- Leading bacterial cause of human gastroenteritis in the world
- 2.4 million U.S. cases/year
- Undercooked poultry, shellfish, unpasteurized dairy products, contaminated water
- Watery→bloody diarrhea

Campylobacteriosis



- Adhesion
- Invasion
- Catalase for mϕ survival
- Treated with antibiotics

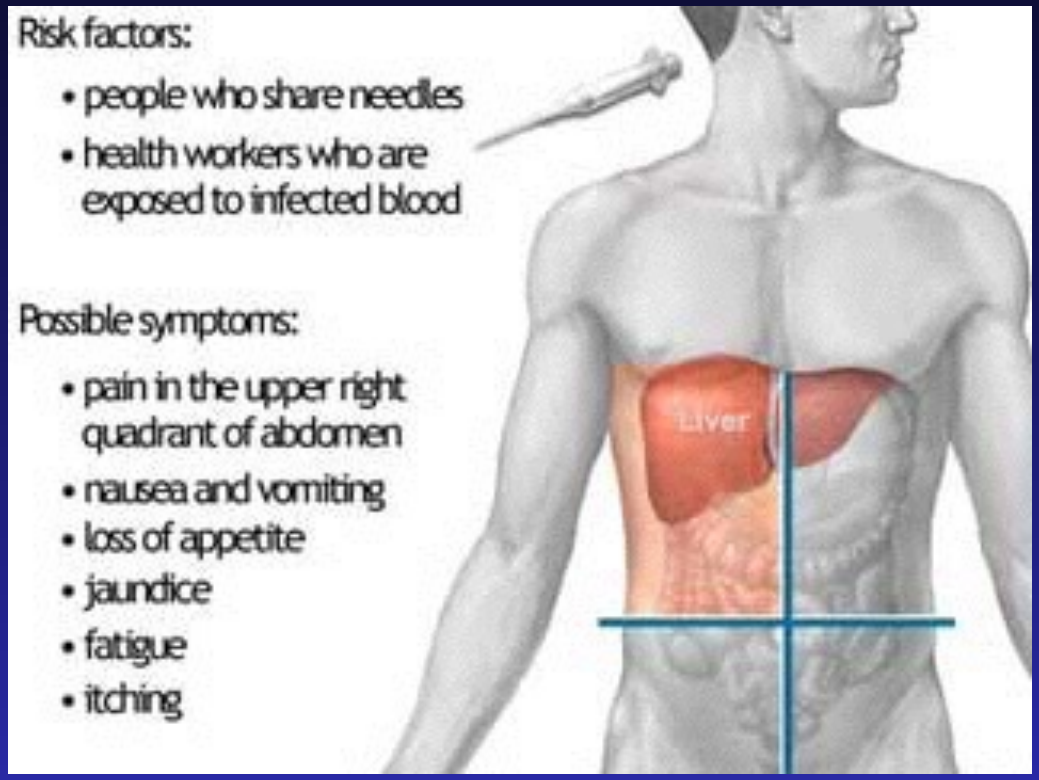


Rotavirus

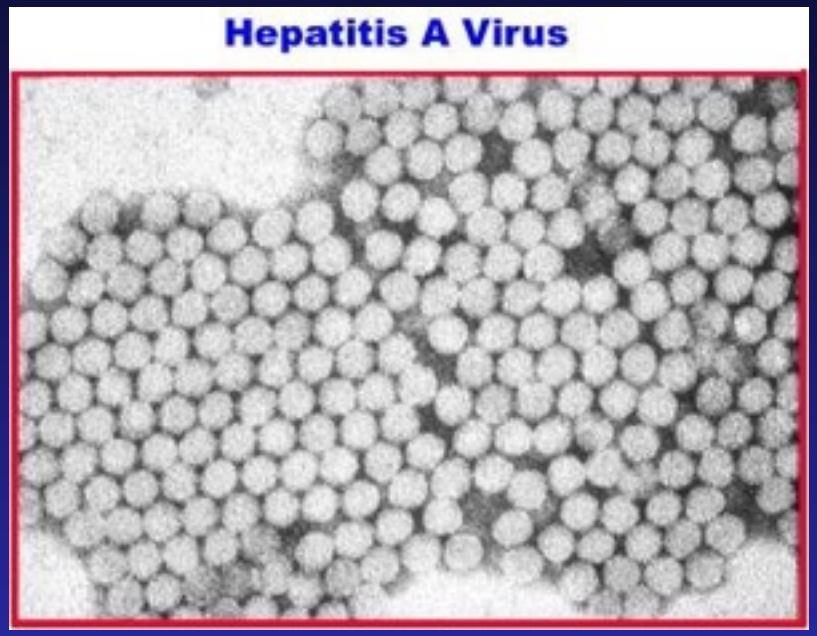
- dsRNA virus
- Primary cause of diarrhea morbidity and mortality
- 1 million cases per year; 70,000 hospitalizations
- Fecal-oral transmission, fomites
- Most serious in infants 6-24 months

