



**Biology 675**

CONTROL & PREVENTION



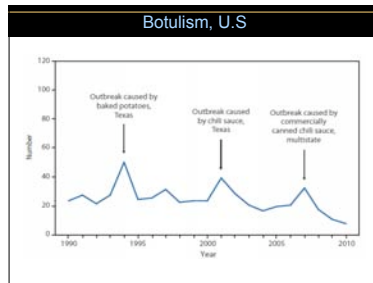
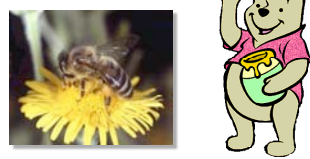
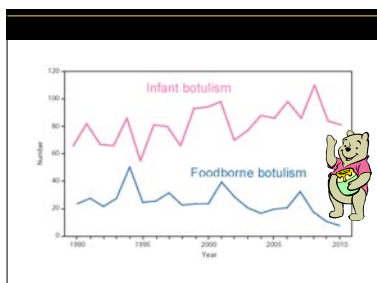
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**Reservoirs**




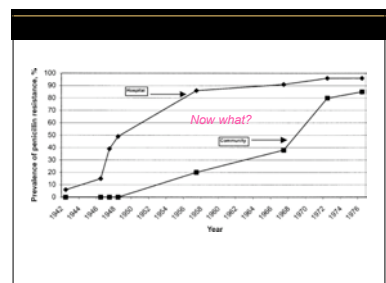
**Infection v. Intoxication**

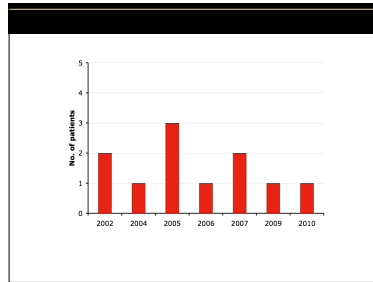
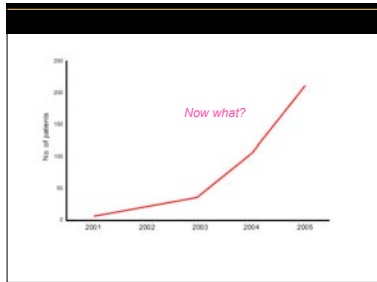
**Botulism: *Clostridium botulinum***

**Infection v. Intoxication**

- *Staphylococcus aureus*



Handwashing

- What did NYC physicians say about handwashing in 1910?

Handwashing

Handwashing ...”is  
-1910 NYC Physicians

Handwashing

“Handwashing is  
-CDC

Joseph Lister

Vacca =

Mary Montagu

Edward Jenner

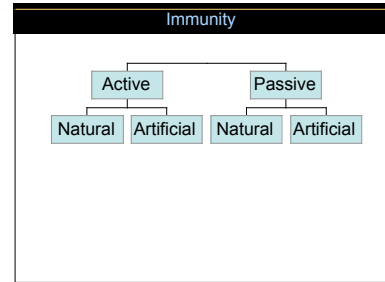
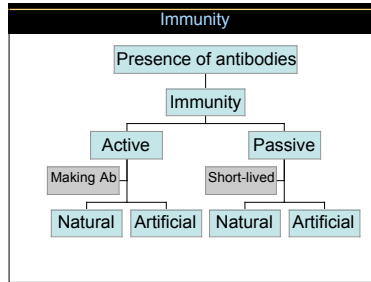
Vacca =

