Lecture 36: Microbial Diseases of the Digestive System - Viral, protozoan and helminthic infections

*Mumps* begins with infection and inflammation of the *paratid glands*, which are one of three pairs of salivary glands
- The agent is a *paramyxovirus*, the same group to which measles virus belongs
- Mumps virus uses the respiratory tract as portal of entry, gaining access to the paratid glands (and other tissues) following transient viremia
- The main complications of mumps involve inflammatory damage to testes, meninges, ovaries or pancreas
- An effective attenuated vaccine, administered as part of the MMR vaccine, has dramatically reduced the incidence of mumps

*Cytomegalovirus (CMV)* is a herpesvirus that causes infections that are usually subclinical (Tortora et al., Figure 25.13)
- Infection with CMV is extremely common, with a high percentage of persons showing serological evidence of having been infected
- Like other herpesviruses, CMV persists for life; macrophages are an important site of latency
- Although infection with CMV is usually mild, it can be damaging in particular circumstances
  - Primary infection of a pregnant woman can lead to *congenital cytomegalic inclusion disease* in the developing fetus, a major cause of congenital mental damage
  - CMV is frequently transmitted by transplanted tissues, and can cause a severe systemic infection in the (intentionally) immunocompromised recipient
  - Reactivation of CMV in a compromised host can lead to systemic infection (this is also true of varicella/zoster and herpes simplex viruses)

the term *viral hepatitis* describes a group of infections characterized by inflammation of the liver
- Hepatitis can be caused by a number of different viruses, with different biological consequences and different routes of transmission (Tortora et al., Table 25.1)
- *Infectious hepatitis* is caused by *hepatitis A virus (HAV)*
  - HAV is usually transmitted via the fecal-oral route and is a relatively common infection
  - Pathogenesis varies widely, from subclinical infections to severe liver damage
  - Recovery from infectious hepatitis usually leads to strong immunity
- *Serum hepatitis* is caused by *hepatitis B virus (HBV)*
  - HBV may be sexually transmitted and has been transmitted with blood transfusions; the actual route of transmission is not always known
  - Health care professionals are at risk for acquiring HBV through contact with contaminated blood (which may carry a very high concentration of HBV virions)
  - HBV infection may become chronic, and has been linked to a greatly increased risk for liver cancer
  - A subunit vaccine, consisting of the *hepatitis B surface antigen* (HB₃Ag), is available to those at risk for HBV infection (that means you!)
    - The earliest vaccines were prepared from the serum of chronic hepatitis B carriers (a high serum level of HB₃Ag is characteristic of HBV infection)
    - Today, the vaccine is HB₃Ag produced by a gene cloned in brewer's yeast, *Saccharomyces cerevisiae*
- Another form of serum hepatitis is caused by *hepatitis C virus*
  - Hepatitis C virus is an RNA virus that is not yet cultivable in the laboratory
  - Prevalence of hepatitis C virus infection is not yet clear but, given that a large proportion of infected persons progress to chronic hepatitis, it represents a major health threat
  - Hepatitis C virus infection has been treated with interferon, but this is not universally effective
- Hepatitis D is caused by the delta agent, an unusual defective virus that sometimes accompanies infection with hepatitis B virus; it can be thought of as an especially pathogenic form of hepatitis B.
- Hepatitis E is another form of infectious hepatitis; pathogenesis and epidemiology are similar to hepatitis A, although the viruses are not related.

Viral gastroenteritis is a common infectious disease, especially in young children.
- Rotavirus (Tortora et al., Figure 25.16) is the infectious agent most frequently associated with viral gastroenteritis.
- The Norwalk agent is a common cause of viral gastroenteritis in adults - what we call "intestinal flu".

Ingestion of food in which certain fungi have grown can result in mycotoxin poisoning.
- Ergotism, or "Saint Anthony's fire", is caused by a toxin produced by Claviceps purpurea, which may grow on rye.
- Aflatoxins contaminating food may contribute to liver damage.

Several protozoans may cause gastrointestinal infections.
- These are usually acquired from contaminated water; protozoan cysts may survive normal chemical treatment of water supplies.
- Since the infectious agents are, like ourselves, eucaryotes, protozoal GI tract infections may be difficult to treat.
- Giardiasis is caused by Giardia lamblia, probably the most common cause of waterborne diarrheal disease (Tortora et al., Figure 25.17).
- Ameobic dysentery is caused by Entamoeba histolytica, which can cause severe damage to the intestinal epithelium (Tortora et al., Figure 25.19).
- Cryptosporidiosis, caused by Cryptosporidium (Tortora et al., Figure 25.18), can have particularly severe effects on immunosuppressed hosts, and is a major problem with AIDS patients.
- Cyclospora has recently been identified as a cause of protozoal gastroenteritis, which may be severe in immunocompromised persons.