Hepatitis

- Inflammation of the liver
- Multiple viruses

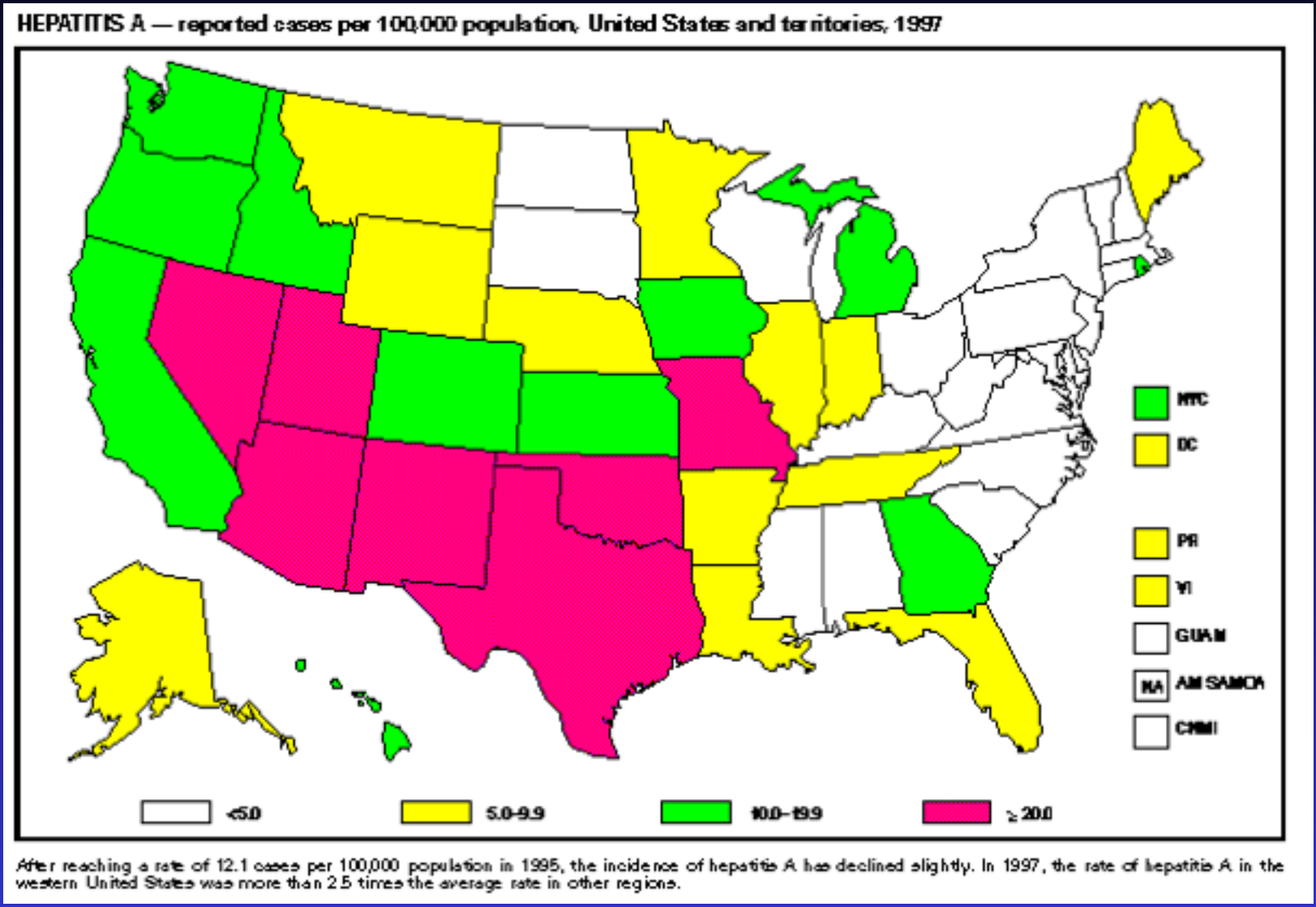


Hepatitis A Virus

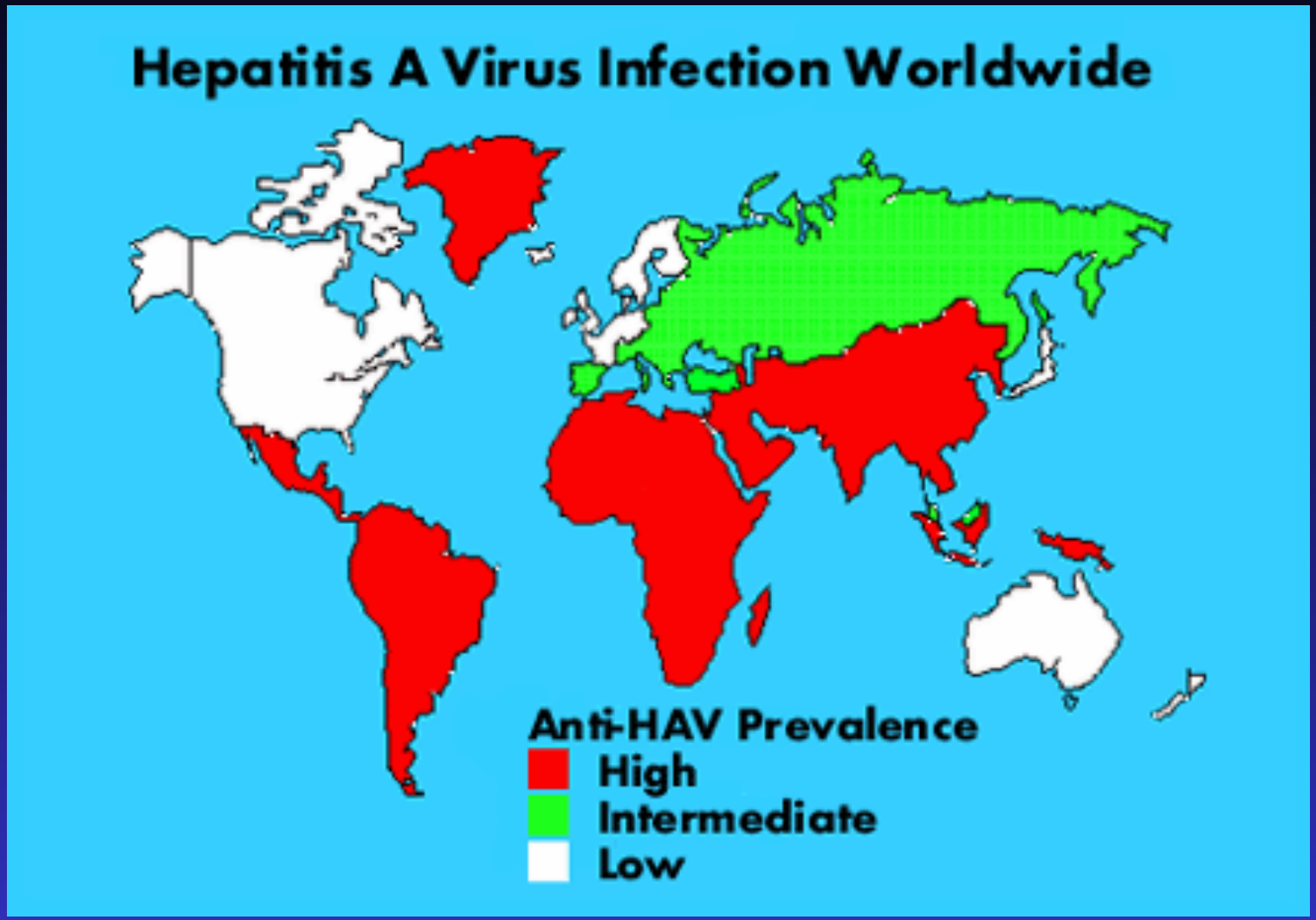


- “Infectious” hepatitis
- Small RNA virus
- Transmitted by fecal-oral route
- Formerly prevented with gamma globulin
- New effective vaccine

