HIV

"HIV" is a retrovirus ([[RNA viruses] RNA virus]]) having the enzyme reverse transcriptase and integrase. *'Reverse transcriptase'* allows the transcription of the genetic information of the virus from RNA to DNA, *'integrase'* allows the integration of the resulting DNA into the DNA of the host cell. The virus penetrates the cells through the CD4 molecule, which is found mainly on T-lymphocytes, as well as monocytes, dendritic and glial cells. The virus is also characterized by "large antigenic variability", which is due to rapid proliferation and a higher probability of nucleic acid copying errors (mutations). Neurotropic and lymphotropic properties allow the virus to invade the CNS and progressively destroy the immune system.

The HIV virus is transmitted through sexual intercourse, blood and blood derivatives, the infected needle, during childbirth and breast milk. It mainly damages *'CD4 + (helper) T-lymphocytes'* , multiplies in them, destroys them and significantly reduces their amount in the body of an infected person, leading to defective defenses (obtained cellular immunity deficiency). With a decrease in CD4 + T cell count <200 / mm^3, AIDS develops. At present, pharmacotherapy is not able to eliminate the virus, but it effectively suppresses its replication. This significantly reduces the morbidity and mortality of treated patients and improves their prognosis.

There are 2 known types:

1. **HIV 1** – in Central Africa and on other continents, where it has spread.
2. **HIV 2** – in Western Africa only, the progress of the disease is **slower** then by the HIV 1 infection.

Structure of the HIV virion

'HIV' - human immunodeficiency virus, is a retrovirus of the family *Retroviridae* , genus *Lentivirus* . One of the important factors of pathogenicity is its high reproductive capacity of 10^9 to 10^{12} virions per day. The lifespan of one virion is about 6 hours. The lifespan of T-cells in the blood is about 2.5 days. After trying to compensate for the loss of T-lymphocytes, the body is depleted.

1. **Envelope**
   - Phospholipid bilayer with surface glycoproteins:
     - **gp41** – part anchored in the membrane;
     - **gp120** – part extended outward, attached to gp41.
   - Layer made up of the protein**p17**.
2. **Capside**
   - Asymetric, conic shape, made up of the protein **p24** (HIV antigen).
3. **Nucleoid**
   - Two identical strands + **RNA**. Genome create 3 structure genes (gag, env, pol) and 6 regulatory genes.
   - Enzymes:
     - **reverse transcriptase** – reverses viral RNA to DNA;
     - **integrase** – integrates viral DNA created by reverse transcription into DNA of the host cell;
     - '*proteases* – cleaves precursor gp160 into gp41 and gp120;
     - **ribonucleasis**.
   - Proteins coating RNA strands – proteins **p7** and **p9**.

Target cells

1. **CD4+ T-lymfocytes** (the helper precursors) – their damage causes immunodeficiency.
2. **Makrofages** (including CNS microglia, dendritic cells etc.) – serves as an reservoir of the infection.

- The virus binds with its "gp120" (ligand) to the "CD4" (receptor) of target cells, co-receptors, which are chemokine receptors on the surface of target cells, are also needed for binding:
  - *'CXCR-4'* on the surface of T_H lymphocytes;
  - *'CCR-5'* on macrophage surface.

