Welcome to Pathogen Group 5

- Variola virus
- Rubeola virus
- Rubella virus
- Mumps virus
- Hepatitis A virus
- Hepatitis B virus
- Hepatitis C virus
- Epstein-Barr virus
Smallpox (disease eradicated from earth in 1977; virus still in some labs)

- Variola virus—Ds DNA w/envelope
- human reservoir only
- During middle ages an estimated 80% of population in Europe contracted smallpox
- intensive immunization program
  - Cases per year (1900-1904) before immunization were 48, 164 but 100% decrease after immunization!
- herd immunity
Smallpox as terrorist weapon

- U.S. quit immunization in 1972; need booster every 10 years to maintain immunity
- Vaccine kills 1 in 1 million vaccinees
- Vaccine production ended in 1980
- Fatality rate 30% or more
- Killed 300 million people in 20th century
- Highly contagious through air, direct contact, indirect contact (bedding, clothing)
Smallpox

- Incubation period 12-14 days
- First symptoms: high fever, headache, backache, prostration, sometimes abdominal pain
- Day 16 or 17: rash on face arms, legs, turns into small pustules that become blisters and crust over
- Days 21-28: scabs develop, then fall off if person survives
- NO cure
- Vaccine up to 4 days after exposure can reduce severity
Rubeola virus: measles

- ss RNA with envelope
Symptoms of measles

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Days after contracting measles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin rash</td>
<td>10-20</td>
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<tr>
<td>Koplik's spots</td>
<td>13-14</td>
</tr>
<tr>
<td>Conjunctivitis</td>
<td>14-15</td>
</tr>
<tr>
<td>Coryza (&quot;runny nose&quot;)</td>
<td>15</td>
</tr>
<tr>
<td>Cough</td>
<td>16-20</td>
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</tbody>
</table>
Measles (rubeola)

- Koplik’s spots (resemble “grains of salt on a red base” in photo of mouth)
- Rash lasts > 3 days
- Cough, conjunctivitis
- Risk of encephalitis
- Humans only natural host
- Spread is by respiratory route
- Prevention with MMRV (measles, mumps, rubella & varicella vaccines)
measles in USA (thanks to vaccination program)
Rubella virus: German measles

- ss RNA with envelope
- Enters via respiratory route, multiplies in the nasopharynx and enters bloodstream (viremia)
- Congenital rubella syndrome
  - The placenta becomes infected during viremia in pregnant women
  - Effects on fetus can be devastating
Rubella (German Measles)

- Rash
- Fever
- Arthralgia
- Lymphadenopathy
- Incubation period is 14 to 21 days
- MMR vaccine (MMRV if varicella included) for prevention
Mumps virus: mumps

- ss RNA with envelope
- Salivary glands swollen
- Gonads in some adults
- Humans the only source
- Generally 15 to 21 days incubation
- Effective vaccine: MMR
The Hepatitis Viruses (A,B,C,D,E,G ...)  
Check this website:  
http://www.cdc.gov/hepatitis/index.htm

- World Hepatitis Day = July 28th
- World Hepatitis Day is now recognized annually on July 28th, the birthday of Dr. Baruch Blumberg (1925-2011). Dr. Blumberg discovered the hepatitis B virus in 1967 and two years later developed the first hepatitis B vaccine and for these achievements won the Nobel Prize.
Hepatitis A virus (HAV): hepatitis A

- ss RNA, no envelope
- Transmission (see hepatitis chart handout to be given in class)
- Following ingestion, the virus reaches the liver, multiplies there, causes damage
- Jaundice
- Rash
- Spreads fecal-oral
  - Through fecal contamination of hands, food or water
- Effective vaccine (since 1995)
hepatitis A fever
hepatitis A jaundice
Hepatitis B virus (HBV): hepatitis B

- ds DNA with envelope (partly ss DNA)
- Formerly known as serum hepatitis
- Mode of spread = blood & semen & can cross the placenta
- Progressive liver damage
  - Can lead to cirrhosis & cancer
  - Chronic carriers
- Refer to chart handout in class
- Vaccine
Hepatitis B
Rise of hepatitis C (HCV)

- Ss-RNA with envelope
- Transmission: blood, possibly semen
  - Tattoos & body piercing with unclean instruments
- Incubation period 2-24 weeks
- Initially usually mild or asymptomatic
- Over 50% of cases become chronic, eventually severe
  - Possible cirrhosis & liver cancer
- No vaccine yet
Epstein-Barr Virus (EBV)

• ds-DNA, envelope
• a herpes virus
  – Latently infected individuals
• infects B lymphocytes and epithelial cells
• Infectious mononucleosis “mono”
  – “kissing disease”
    • Spread by saliva
  – Common between ages 15 & 24 years
  – Incubation period
    • 30 to 60 days
  – Fatigue, fever, sore throat and enlarged lymph nodes
Burkitt’s lymphoma

- Cancerous tumors of the jaw caused by Epstein-Barr virus (EB virus)
- EBV also associated with Hodgkin’s disease and nasopharyngeal cancers
- EB and multiple sclerosis too?