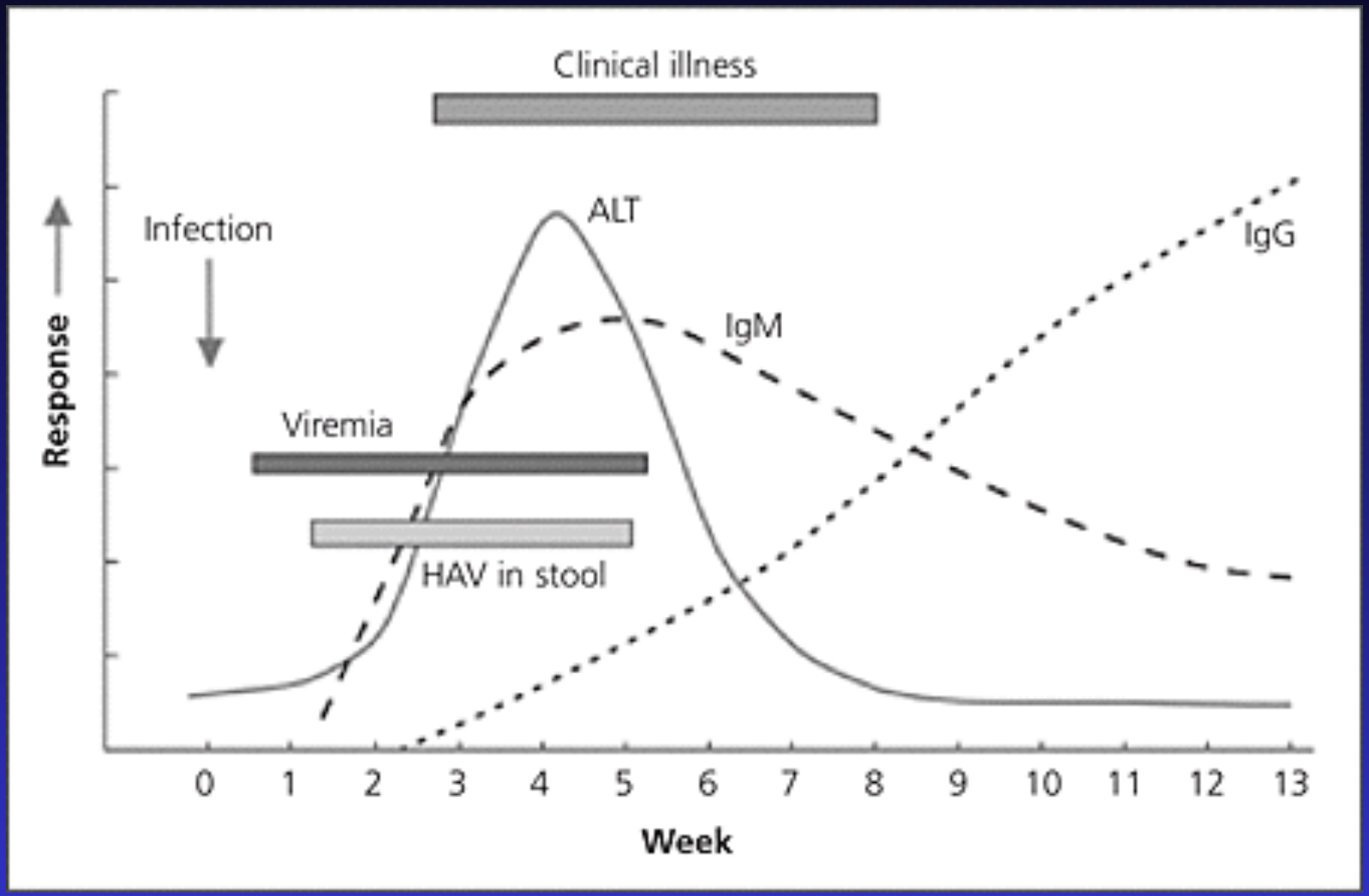
Hepatitis A in US



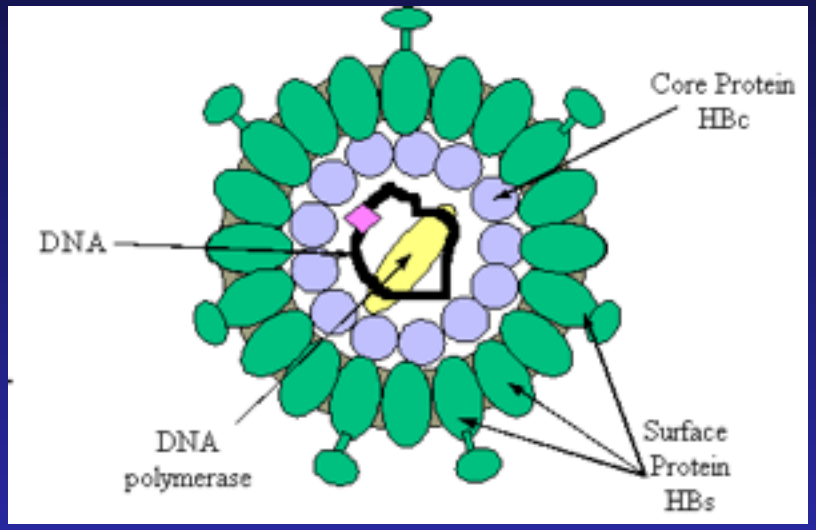
Hepatitis A Worldwide



Hepatitis A Antibodies



