Welcome to Pathogen Group 7

- Poliomyelitis (polio) virus
- Arthropod-borne encephalitis viruses
- Common cold viruses
- Influenza (flu) viruses
- *Legionella pneumophila*
- Cytomegalovirus (CMV)
Poliomyelitis (polio) viruses

- ss-RNA, no envelope
- most infections confined to lining of digestive tract; a few progress to paralytic infection of CNS
- fecal-oral transmission
- once a very dreaded disease: flaccid paralysis
- now rare because of immunization
- 2 types vaccines:
  a. Salk IPV (inactivated polio vaccine; killed virus)
  b. Sabin OPV (oral polio vaccine; live modified virus)
- IPV is now the recommended immunization
• movement of virus from digestive tract to CNS
polio-damaged muscles
decline of polio
Arthropod-borne encephalitis viruses

- ss-RNA with envelope
- many types
- transmitted by *Culex* spp. and other mosquitoes
- reservoirs: birds, horses
- sudden onset: fever, headache, sensory changes, vomiting, paralysis, convulsions, stupor, disorientation, coma
- most infections asymptomatic
- greatest risk to infants
- vector control, vaccines for high risk individuals
Encephalitis viruses

California encephalitis common, but usually asymptomatic
Wetland birds common reservoirs
encephalitis hosts

Diagram showing the cycle of encephalitis transmission involving various hosts and mosquitoes.
encephalitis tissue damage by immune process
Common cold viruses

- over 200 viruses
- rhinoviruses, paramyxoviruses, enteroviruses, coronaviruses, reoviruses, adenoviruses
- most common transmission: virus on fingers into eye or nose; also airborne droplets
- usually NO fever (some viruses do cause fever)
- duration not over a week; beyond that symptoms are probably from bacterial secondary infection

rhinovirus
progress of a cold: 1

Infection

Virus invades mucosal tissue
progress of a cold: 2
progress of a cold: 3

Viral shedding: spread of infection

Virus-rich discharge
Cell damage

Host defenses activated

Bacterial cell (secondary infection)
Phagocyte
progress of a cold: 4

Growth of bacteria; viral infection ends

Phagocytosis of virus and bacteria

Recovery

Antibodies and interferon
Epithelium regenerates
Influenza viruses

- ss-RNA with envelope
Influenza

- virus (blue) attached to respiratory cilia
- Most cases December-March
- Avg year: 110,000 hospitalizations and 20,000 deaths
• flu virus hybridization
• Porcine and avian flu viruses can also move directly to humans without hybridization
A Pandemic Is Declared

On June 11, 2009, the World Health Organization (WHO) signaled that a global pandemic of novel influenza A (H1N1) was underway by raising the worldwide pandemic alert level to Phase 6. This action was a reflection of the spread of the new H1N1 virus, not the severity of illness caused by the virus. At the time, more than 70 countries had reported cases of novel influenza A (H1N1) infection and there were ongoing community level outbreaks of novel H1N1 in multiple parts of the world.

Check http://www.cdc.gov for the latest information!
Influenza pandemic

- often occurs as pandemics
influenza

• a respiratory disease: fever, headache, myalgia, prostration, nasal discharge, sore throat, cough
• some children will have GI symptoms
• secondary bacterial infection common
• Reye syndrome in some children who take aspirin for flu (damage to CNS and liver)
influenza

• vaccine highly recommended for:
  – older people
  – people with chronic circulatory or respiratory illness
  – people whose services are essential to their community

• must reimmunize every year

• Each million immunizations saves 1300 hospitalizations and 900 deaths
Legionella pneumophila:

- Legionellosis (Legionnaires disease)
- Pontiac fever is milder form without pneumonia
- Small, gram - bacillus (can't see with Gram stain)
- Very fastidious
- Normal habitat: amebas in water
Legionella

- 15% of community-acquired pneumonia
- Airborne transmission
- Usually flu-like illness; fever, myalgia, cough, possible pneumonia, may be severe in people in poor health
  - HIV/AIDS
  - Transplant recipients (immunosuppression)
Legionella
### Legionella symptoms

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Present</th>
<th>Absent</th>
<th>% Present</th>
</tr>
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<tbody>
<tr>
<td>Fever</td>
<td>118</td>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>Malaise</td>
<td>86</td>
<td>11</td>
<td>89</td>
</tr>
<tr>
<td>Cough</td>
<td>96</td>
<td>16</td>
<td>86</td>
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<tr>
<td>Chills</td>
<td>70</td>
<td>25</td>
<td>74</td>
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<tr>
<td>Dyspnea</td>
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<td>35</td>
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<tr>
<td>Myalgias</td>
<td>47</td>
<td>38</td>
<td>55</td>
</tr>
<tr>
<td>Headache</td>
<td>49</td>
<td>44</td>
<td>53</td>
</tr>
<tr>
<td>Chest pain</td>
<td>46</td>
<td>42</td>
<td>52</td>
</tr>
<tr>
<td>Sputum production</td>
<td>47</td>
<td>47</td>
<td>50</td>
</tr>
<tr>
<td>Purulent sputum</td>
<td>23</td>
<td>24</td>
<td>49</td>
</tr>
</tbody>
</table>
Cytomegalovirus (CMV)

- one of most body-wide viruses
- transmitted through every body fluid and tissue
- a herpesvirus: ds-DNA with envelope
- causes large host cells
- infects 100% infants developing countries
- In U. S. : maybe 80% of us by age 35
- rarely symptomatic
- severe in perinatal infection or HIV +
- Major cause of death and illness following organ transplants
CMV (blue) in host cell
Congenital CMV