- Variolation:
- Vaccination:
- Herd immunity

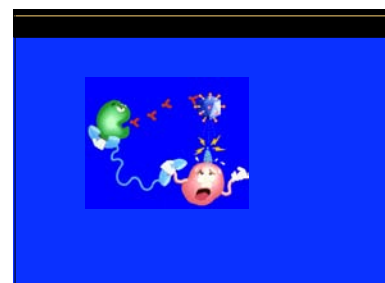
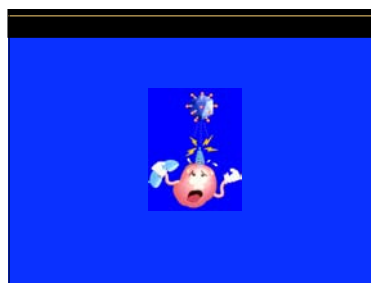
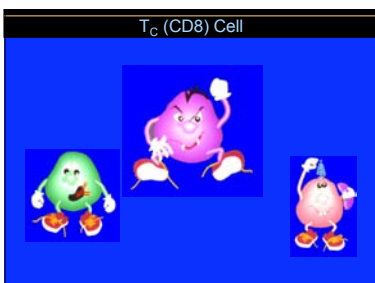
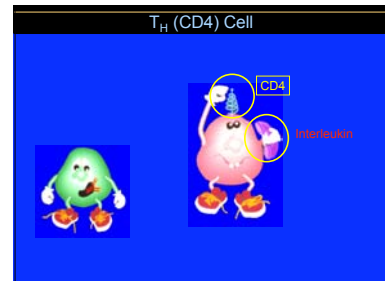
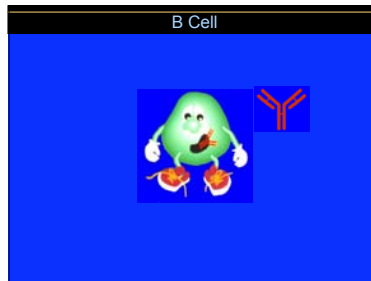
Principal Vaccines Used in the United States to Prevent Bacterial Diseases in Humans

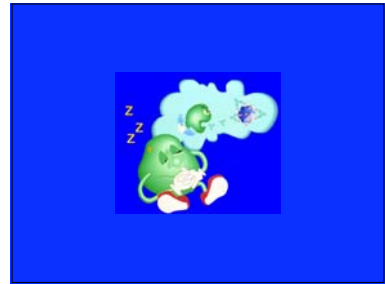
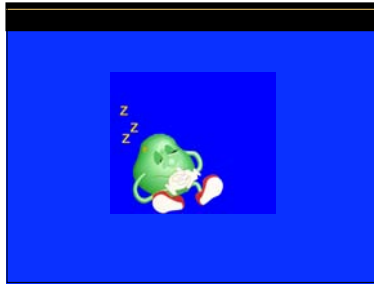
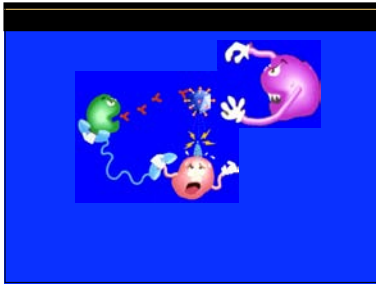
- DtaP
  - Diphtheria: Purified diphtheria toxoid
  - Pertussis: Acellular fragments of *B. pertussis*
  - Tetanus: Purified tetanus toxoid
- Meningococcal meningitis: Purified polysaccharide from *N. meningitidis*
- *Haemophilus influenzae* type b meningitis: Polysaccharides conjugated with protein
- Pneumococcal conjugate vaccine: *S. pneumoniae* antigens conjugated with protein

- Principal Vaccines Used in the United States to Prevent Viral Diseases in Humans**
- Smallpox: Live vaccinia virus
  - Polio: Inactivated virus
  - Rabies: Inactivated virus
  - Hepatitis A: Inactivated virus
  - Influenza: Inactivated or attenuated virus
  - Measles, Mumps, Rubella: Attenuated viruses
  - Chickenpox: Attenuated virus
  - Hepatitis B: Antigenic fragments (recombinant vaccine)
  - Cervical cancer: virus proteins



What's in a vaccine?






Testing for Antibodies


Skin Test

- Inject antigen
- Wheal = +
- What does + mean?