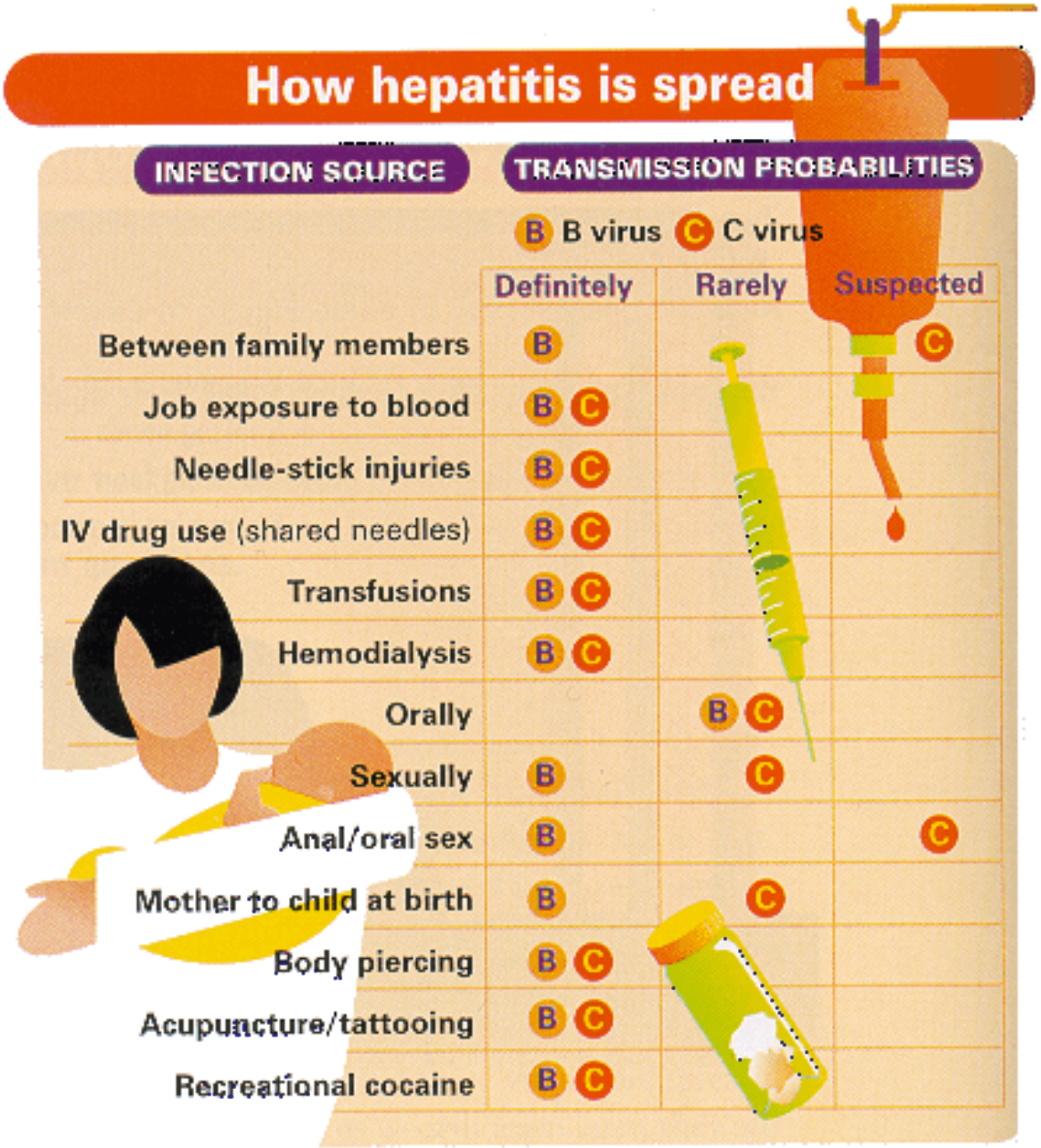
Hepatitis B Virus



- "Serum" hepatitis
- Enveloped DNA virus
- Can result in chronic infection and liver cancer
- Recombinant vaccine

