HIV/AIDS

AIDS (Acquired Immunodeficiency Syndrome) is a chronic disease of the immune system that is caused by the human immunodeficiency virus (HIV). The virus damages and destroys immune cells, called T-Helper cells, which are crucial to the defense of the body from infections with fungi, bacteria, and other viruses. Because of this mechanism, people who are sick with AIDS are susceptible to infections that people with healthy immune systems are not affected by.

AIDS is among the five most common causes of death through infectious diseases worldwide. Today, there are 39.5 million people who are infected with HIV. In 2006, 2.9 million people died as a result of AIDS. In Austria, 12,000-15,000 people are infected with 1-2 new infections daily. Infections are more common among men (79.1%) than women (20.5%).

The HI virus is acquired through the following bodily fluids: blood, sperm, vaginal secrete, and breast milk. The most common routes of infection are unprotected sexual intercourse (including vaginal, oral, and anal) with 70.6% of new infections and the use of contaminated syringes in the intravenous consumption of drugs with 20.5%. The rate of infection from mother to child either during pregnancy or birth is high with 10-30%. When the HIV infection is known, this chance can be decreased to 2% through antiretroviral medications and cesarean births. Infection can also take place through blood or blood products. Although these products are tested, there is a period of 6 weeks between infection with the virus and a positive test result. However, the chance of receiving a contaminated blood product remains extremely low at 1:1,500,000-1,300,000. The concentration of HI virus particles in the tears, sweat, and saliva of infected individuals is not high enough to infect others.

Testing for HIV can be done approximately 6 weeks after infection using a technique called ELISA (enzyme-linked immunosorbent assay), which perceives the presence of antibodies produced by the body against the HI virus. Because the consequences of an infection are so sever, a positive test result must be confirmed through a second test (e.g. the Western Blot test) to rule out false positive results. To rule out the possibility of a blood sample switch, a second test is also done with a second blood sample. Only after this procedure has been performed should a diagnosis of HIV be delivered to a patient.

Infections with HIV proceed through several phases:

- **Acute (Primary) Phase:** Two to six weeks after infection about 30% of infected individuals experience flu-like symptoms such as fever, night sweats, and abnormal fatigue. Most patients are asymptomatic in this phase.
- **Latent (Asymptomatic) Phase:** In this phase, the virus multiplies in lymphatic tissue. The infected patient is clinically healthy but capable of transmitting the virus to others. This phase lasts for an average of 10 years.
- **Symptomatic Phase:** Over time and with a decrease in the number of T-Helper cells, light infections become more common and enlarged lymph nodes can be observed outside of the groin area, known as lymphadenopathy syndrome (LAS). Symptoms such as night sweats, weight loss, subfebrile temperatures, and general feelings of weakness are common.
- As the number of virus particles increases, the number of T-Helper cells sinks, and the architecture of the lymph nodes is destroyed, the complete clinical picture of AIDS is seen in the infected patient. In this phase, certain illnesses called “AIDS

defining diseases" occur. These include **opportunistic infections** (such as infections with the protozoan toxoplasmosis or the fungus Pneumocystis carinii which causes pneumonia) and **malignant tumors** (such as the Kaposi sarcoma). These illnesses are harmless for or do not occur in healthy people.

The number of T-Helper cells in the blood of the HIV positive patient is used to gage the level of destruction of the immune system. The standard limit is reached when the level falls below 200-400/ml.

Antiviral therapy suppresses the multiplication of the HI virus, slows the course of AIDS, and helps in the treatment of secondary infections. Unfortunately, cure from HIV/AIDS is not possible at this time. To prevent or slow the development of resistance while at the same time reducing the virus load as much as possible, a combination of at least three antiretroviral medications is used. This treatment is called HAART (highly active antiretroviral therapy). There are differing opinions about the best time to start HAART, which attempt to balance the dangers of AIDS against the long-term danger caused by the toxic nature of these medications. The recommendation today is to begin the treatment when the immune system is manifestly weakened. Three factors must be considered: the patient's clinical situation, CD-4 values (corresponds to the number of T-Helper cells), and the viral load.

Four types of medications are used for the antiviral therapy:

1. **Nucleoside Reverse Transcriptase Inhibitors (NRTI):** These substances function as false nucleosides that are built by the virus into its DNA and impede the propagation of the reverse transcriptase viral enzyme. The main side effect is bone marrow toxicity, which causes a decrease in the number of red and white blood cells.
2. **Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTI):** These substances bind directly on the reverse transcriptase viral enzyme. The main side effect is rashes, seldom liver toxicity and central nervous system symptoms.
3. **Protease Inhibitors (PI):** These substances prevent the HI virus from multiplying in a later stage of its life cycle. They block the HIV protease enzyme and cause the formation of virus particles that are not infectious. They are potent in the long-term treatment but can cause side effects in the metabolism of fats. This manifests itself in the form of lipodystrophy (a disturbance of the fat distribution) and dyslipidemia (an increase in the amount of lipids in the blood). Another disadvantage of this group is that they are rapidly degraded by the body and must hence be taken three times a day.
4. **Fusion Inhibitors (FIs):** In 2003, the first fusion inhibitor T-20 was released. It prevents the fusion of the HI virus with the T-Helper cells. A positive aspect of T-20 is that they cause mitochondrial toxicity and hence no lipodystrophy. They must be applied subcutaneously which commonly leads to skin irritation in the puncture area. However, the cost of producing T-20 is extremely high preventing it from being a first choice treatment.