

# Chapter 29 HIV Disease and Complications of Immunodeficiency

## Summary Outline

AIDS was first recognized in 1981 in sexually promiscuous homosexual men. It has claimed over **420,000 lives in the United States**, and become the **leading cause of death** in those **25 to 44** years of age. Worldwide, **33 million people** are infected with an AIDS-causing virus.

### 29.1. Human immunodeficiency virus (HIV) and AIDS

- A. **“AIDS defining conditions”** include **unusual tumors** or **serious infections** by agents that normally have **little virulence**. These conditions usually reflect **immunodeficiency**.
- B. **HIV disease: Acquired immunodeficiency syndrome (AIDS)** is a **late manifestation** of human immunodeficiency virus (HIV) disease. **Early symptoms** of the acute retrovirus syndrome are **“flu-like”** and often occur six days to six weeks after infection by HIV; these **symptoms subside without treatment**. HIV disease **progresses** and can be transmitted to others. The **asymptomatic period ends with the appearance of tumors, or the onset of immunodeficiency (AIDS)**.
- C. **Causative agent** is the **Human immunodeficiency virus type 1 (HIV-1)**, a **single-stranded RNA virus** of the **retrovirus family**.
- D. **Transmission** is mainly by **sexual intercourse, by blood contaminated hypodermic needles, and from mother to fetus or newborn**.
- E. **Infection of cells:** HIV infects **T helper (Th) lymphocytes** and **macrophages**. Inside the host cell a **DNA copy of the viral genome** is made through the action of **reverse transcriptase**, a complementary DNA strand is made, and the **double-stranded DNA is inserted into the host genome as a provirus** by viral integrase (IN).
- F. **Antimicrobial medications** are used to prevent and treat opportunistic infections, and combinations of antiretroviral medications (HAART) are used to treat HIV disease.
- G. **HIV vaccine prospects:** No approved vaccine is currently available, but a number of prospects have moved from animal to human trials.

### 29.2 Malignant tumors that complicate acquired immunodeficiencies

- A. **Kaposi’s sarcoma** is a tumor arising from blood or lymphatic vessels. There is markedly **increased incidence among immunodeficient individuals**. Infection by **human herpes virus 8** appears to be required for the tumor to develop.
- B. **B lymphocytic tumors of the brain** are **malignant tumors (lymphomas)** that arise from lymphoid cells. There is strong evidence exists that **EB virus plays a causative role** in these tumors.
- C. There is an **increased rate of anal, genital and cervical carcinoma** in people with HIV disease; these tumors arise from squamous epithelial cells and are strongly associated with **human papillomaviruses (HPV)**, which are transmitted by sexual intercourse.

### 29.3 Infectious complications of acquired immunodeficiency

- A. **Infections that occur in healthy individuals** also occur and **produce more severe disease in those with immunodeficiency**. **Latent infections** such as those by *Mycobacterium tuberculosis* and herpes viruses are **commonly activated**, and **organisms that are rarely capable of causing disease** in healthy individuals **can be life-threatening**.
- B. **Pneumocystosis**, caused by *Pneumocystis carinii*, is **widespread and usually asymptomatic**. It was the **most common cause of death among AIDS sufferers** before effective preventive regimens were developed. Symptoms develop slowly, with gradually **increasing shortness of breath and rapid breathing**.

- C. **Toxoplasmosis, rare among healthy people**, can be a serious problem for those with cancer, organ transplantation and HIV disease. The disease can also be congenital. **Symptoms**, which usually disappear without treatment, include **sore throat, fever, enlarged lymph nodes and spleen**, and sometimes a **rash**. Infections early in pregnancy can cause **miscarriage or birth defects**. **Infections later in pregnancy** are usually milder but can result in **epilepsy, mental retardation or recurrent retinitis** in the child. The causative agent is *Toxoplasma gondii*, a tiny protozoan that undergoes sexual reproduction in the intestinal epithelium of cats. **Oocysts** are discharged in cat feces and can infect humans through **contaminated drinking water or eating rare meat**.
- D. **Cytomegalovirus**, an **enveloped, double-stranded DNA virus**, is a common cause of **impaired vision in people with AIDS**. The virus can exist in a **latent form**, a **slowly replicating form**, or a **fully replicating form**. **Coinfection with HIV** results in **fully productive infection** and tissue death. **No vaccine** is available. The antiviral medication **ganciclovir** can be given to prevent CMV retinitis.
- E. **Mycobacterial diseases** are commonly caused by *Mycobacterium tuberculosis* and *Mycobacterium avium complex (MAC)* organisms. **Normal** people usually get **asymptomatic or mild infections** with MAC organisms, but **immunodeficient patients** may have **fever, drenching sweats, severe weight loss, diarrhea and abdominal pain**. MAC organisms enter the body via the lungs and gastrointestinal tract, are taken up by **macrophages, but resist destruction**, and are carried to all parts of the body. In people who are immunodeficient, **MAC organisms multiply without restriction**, producing massive numbers of organisms in blood, intestinal epithelium and tissues. There are **no generally effective measures** available, but **prophylactic medication is advised for severely immunodeficient patients**.