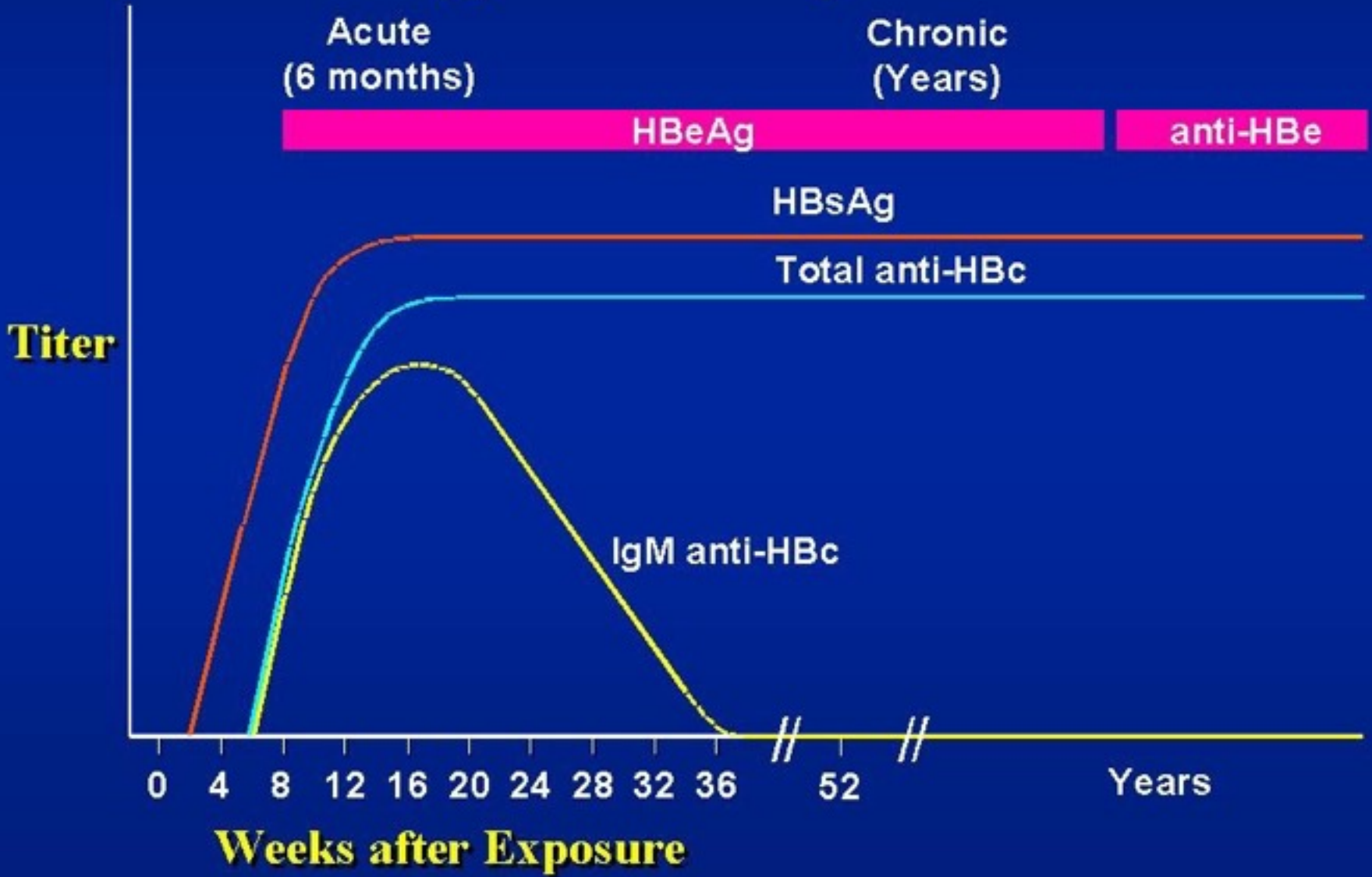
How hepatitis is spread

INFECTION SOURCE	TRANSMISSION PROBABILITIES		
	B B virus C C virus		
	Definitely	Rarely	Suspected
Between family members	B		C
Job exposure to blood	B C		
Needle-stick injuries	B C		
IV drug use (shared needles)	B C		
Transfusions	B C		
Hemodialysis	B C		
Orally		B C	
Sexually	B	C	
Anal/oral sex	B		C
Mother to child at birth	B	C	
Body piercing	B C		
Acupuncture/tattooing	B C		
Recreational cocaine	B C		