A photograph showing a person's arm being tested with a skin prick. A hand is holding a small needle and pricking the skin on the forearm.

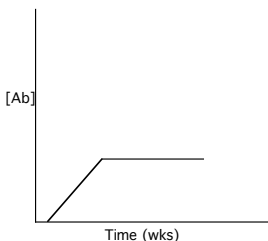
Tuberculin Skin Test

- Inject *Mycobacterium tuberculosis* antigen
- Wheal = +
- What does + mean?

A photograph of a skin test result. It shows a raised, red, circular area (a wheal) on a person's arm, which is a positive result for a tuberculin skin test.

Presence of Ab means

Presence of Ab means:

A line graph showing the concentration of antibodies ([Ab]) on the y-axis and time in weeks (Time (wks)) on the x-axis. The graph shows a linear increase in antibody concentration over time, followed by a horizontal line indicating a constant level of antibodies.

People with AIDS have no antibodies

A. True  
B. False

**Who's responsible?**

After reading about a child who developed autism following measles vaccination, Judy decided not to risk the health of her son and he did not receive the measles–mumps–rubella (MMR) vaccine.

The child contracted measles after visiting a relative on April 4; the child developed a rash on April 13. On April 12, the child attended a wedding and reception.

Twelve people at the wedding and restaurant developed measles between April 12 and May 14. One 24-year-old woman returned home from the wedding and was the source of exposure for her daughter. The girl developed encephalitis and died on July 15. Judy didn't know that in 1998, one million deaths were attributed to measles worldwide and that MMR does not cause autism.

What are the responsibilities of individuals (e.g., parents) for the health of society?

**Who's responsible?**

Mary's son contracted rubella when Mary was pregnant with her second child. Mary's blood tests showed that she did not have immunity (antibodies) against rubella before the pregnancy. This situation put Mary's baby at severe risk, because if a pregnant woman contracts rubella during the first three months of pregnancy, the virus can infect the fetus, causing deafness, cataracts, mental retardation, or even death.

How can fetal infection be prevented?

**Who's responsible?**

There is a small risk of brain damage from the whole-cell pertussis vaccine (in DTwP); the estimated risk is 0-10 episodes per million doses. Side effects from the acellular pertussis vaccine (in DTaP) are minimal.

Nevertheless, Chantelle chose the diphtheria-tetanus vaccine instead of the diphtheria-tetanus-pertussis vaccine.

Pre-vaccine, pertussis (whooping cough) killed 4000 children annually in the U.S. Now approximately 4000 cases occur annually which result in fewer than 10 deaths.

Vaccines are given to healthy people, so what risks are acceptable?

**Who's responsible?**

Chickenpox vaccine became available in the U.S. in 1995. Maria decided against using this relatively new vaccine and used her parents' method—she wanted her children to get chickenpox to develop natural immunity. Her two children did get chickenpox.

Her son had slight itching and skin vesicles but her daughter was hospitalized for months with streptococcal cellulitis and underwent several skin grafts before recovering. Maria's housekeeper contracted chickenpox from the children and subsequently died. Almost half of the deaths due to chickenpox occur in adults.

Did Maria make a good choice?

**Who's responsible?**

The rate at which an infection spreads or reproduces (R) is dependent on the number of susceptible people and the number of susceptible contacts ( $R_0$ ). An epidemic exists when  $R > 1$ .

$R = R_0 \times$  percentage of unvaccinated people.

$R_0$  values range from 5 (in Kansas) to 16 (in Nigeria).

What level of vaccination is necessary to prevent an epidemic of measles in Kansas?

In Nigeria?

**?**

You have \$100,000 to spend either on a liver transplant for a recovering alcoholic or on a vaccine for 10,000 children. Which is the better choice?

Do you agree with CDC's position that "failure to vaccinate increases the risks to both the individual and society"?

What is the responsibility of the lawmakers and government for the health of everyone?