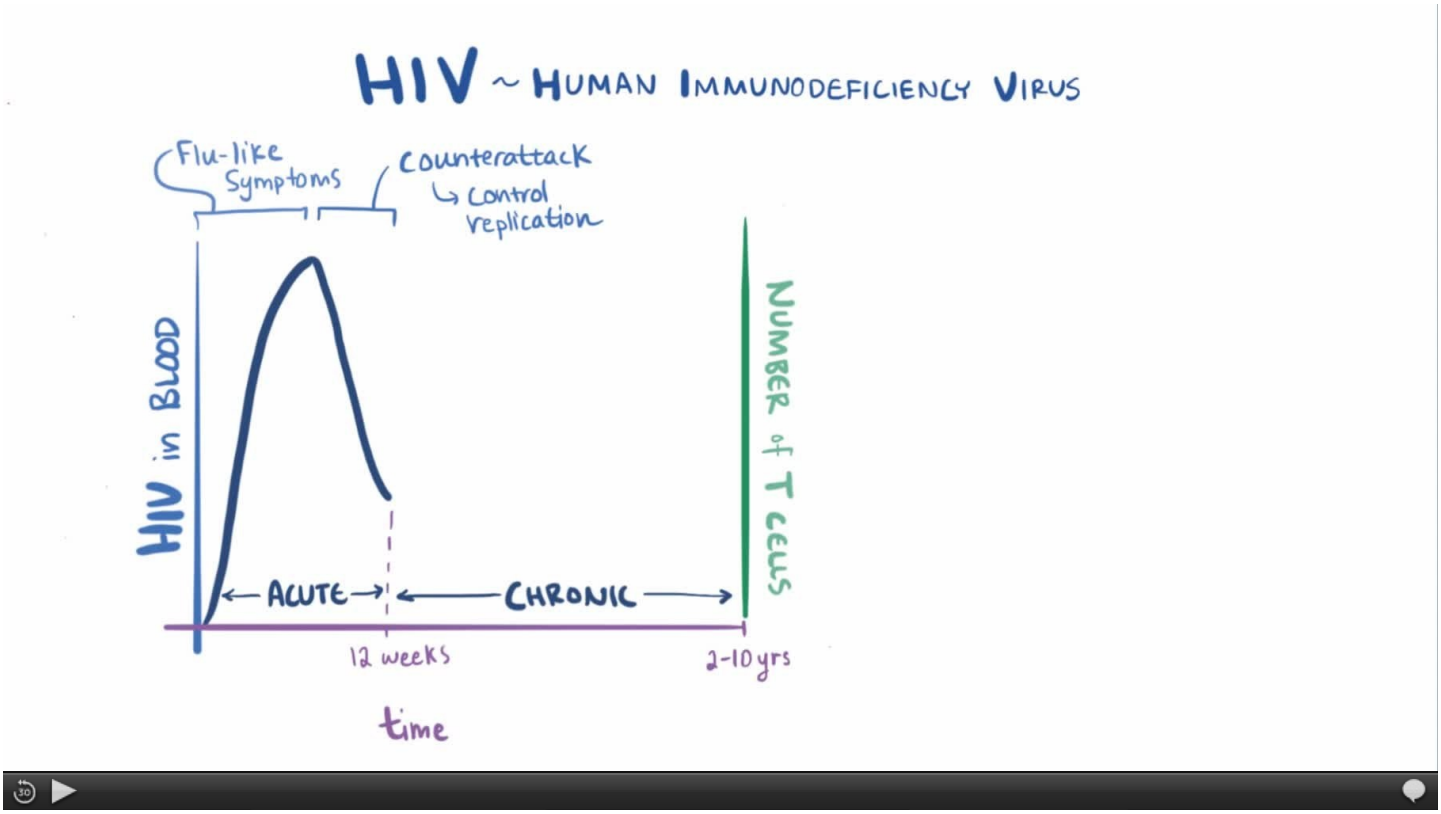
Transmission of the HIV

1. Sexual intercourse
2. Blood and blood derivates
3. Vertical transmission (from the mother to the child)

Compromised systems

1. **Immune system** – immunodeficiency leading to the opportunistic infections and creation of malignities
2. Central nervous system – HIV encefalopathy (infected microglia produce cytokines affecting neurons).

The course of HIV Infection



'Incubation period' is usually 2-6 weeks, sometimes several months, without treatment, infected patients die within 10 years of infection (1-2 years from the transition of the infection to the AIDS stage).

1. *'Primary HIV infection'* :
2. * Transient severe decrease in peripheral blood CD4 + lymphocytes, replication HIV virus, development 2-4 weeks after infection, disappears 1-3 after weeks, transient viremia occurs (diagnosis via p24 antigen) .
3. * Symptoms similar to tonsillopharyngitis, infectious mononucleosis or influenza such as flu-like syndrome (fatigue, fever, muscle and joint pain, morbiliform rash especially on the back and chest), ulceration mucosa, enlargement of the lymph nodes, possible CNS disorders (8%) under the picture of aseptic meningitis.
4. *'Asymptomatic stage'* :
5. * no clinical signs or subjective difficulties;
6. * persistent generalized lymphadenopathy (general nodular enlargement);
7. * sometimes accompanied by lymphopenia and mild anemia, lasts from 18 months to 15 years.
8. *'Early symptom stage'* :
9. * accompanied by general symptoms - fever above 38.5 ° C, night sweats, fatigue, weight loss - lasting more than 1 month;
10. * typical occurrence of so-called small opportunistic infections (eg oropharyngeal, vulvovaginal candidiasis, leukoplakia, recurrent herpes zoster);
11. * mucosal and skin disorders: seborrheic dermatitis, psoriasis, staphylococcal folliculitis, facial and perigenital mollusca contagiosa, verruca vulgaris especially on limb fingers, anogenitally [[Human papillomavirus] | acuminata]], hairy leukoplakia on the mucosa of the tongue...;
12. * the more severe the course of these infections, the worse the patient's prognosis;
13. * immunopathological manifestations (peripheral neuropathy, thrombocytopenia), 200–500 CD4 + lymphocytes / mm^3;[1], an unfavorable feature is a reduction (adenopathy).
14. *'Late symptomatic stage, AIDS'* (Acquired Immuno-Defficiency Syndrome) - end stage of HIV infection:
15. * below 200 CD4 + lymphocytes / mm^3, the amount of HIV in the peripheral blood increases [1];
16. * stage of so-called large opportunistic infections: pneumocystis pneumonia, toxoplasma encephalitis, candidiasis of the respiratory tract, cryptococcal infection, TBC, infection cytomegaloviruses ([[chorioretinitis] chorioretinitis] , generalized CMV infection), disseminated mycobacteriosis;
17. * tumors (Kaposi's sarcoma, malignant lymphomas (Burkitt's lymphoma - causative agent EBV), primary brain lymphoma, invasive cervical cancer);
18. * HIV encephalopathy (dementia, memory and concentration disorders, personality changes, depression);
19. * Despite consistent treatment, the patient dies of exhaustion of the organism within a few years.