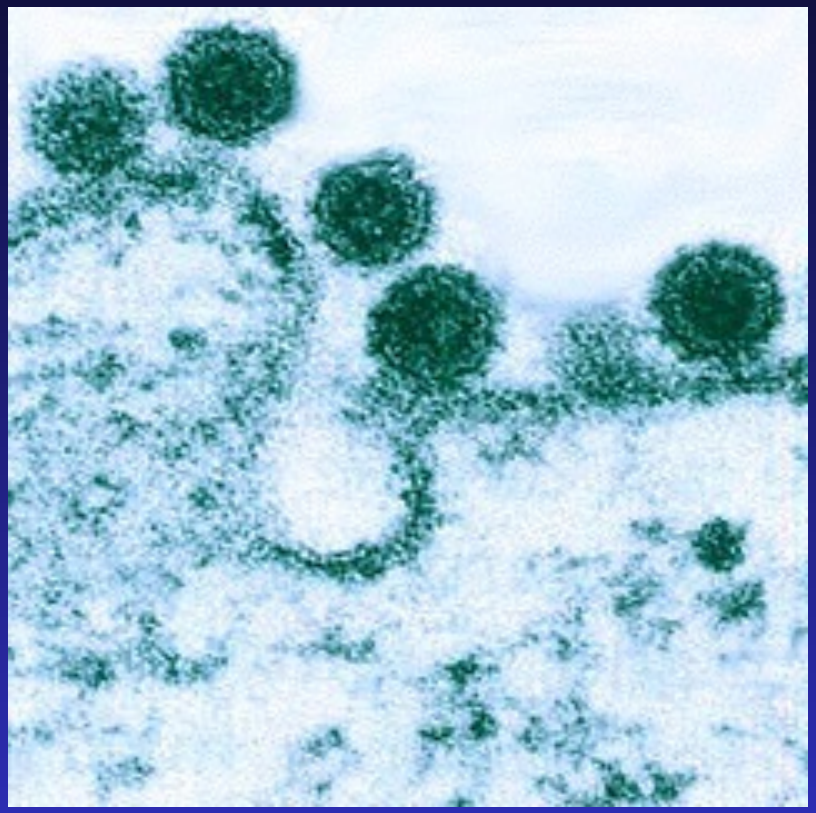


Progression to Chronic Hepatitis B Virus Infection

Typical Serologic Course

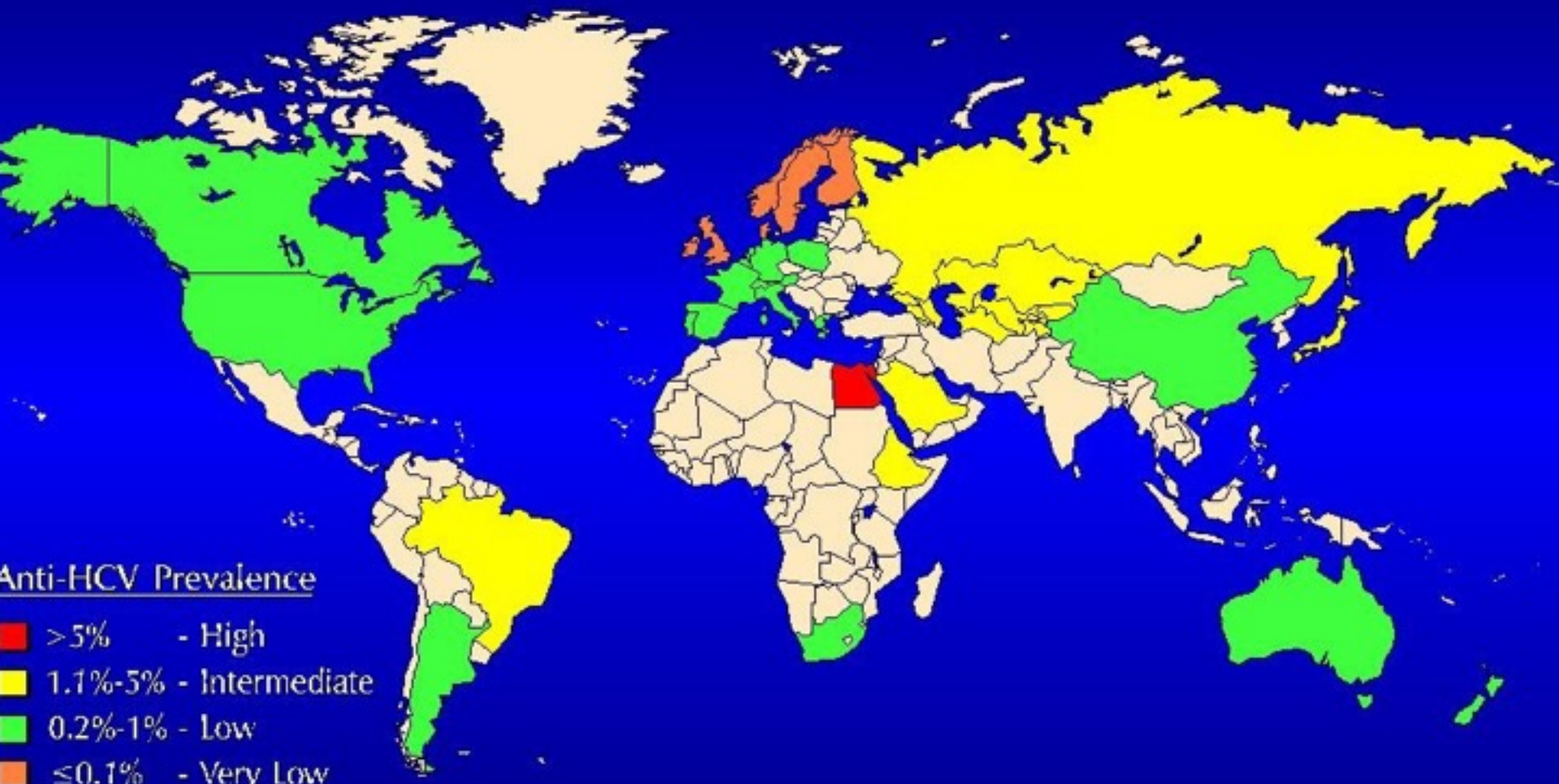


Hepatitis C Virus



- “Serum” hepatitis
- More likely than HBV to become chronic
- Also causes liver cancer
- No vaccine

Prevalence of HCV Infection Among Blood Donors*



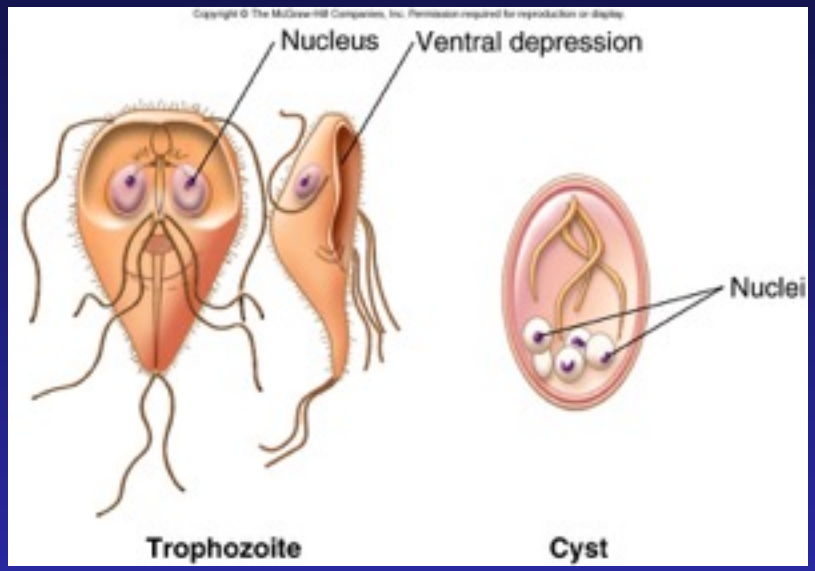
* Anti-HCV prevalence by EIA-1 or EIA-2 with supplemental testing; based on data available in January, 1995.