Laboratory diagnostics

- *'ELISA'* for the determination of viral peptides. The diagnostic window can last up to 12 weeks (depending on the ELISA type).
- *'PCR'* for the determination of viral nucleic acids.

1. Determination of viral particles in the blood - antigen *'p24'* (occurs during acute HIV infection and AIDS).
2. Antibody assay *'anti-HIV 1'* , *'anti-HIV 2'* (appearing 1-3 months after infection).
3. Determination of *'CD4 + lymphocytes'* :
4. * CD4 / CD8 ratio - normally 2: 1, in AIDS 1: 2;
5. * number of CD4 + lymphocytes in µl of blood - standard 1000, in AIDS below 50.
6. Increased level of *' β_2 -microglobulin'* .

Laboratory markers

Count of CD4+ lymfocytes: norm is 1000/µl of blood.

Laboratory category	Clinical cantegory	CD4+ lymfocytes/µl of blood	Signs
I	**A**	500–1000	primoinfection + asymptomatic seropositivity
II	**B**	200–500	early symptomatic stage
III	**C**	under 200	late symptomatic stage

Treatment

- "combination of antivirals" is used for treatment, the patient's comorbidities are taken into account when choosing drugs;
- Therapy begins *'immediately'* after confirmation of infection
- antivirals suppress the replication of the virus, which also improves cellular immunity;
- *'target: undetectable viral load'* (undetectable patients are non-infectious)
- treatment includes prophylaxis, diagnosis and treatment of opportunistic infections, treatment of comorbidities, vaccination;
- treatment takes place in AIDS centers. [2]

Recommended 3 combination of 1st choice:

1. nucleoside reverse transcriptase inhibitor (NRTI): *emtricitabine, lamivudine, abacavir*
2. nucleotide reverse transcriptase inhibitor (NtRTI): "tenofovir"; or NRTIs
3. non-nucleoside reverse transcriptase inhibitor (NNRTI): "efavirenz, nevirapine"; or ritonavir-boosted protein inhibitor (PI / r): *lopinavir / ritonavir, darunavir / ritonavir, atazanavir / ritonavir* . [2]

HIV during pregnancy

- all pregnant women are tested for HIV serology;
- treatment continues during pregnancy / resumes treatment with 2-3 combinations of antiretroviral drugs;
- childbirth takes place at a specialized workplace (Na Bulovce);
- delivery is by caesarean section and infused with zidovudine;
- lactation stops after delivery, breastfeeding is contraindicated [2]

🔎 *For more information see HIV Infection in Pregnancy.*

Links

Similar articles

- HIV infection during pregnancy
- AIDS • Epidemiology of AIDS • Diagnostic of AIDS

References

1.BENEŠ, Jiří, et al. *Infekční lékařství.* 1. vydání. Galén, 2009. 651 s. ISBN 978-80-7262-644-1.

2.Doporučený postup Společnosti infekčního lékařství České lékařské společnosti J. E. Purkyně. *Doporučený postup komplexní péče o dospělé infikované HIV*. 2010. Dostupné také z URL <https://www.infekce.cz/DoporART10.htm>.

Source

- ws: https://www.wikiskripta.eu/w/HIV
- PASTOR, Jan. *Langenbeck's medical web page* [online]. ©2005. [cit. 2011-10-28]. <http://langenbeck.webs.com>.

References

- BENEŠ, Jiří, et al. *Infekční lékařství.* 1. vydání. Galén, 2009. 651 s. s. 152-157. ISBN 978-80-7262-644-1.
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1. BENEŠ, Jiří, et al. *Infekční lékařství.* 1. edition. Galén, 2009. 651 pp. ISBN 978-80-7262-644-1.
2.