CDC

Hepatitis C

- Treated with Interferon alpha and ribavirin
- No cure but slows liver damage

Giardia lamblia

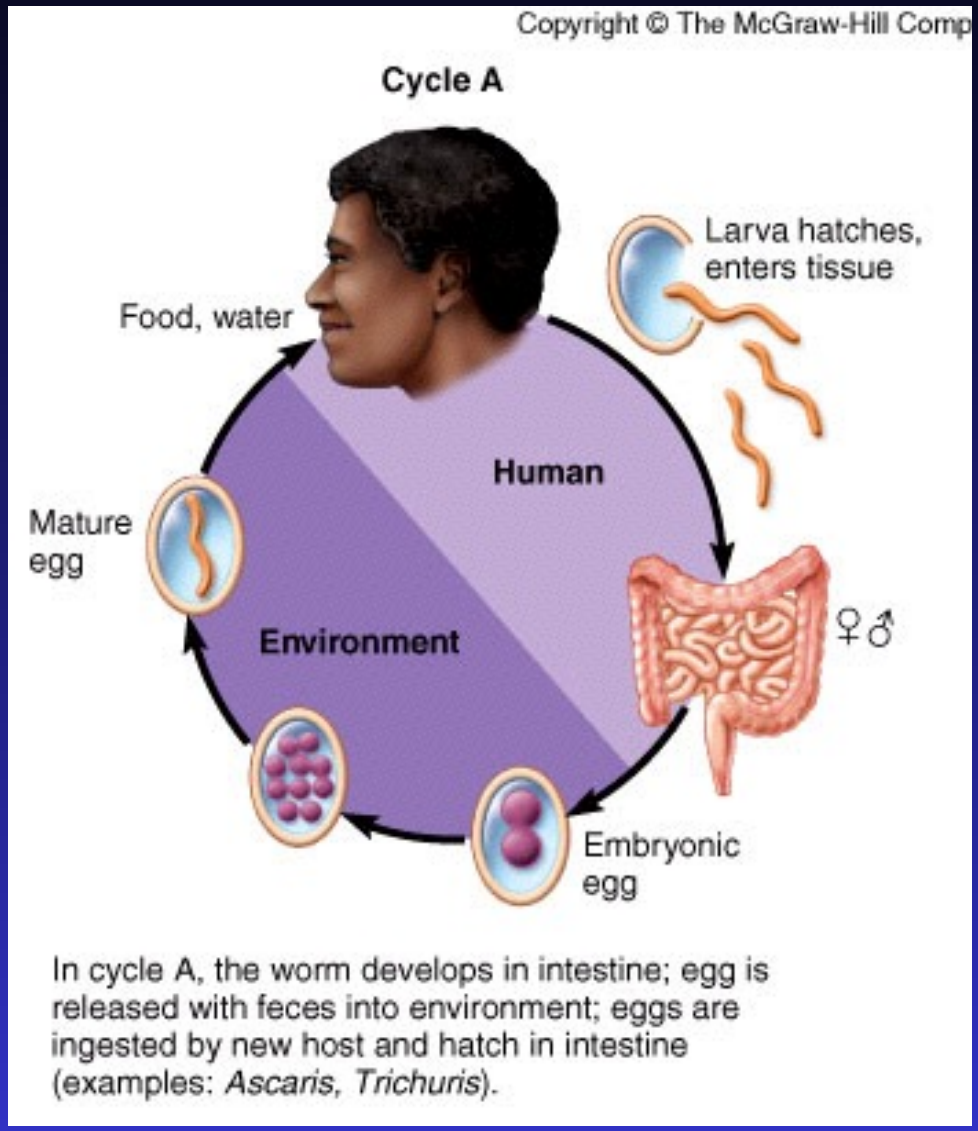


- Protozoan
- Cysts survive in environment
  - Insensitive to chlorine
- Contaminated water source of infection

Giardiasis

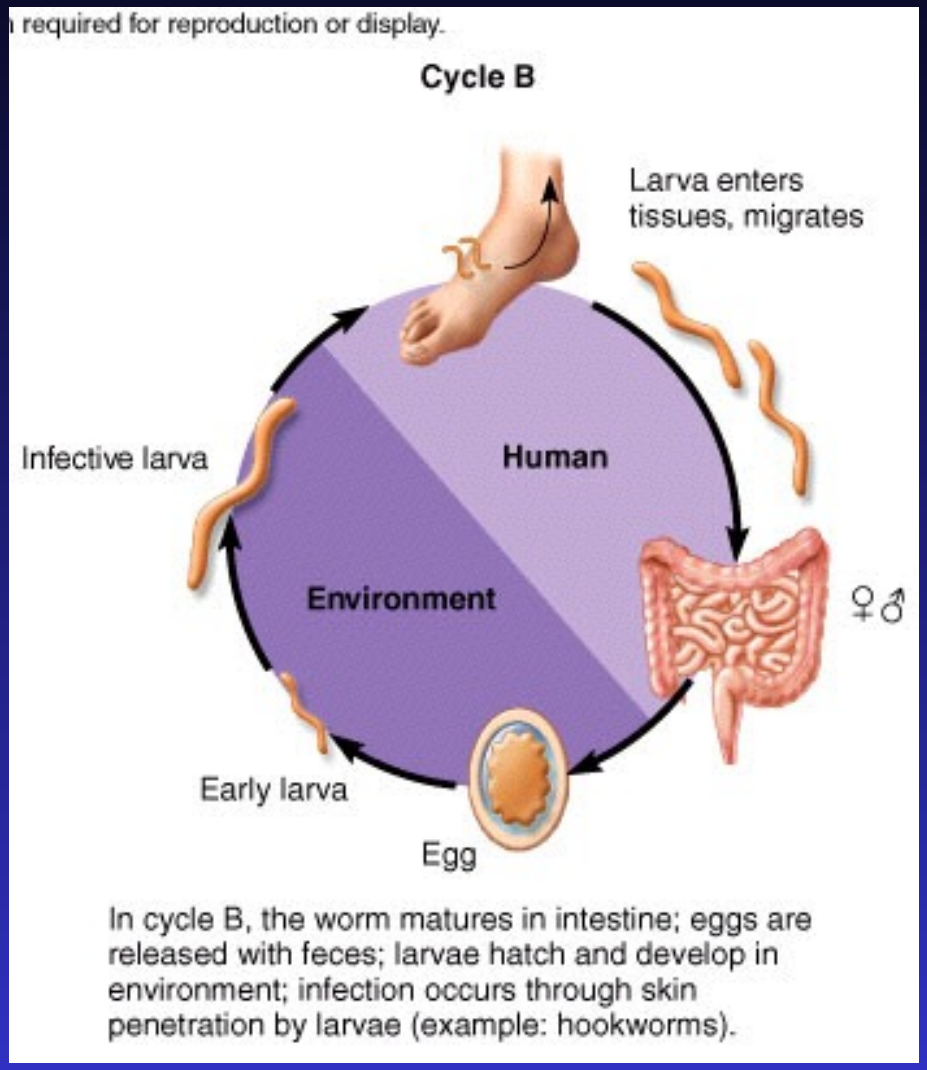
- Shed by wild animals into water supply as well as by infected humans
- *G. lamblia* attaches to human intestinal wall
- Diarrhea lasting for weeks
- Treated with anti-parasitic drugs

Helminth Transmission



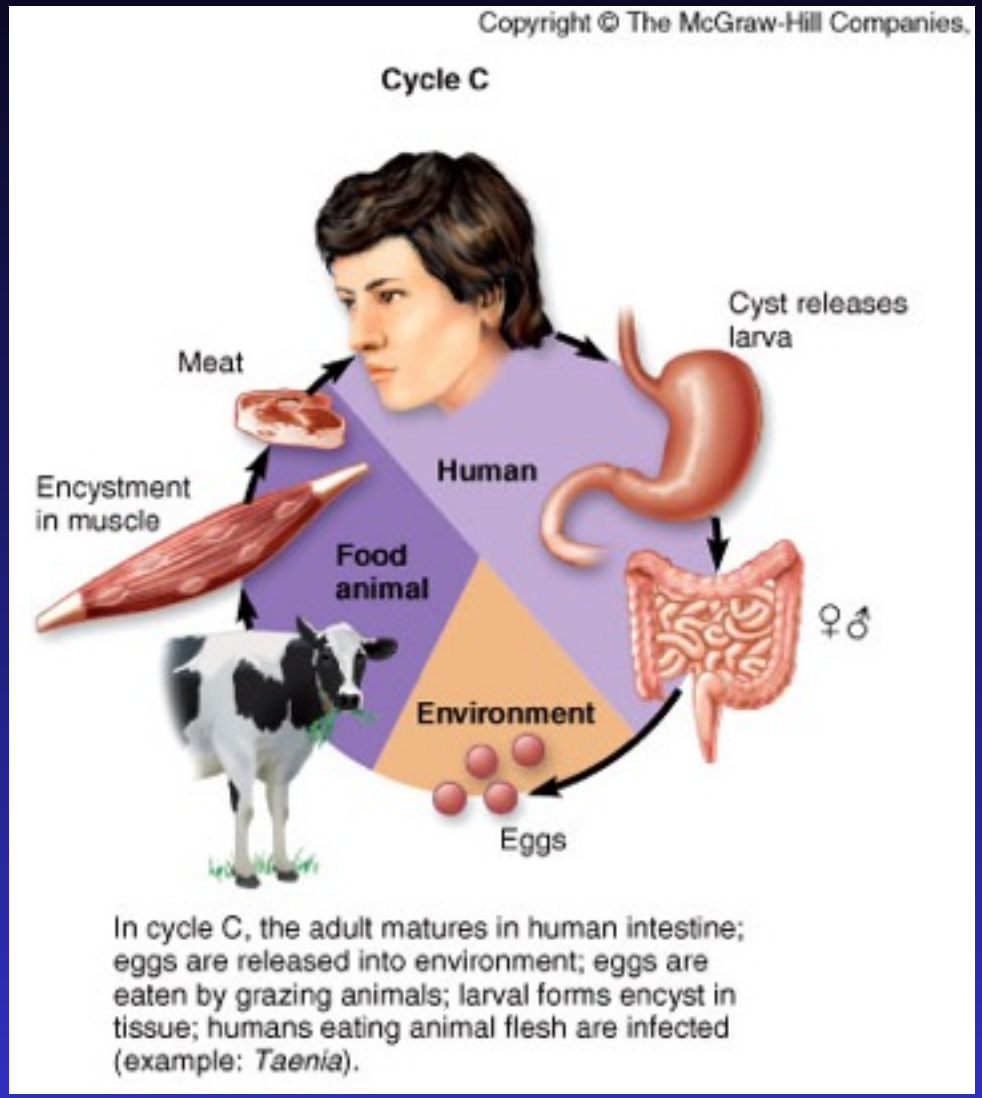
- Intestine --> environment --> ingested
- Examples: whipworm

Helminth Transmission



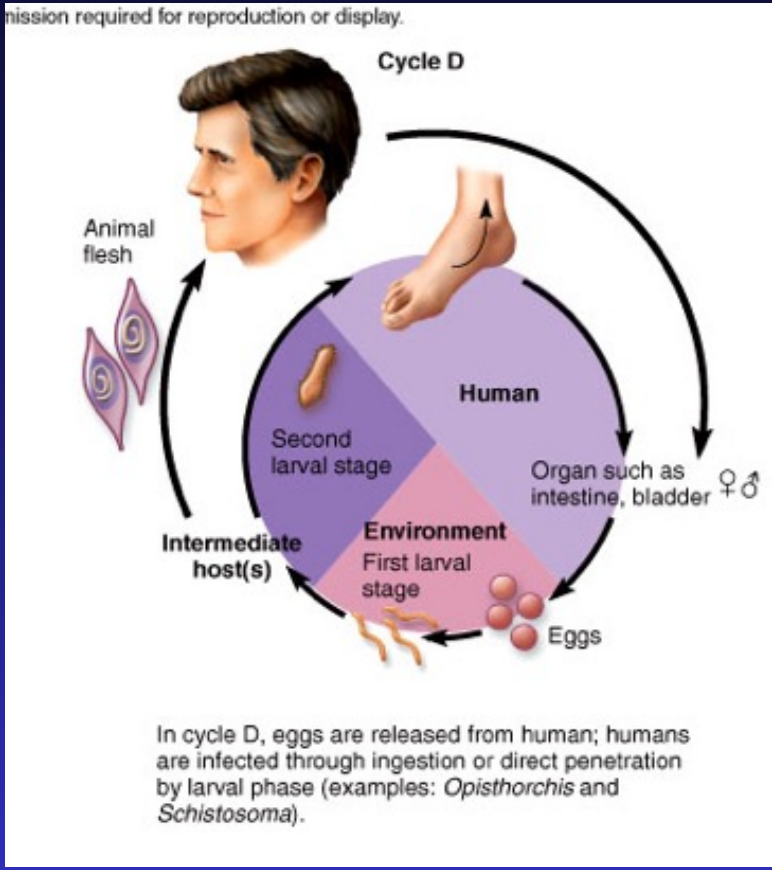
- Intestine --> environment --> skin penetration
- Example: hookworms

Helminth Transmission



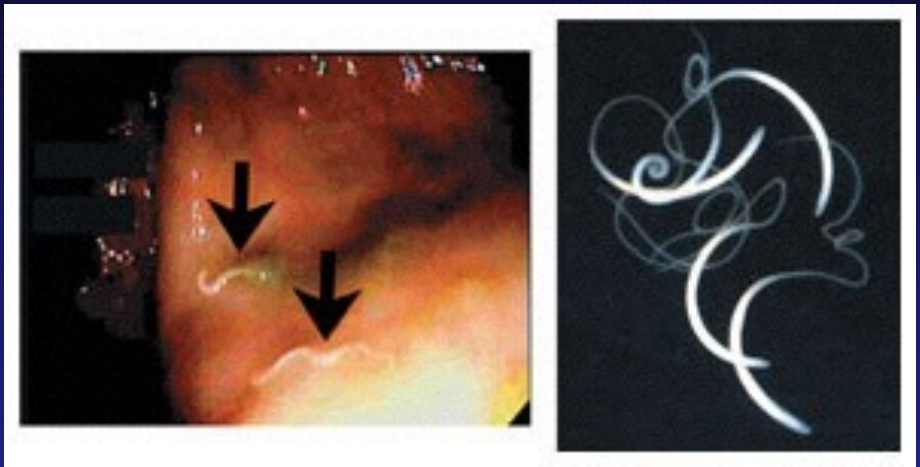
- Intestine --> environment --> food animal muscle --> ingested
- Example: tapeworm

Helminth Transmission



- Various organs --> environment --> ingestion or penetration
- Example: flukes

Treatment of Inflammatory Bowel Disease with Worms?



- Pig whipworm causes transient, non-invasive, non-infective human disease
- Improved IBD symptoms